

Sound Pan Pipe

CONTENT STANDARD: Physical Science

CONTENT TOPIC: Sound

CONCEPT: Sound is produced by vibrations and is transmitted through matter in all directions.

CONTENT OBJECTIVE: To understand how sound is produced and transmitted

INSTRUCTIONAL OBJECTIVES: The learner will:

- Discover how sounds are produced.
- Discover how sounds travel.

OUTLINE OF CONTENT:

- I. Sound is produced by vibration
- II. Sounds move through objects

GOAL: To enable students to demonstrate ways of thinking and acting inherent on the practice of science; and to exhibit an awareness of the historical and cultural contributions to the enterprise of science.

STANDARD(S): The learner will understand that:
Science is based upon suppositions derived from observations of natural phenomena.

BENCHMARK: Careful observation can yield scientific knowledge.

The validity of an investigation cannot be accepted unless the complete investigation can be independently duplicated.

BENCHMARK: If variables remain constant an investigation can be repeated with expectations of predictable results.

CLASSROOM CONNECTORS

TIME REQUIRED: 35 minutes

MATERIALS: Straws, scissors and clay.

SET: Listen. (Have children shut their eyes for a minute and listen for sounds). Open your eyes. Raise your hand if you heard a sound. (Share responses and list on the chalk board.) Today, you will learn how sounds are made and travel to our ears.

INSTRUCTION:

***NOTE: Kindergarten and 1st grade students will need an intro into “molecules.” Keep it simple for them. Emphasize sound is *VIBRATIONS* in the air.**

Sounds are caused by vibrations. When an object vibrates, it pushes on molecules of air causing these molecules to bump other molecules passing the motion on. This is how sound travels through air. These sound WAVES thus travel through air and other matter. (Have students simulate a sound wave by standing shoulder to shoulder about 20 cm apart in a long row. Push the first person gently to start wave motion.) You can feel these vibrations by placing your fingers against your throat while you talk. You can see these vibrations if you strum any kind of taut string. (show instrument) Sound is a form of energy because it causes matter to move. Sound travels through air this is why we could hear the sounds earlier when we closed our eyes and listened quietly. Sound travels through liquids. Can you hear sounds while swimming under water? Sure you can! Sound travels most rapidly through solids. Sounds can be loud or soft. This loudness or softness is its volume. The more energy, the louder the sound. Sound travels through matter by vibration. One molecule pushes to the next and so on. We will experiment with sound traveling through matter.

Sounds also differ in pitch. Pitch is the highness or lowness of a sound. An object vibrating very fast makes high-pitched sounds. Lower pitched sounds are made by objects vibrating more slowly. The number of times per second an object vibrates is its frequency. An object vibrating many times a second has high frequency. An object vibrating only a few times a second has a low frequency. In our experiment we will see if different lengths of straws make different sounds when you blow on them. This experiment works in the same way as pipe organ you may have seen (like in a church).

SUPERVISED PRACTICE:

Make a Pan Pipe:

Split the class into 6 teams of 3 to 4 students per team.

1. Give each team 6 to 8 straws (for example two each).
2. *Have the students cut each straw a **DIFFERENT length**.*
3. Have the students blow across the top of each straw and listen carefully.
4. Now take and plug the end of each straw with a piece of clay.
5. Have the students blow across the top of each straw and listen carefully.
 - Do they hear a different sound from each straw? Are some sounds higher or lower?
 - Which straws make the higher sounds (long or short)? Which straws make a lower sound?
 - What happens when the straw is plugged up?
 - Why do you think the straws make a different sound when the straw is plugged?



CLOSURE:

Sing "Old MacDonald" or any familiar song which you think the students will enjoy singing. After singing it in the usual manner one time, try singing the song at a different pitch. Tell your class that when you raise your hand, it means to raise the pitch. If you lower your hand, this means lower the pitch. Record the song and play it back. Stress raising and lowering the pitch - not the volume.

Put your ear against the wall and have one student tap the wall from some distance away with eraser end of a pencil. As the tapping continues, lift your ear away from wall so that sound reaches you through the air. Which is louder - through the air or the wall. Why? (Molecules are closer together in a solid. They can bump each other more easily to carry sound from one molecule to another.)