Physics of Sound

Materials Needed:

- Balloons
- Balloon pump
- Various types of beans
- Tuning Forks
- Sponges
- Plastic Solo Cups
- Tongue Depressors
- Wooden resonating box (approximately 10" width X 5" depth X 5" height)
  - Drill 4 holes (¼") along each short side of the top of the box.
  - Drill a hole (¼") through the center of each peg.
  - Place ¼" wooden pegs in each hole.
  - Choose 4 rubber bands, each different thickness. Cut the rubber bands and tie them to the pegs. Feed one end of the rubber band through the hole in the peg. Tie the rubber band into place, then stretch the rubber band across the box and tie it to the opposite peg.

Various sizes of rubber bands

Purpose of this activity:

Beginning to experiment with physics of sound at an early age is very beneficial to a child. Children are given the opportunity to experiment with and make discoveries about different aspects of sound. Through experimentation and self-discoveries, children will begin to learn different aspects such as: pitch, amplitude, and tension. Children can be creative by using the same object to produce different sounds. Young children will begin developing an understanding of music, and they will work on their fine motor skills.

While creating noise with different objects, young children will become aware of the differences in sounds. Through experimenting with different materials, children will begin to create associations between certain materials and the sounds they produce. Through experimentation with rubber bands, children will begin to realize that, when they are at a fixed tension, thicker rubber bands create a much lower sound than thin rubber bands.

Doing the activity:

Start out making balloon maracas by placing beans in balloons and then blowing up the balloons using a balloon pump. The children can shake the balloon maracas and feel, see, and hear the materials bouncing around inside the balloon. The children will be able to not only hear, but they can feel and see the objects that are creating sounds. Ask the children to explain what they see, hear, and feel. Ask the children if they can make the balloons produce loud/soft sounds. Allow the children to choose a number of beans to place in the balloon. Ask the children to predict whether the balloon will sound loud or soft. Then allow the children to test their ideas.

Next, introduce the tongue depressors. Place tongue depressors on a table and ask the children if they can produce sound using them. Hold the tongue depressor against a table and allow part of it to hang over the edge. Point to the part of the tongue depressor hanging off the table and ask the children what would happen if they hit it. Allow the children to strum and listen to the sounds. Move the tongue depressor around so there are different lengths of it hanging off the edge of the table. Ask the children if they hear a difference in the sounds being produced. Allow the children to experiment on their own or with a partner using the tongue depressors.

Next, introduce tuning forks and allow the children to experiment. Never allow children to place tuning forks in their mouth, as it could result in shattering teeth. Tuning forks are used as another form of sound that you can feel, see, and hear. By striking the tuning fork against an object, it creates a sound. The children can place the end of the tuning fork near their cheek, arm, leg, or hand and be able to feel the vibrations. The children can look at the tuning fork and see the vibrations as well. Place sponges on the table and ask the children what would happen if they strike the tuning fork on the
sponges. Allow the children to experiment with the tuning fork on different objects. Ask the children if they can make the tuning fork produce loud/soft sounds.

As another variable to the learning center, give the children a plastic Solo cup and two different sizes of rubber bands. Ask the children if they can use the cups to make the rubber bands produce sound. Allow the children time to work with the rubber bands, and ask questions that assist the children in discovering that the rubber bands can be vertically suspended around the cup so that the cup serves as a resonator. Then the children can pluck the rubber bands and listen to the different sounds being produced. Ask the children how one rubber band looks/sounds different than the other rubber band. Allow the children time to experiment with the rubber bands and become familiar with the different pitches being produced.

Once the children have been introduced to sound by feeling, seeing, and hearing different objects; they can begin experimenting with the wooden resonating box. It is best to have one child work with the box at a time. Children can take turns with the wooden box and continue working with the tuning forks, tongue depressors, and rubber bands when it is not their turn. Place the wooden box in front of the child and allow them to explore the different sounds. Begin to ask productive questions such as:

- What have you noticed about these rubber bands?
- Can you figure out a way to hear the rubber bands make sound?
- Can you tell me which rubber band makes the loudest sound?
- Can you tell me which rubber band makes the quietest sound?
- How does this rubber band sound different from this one?

Continue to allow the children to experiment and make self-discoveries about different aspects of sound. As the children work with the box; they will begin to hear, see, and feel differences when they pluck the rubber bands. You can continue by asking questions that focus on the children’s knowledge of pitch. Work with the children to create an understanding of the difference between “high and low” and “loud and soft”.

Variations to the activity:

Touch the tuning fork to a bowl of water and see what happens to the water. Then strike the tuning fork against a surface and hold it to the water. The vibrations from the tuning fork create waves in the water. This is a great way to see vibrations.

Once the children can realize the difference in sound with the rubber bands, ask if they believe the color of the rubber band will affect the sound. Allow the children to test their preconception.

Have the children stretch the rubber band further to adjust the tension. Allow the children to experiment with tension and how it affects the sound.

Add cotton balls to the learning center. Allow the children to place the cotton balls in the balloons if they choose to do so. Ask the children how the balloons with cotton balls sound different from the balloons with beans inside.