

Project FOCUS
Best Lesson:
FIRST GRADE

Title of Lesson: Good Vibrations: Tuning Forks!

Theme: Physical Science

Unit Title: Sound

Performance Standard(s) Covered:

S1CS1. Students will be aware of the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.

- a. Raise questions about the world around them and be willing to seek answers to some of the questions by making careful observations and measurements and trying to figure things out.

S1CS5: Students will communicate scientific ideas and activities clearly.

- a. Describe and compare things in terms of number, shape, texture, size, weight, color, and motion.
- b. Draw pictures (grade level appropriate) that correctly portray features of the thing being described.

S1P1: Students will investigate light and sound.

- c. Investigate how vibrations produce sound.

S1CS5: Students will use tools and instruments for observing, measuring, and manipulating objects in scientific activities.

- a. Use ordinary hand tools and instruments to construct, measure, and look at objects.
- c. Identify and practice accepted safety procedures in manipulating science materials and equipment.

Essential Question: What is sound? How do vibrations and sound correlate with one another?

Objective: Students will be able to see the vibrations produced by the tuning fork as well as acknowledge the relationship between the vibrations and the sound that is produced (the sound begins to dwindle

as the strength of the vibrations do); furthermore, students will additionally be able to feel the notion that sound ceases when vibrations do via touch.

Key Words and Terms:

Sound

Vibrations

Volume (Loud, soft)

Pitch (High, low)

Learning Activity (Description in steps):

Abstract: This lesson introduces students to the concept that sound is created as well as manipulated via vibrations and their alterations.

Materials Needed (Type and quantity):

1 Tuning fork

1 Clear, plastic container with a large surface area

Water

Worksheets (1 per student)

Safety Concerns: There are no sharp, hot or harmful aspects of this experiment.

Procedure:

This lesson is best carried out in small, rotating groups - preferably four or five students per group in order to hold each child's focus. Once you have set-up by pouring water into a clear, plastic container and allocating enough worksheets for the given group, begin by introducing each group to the tuning fork.

- a. Briefly describe what a tuning fork is, it's uses in society, and its ability to exhibit the definition of sound.
- b. Discuss with the students: How would they best describe what sound is? What are vibrations, and where (inside or outside of the classroom) are we introduced to/experience vibrations? How do they think vibrations and sound relate to one another?

Activity:

1. Once you have introduced today's topic to the students, begin by tapping the tuning fork on the table and allowing for the students to listen to its pitch. Discuss how the volume of the sound the tuning fork makes changes from the time it is initially hit until it can no longer be heard.
2. Go around to each student in the group, tap the tuning fork on the table beside them, then bring the tuning fork up to his or her ear in order for him or her to listen to it closely. Discuss how the volume of the tuning fork changed, but also discuss how the pitch of the tuning fork remained the same (if the students have not covered the definition of pitch, include an introductory discussion over this concept prior to this lesson). When the tuning fork is near each child's ear, it is easier for him or her to distinguish between volume and pitch – the sound pitch-wise (whether high or low) is the same, while our ability to hear it (volume, being loud or soft) changes.
3. Go around to each student in the group once more. During this route, tap the tuning fork on the table beside the student, then gently touch each child's hand with the tuning fork. Once you have done so with each student, discuss with the students (as a group) what happened when the tuning fork touched their hand. How long did the vibrations last? How long did the sound coming from the tuning fork last? Note: At the end of this lesson, I have attached a worksheet I used to help facilitate our discussion.
4. After this discussion, tap the tuning fork on the table and gently touch it to the table. The ringing sound of the tuning fork is fairly loud. Speak with students about why this sound is at a higher volume than the sound that is created when the tuning fork is hit on the table then left untouched. This is an additional demonstration that I believe helps to decipher a relationship between volume and pitch: The pitch remains the same regardless of volume.
5. The last part of the lesson involves a visual display of the vibrations. Tap the tuning fork on the table then place it on the surface (not submerged into) the water. Ripples will appear as the vibrations are transmitted through the medium (water). Discuss with the students about what they are witnessing. Why does the tuning fork cause the water to splash when it is hit hard prior to

touching the water? When the ripples become less intense (less noticeable), can we still hear the sound of the tuning fork as clearly as we originally heard it?

6. Allow time for each student to tap the tuning fork and touch it to the surface of the water. Also discuss how the sound of the tuning fork can be manipulated: If our fingers or hands are touching the fork portion of the tool, why isn't sound produced? Why isn't sound (or ripples in the water) produced if we submerge the tuning fork?

Notes and Tips (General changes, alternative methods, cautions):

If I were to repeat this lesson, I would like to find more ways for the students to manipulate the volume of the tuning fork in order to best describe the concept of volume. This would also allow the students to better understand the relationship between the manipulation of vibrations and the effect it has on the sound that they hear. I believe this would facilitate the understanding of the definition of sound. On another note, be cautious of the fact that students become very excited by this activity. When the tuning fork touches the hand of a student after it has begun transmitting vibrations, it will give a weird sensation that most students at this age are shocked by. Although it is not painful, and none of the students I worked with disliked it, it did cause a bit of a ruckus that I was not expecting. Be sure to calmly warn students about how the tuning fork will feel when placed on their hand.

Sources/References: This lesson was based off of a slow-motion video I saw of a tuning fork hitting water.

Here: <http://www.geek.com/science/good-vibrations-tuning-fork-hitting-water-at-1600fps-1551996/>

Good Vibrations: Tuning Forks!

1. Tap the tuning fork on the table. Next tap the tuning fork on the table and touch it to your hand lightly.
 - a. What happened when you hit the tuning fork?

 - b. What happened when the tuning fork touched your hand?

2. Tap the tuning fork and let it ring, then tap the tuning fork and lay it gently down on the table. Circle the way you heard the tuning fork best:
 - a. In the air
 - b. On the table

3. Tap the tuning fork on the table then place the tuning fork in water. Draw a picture of what happened when you put the tuning fork in the water.



4. What do you think causes sound?