



STEM Sound Investigations Good Vibrations Student Inquiry Sheet



Name _____ Class _____ Date _____

CAUTION: To make your tuning fork produce sound, gently tap it on something that is rigid but soft like the rubber sole of a shoe or a piece of garden hose. It is easily damaged if you hit on something that is very hard such as the floor or table.

1. Investigate what your tuning fork is doing when it makes sound vibrations by answering the following questions. Use your senses of sight, sound and touch while you observe.
 - a. Is the tuning fork moving? How is it moving?
 - b. What does the motion feel like?
 - c. After you tap the tuning fork to make a sound, use a stop watch to measure how long it keeps making the sound. Record your results below.
 - d. Touch the tuning fork to a ping pong ball hanging on a string or to water in a cup. What happens?.
 - f. Based on your explorations, what can you say about how the tuning fork makes sound?
2. While exploring the tuning fork, you probably noticed it was shaking or vibrating. A vibration means that something is moving back and forth (or up and down). One vibration is the complete back and forth motion of something. Materials that vibrate at least 20 times and not more than 20,000 times in one second can be heard by many people. As people get older their range of hearing decreases.
 - a. Try to make one of your fingers vibrate fast enough to make a sound (At least 20 times up and down in one second). How close did you come? Any chance of getting to 20,000 vibrations?
 - c. The official name for the number of cycles (or vibrations) in one second is Hertz (Hz). Thus 20 Hz is 20 vibrations per second. Find out why cycles per second are referred to as Hertz.



**Check
Point**



Visible light is vibrating energy that travels as waves. Some light amazingly vibrates almost 1 quadrillion vibrations every second. That's 1,000,000,000,000,000 vibrations per second. Does this even seem possible?

- 3: There are other things besides a tuning fork that can make exploring sound fun. For this investigation, tie two pieces of string to a metal coat hanger. Holding each piece of string, swing the coat hanger and bang it on a table top. Does it make a sound like a tuning fork? Now try it again, only this time hold the strings up to your ears. What do you hear now? Try hitting the coat hanger on other materials. How does the sound change? What happens if we just hit a piece of string to the table? When you are done exploring, explain how you think the sound gets through the strings to your ears.

4. Sound travels differently through different kinds of matter. In this investigation, see if a tuning fork's sound can be heard longer in the air or on the table. Hold a vibrating or "singing" tuning fork by the stem and place the stem in contact with a table. Ask one student to place an ear directly on the table. Ask another to just listen. Who hears the sound longest? Why do you think that happened?

5. Test 6 or more materials to see how well they transfer sound. You may want to test your locker doors, classroom walls or windows. How about testing air or liquids such as paint or water by putting them in plastic sealed bags? What about ice, rocks, or pencils? List the materials you want to test. Then predict which materials you think will transmit sound the best. Conduct your test and rank your results from best to worst.

| Materials to Test | My Prediction of Which Materials Will Best Transmit Sound | Results of Test |
|-------------------|---|-----------------|
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5. Make up a rule about how sound travels through materials including what makes something a good carrier of sound. Support your rule by explaining how you would prove it. When you are done, create a poster that depicts your rule.



Check Point



If sound travels well through many solids, why is it easier to hear someone speaking to you when there is no wall between you and them?

In Star Wars when the Rebels fight the Empire in space, there are explosions. In the movie, they are loud! Could these sounds really be heard? Space is a vacuum. Can sound really travel through space? To see sound in a vacuum go to: http://www.youtube.com/watch?v=_ckjttBin58 or <http://www.youtube.com/watch?v=q2pj9k1lrsM>