Bill Nye Sound

Sound is _____ or _____ of air . An oscilloscope lets us _____ sound waves. An ear has a cup shape design to _____ sound. Dumbo was picked on for having big ears. What might be an advantage to having large ears? _____.

Sound travels _____ through a metal pipe than it does in air.

Submarines translate_____ waves into pictures.

A slinky perfect for showing how a _____ wave travels.

An echo is a _____ wave that has been _____ or reflected.

Your ear acts as a receiver for incoming sound waves. The sound wave makes your eardrum _____. This makes the little bones in your ear and the fluid in your ear vibrate. The signal gets sent to your _____ so it can be interpreted.

Increased frequency of a wave (more waves per second) results in a _____ pitch

lower frequency (less waves per second) results in a _____ pitch.

All music, _____ in the world, is from only _____ notes.

Why does a sound wave need air?

Humans can hear between 20-20,000 frequency. Sounds below 20 are called infrasonic and can be heard by some animals such as goldfish. Sounds above 20,000 are called _____ Bats and whales are able to hear these sounds even though we cannot.

The ultrasound is _____ _____ for us to hear it. She used the microphone to send a sound wave so they can see where the baby is by having the sound wave _____ .

When you strike a key on the piano , that makes a _____ inside the piano _____. The vibration is what makes _____.

Things _____ at their natural _____.

_____ are specialized structures to catch sound.

When you speak, your vocal cords _____ and this creates _____.

KEY WORDS—SOUND

Directions: Use each key word in one of the sentences below.

sound wave	**compression**	**rarefaction**	**amplitude**	**longitudinal**
crest	**trough**	**frequency**	**pitch**	**transverse**
eardrum	**echo**	**Hertz**	**decibels**	**auditory nerve**

1. The lowest point of a wave is a(n) _____ .
2. The number of vibrations in one second is the _____ of a wave.
3. The _____ of a wave depends on the amount of energy it has.
4. A(n) _____ is energy moving through a substance in a wave.
5. A(n) _____ is reflected sound waves.
6. The _____ carries sound signals to the brain.
7. The amplitude of a sound is measured in _____ .
8. The frequency of a sound wave is measured in _____ .
9. The _____ is how high or low a sound is.
10. The tight layer of skin that vibrates when sound waves hit is a(n) _____ .
11. The part of a wave in which molecules are squeezed together is a(n) _____ .
12. The top point of a wave is its _____ .
13. The part of a wave in which the molecules are pulled apart is a(n) _____ .
14. In a(n) _____ wave, the vibrations move in the same direction as the wave.
15. The vibrations are right angles to the direction of the wave in a(n) _____ wave.

Name _____ Date _____ Class _____

Sound Waves

Directions: *Answer the questions on the lines provided.*

1. How does a vibrating drum produce a sound wave?

2. Does sound travel outside Earth's atmosphere in space? Explain.

3. Explain how intensity, sound, and energy are related.

4. What are the three main parts of the human ear and what is the function of each?

5. Explain why sound travels faster through iron than through air.

Meeting Individual Needs

Name Date Class

SECTION 2 Enrichment

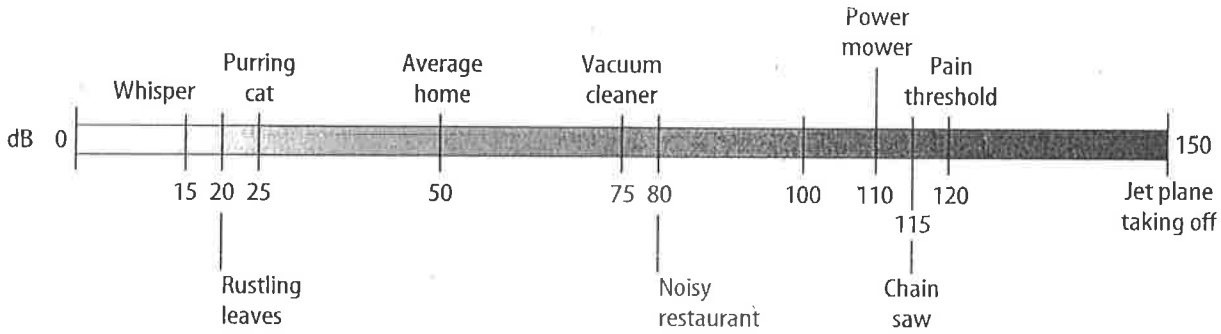
Protect Your Hearing

Noise is part of everyday life whether you live in the city or in the country. Prolonged exposure to noises above 85 decibels can cause permanent hearing loss. Exposure to loud noises can be a result of walking on a busy street, eating in a crowded restaurant, operating machinery, or engaging in recreational activities.

How do you know if the noise is too loud? One rule of thumb is if you cannot hear people talking when you are just a few feet away, the noise may be damaging your hearing. Protect your hearing by decreasing the volume on personal stereos and by wearing hearing protection when you are around loud noises.

You may not be sure if you are exposed to noises above 85 decibels. The list below contains the approximate noise level of some sounds. Plot the sounds on the chart below.

- Rock concert 100–130 decibels
- Power mower 105 decibels
- Motorcycle 90–110 decibels
- Personal stereo at a high volume 105–120 decibels
- Chain saw 110 decibels



1. What activities do you do that may expose you to high noise levels?

2. What can you do to prevent hearing damage or loss while you do your activities?

Meeting Individual Needs

Table 1 Speed of Sound Through Air

Temperature	Speed of Sound (m/s)
0°C	331
15°C	340
20°C	344
100°C	386

Conclusions

1. Look at Figure 1. What two substances does sound travel through fastest? What phase of matter are the substances?

2. Through which substance does sound travel most slowly?

3. Through which liquid does sound travel fastest?

4. Study Table 1. Under what conditions is the speed of sound higher when it travels through air?

5. Generalize about the speed at which sound travels through gases, liquids, and solids.

6. What substances are exceptions to the generalization you made in question 5?

7. Sound moves best through dense and elastic materials. What can you infer about the density and elasticity of cork?

Name _____ Class _____ Date _____

Skills

Worksheet 15.1b

Interpret a Graph

Rock music, rustling leaves, sirens, footsteps—all the sounds you hear have moved through the air or other matter in the form of waves. But these sound waves have moved at different speeds through different kinds of matter.

The speed of sound moving through different kinds of matter is shown in Figure 1. Table 1 compares the speed at which sound travels through air at different temperatures. Study Figure 1 and Table 1 and answer the questions.

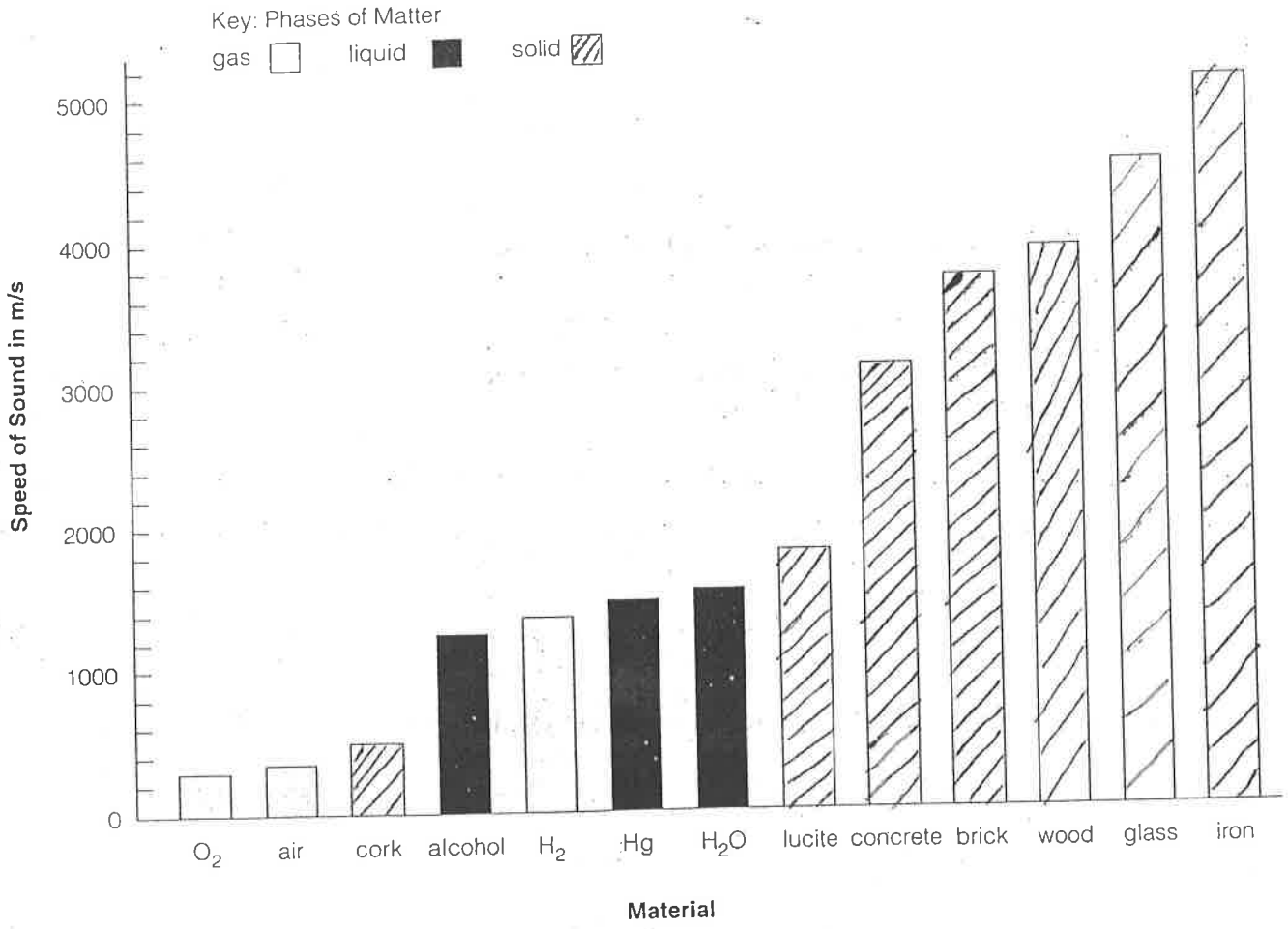


Figure 1 Speed of Sound Through Various Materials

Name _____ Class _____ Date _____

Everyday Science Connection — Worksheet 16.2b

Background Sound

Think of your favorite store or restaurant. Do you remember the type of music played there? Music is used as background sound in many businesses to create an identification with customers. For example, a store serving young people may play modern popular music. Background music may be also be used to mask or block out annoying sounds. Some people listen to music through headphones to block out distracting noise from machines, traffic, and conversation.

If the frequencies of sounds are equal in amplitude, the sound is called *white noise*, which has been found to have a relaxing effect on people. White noise is continuous and usually of low to moderate intensity. Some dentists use machines that produce white noise to relax their patients. White noise can also be produced naturally. The flowing water in the fountains of parks and malls produces white noise that creates an agreeable listening as well as viewing experience for the public.

Natural sounds have also been recorded for use as background sound. This type of background sound is called *environmental music* because it creates the illusion of a natural environment for the listener, such as the woods or the seashore. Environmental music has a calming effect similar to that of white noise.

Study Table 1 and answer the questions that follow.

Table 1 Background Sound

Sound	Source of Sound	Intensity (in decibels)	Places Used (examples)	Purpose
background music	radio or stereo system	30–60 dB	businesses and homes	create customer identification; mask or block out noise
environmental music	radio or stereo system	20–40 dB	businesses and homes	produce relaxing effect; mask or block out noise
white noise	machine or natural source	10–20 dB	dentists' offices; parks and malls	produce relaxing effect; mask or block out noise

1. Compare the purposes of the three types of background sound listed in Table 1.

2. Which type of background sound could be used to block out noise from a lawn mower about 60 decibels? Explain your answer.

3. Describe at least three types of background sound you hear often. How does each sound affect you?

4. Imagine the sound of traffic makes it difficult for you to sleep at night. Describe how you might use background sound to solve your problem.