Grade 4
Unit: Waves of Sound
Lesson 1: “How far can a whisper travel?”

VIDEO TRANSCRIPT

EXPLORATION VIDEO 1

Hi, it's Doug. Have you ever played with echos before? It's fun. You need a place that's long and hollow. A tunnel like this works really well. Are you ready? Hey. Or if you don't have this, you could use a room with a huge ceiling like where this guy is. Are you ready? Listen for when he claps. Woah, let's hear that one more time. There's a good chance that you've played with echoes before, and you might even have some ideas about what they are and why they happen, but for little kids echoes can be really puzzling. Like, watch when this little boy, Zach, who's just three years old went to the Grand Canyon with his dad. While he was there he discovered his Echo for the first time. Let's listen and watch his reaction. You ready?

-Have you heard my name is Zach? It said it.

-Try hello again.

-Hello.

-Who are they?

-I don't know. I don't know what their names are.

-You know I really think it's just you and me. I think it's just--

-No, it's not. No, it's not.

-Are you sure it's not our voices bouncing back? Because it sounds just like you when you say it, and it sounds like me when I say it. Watch this. Ready? Hello. You see that sounded like me.

-No, it's not. It's not. It's just-- it's just someone else. Not us.

-Well, who could it be that sounds just like you over there?

-Come on. It's not us.

-OK.

-Hello. Hello. Hello.

-He talks just like you.

-Maybe there's a kid over there that's saying it.

-Maybe somebody over there saying it, you think?

-Yeah.

-Nah.

You know more about how sound works than little Zach did when he was three, but still, it's easy to take sound for granted. We make sounds constantly all day long when we're talking. Hearing our own echo helps us to realize that sound is a thing. When we make a sound, we're sending something, whatever that is, out into the world around us. So what is sound exactly? When we talk or yell or bang a drum or make any kind of noise, what is it that we're creating and sending out into the world around us? You might have some ideas. Go ahead and try this. Put your hand over your throat and say ah. What do you notice?

EXPLORATION VIDEO 2

When you held your hand over your throat and said, "Ah," you felt your throat vibrating or creating vibrations. A vibration is another way of saying that something is moving back and

forth. But it's not just your voice that creates vibrations. Other sounds do, too-- anything you bang on to make a sound, like this drum seen in slow motion. Notice as you hit it, you can see it vibrate or move back and forth. Or you might have noticed when music is playing through speakers, you can feel and see those vibrating. Now this is my friend Pat Murphy. Pat develops activities at Mystery Science. You might have seen her before in some of the activity videos. Pat tells us that her husband Dave plays bass guitar really loudly from the basement of their home. This is Dave playing bass. And Pat notices that when he does this, it makes the whole house vibrate. See? So we've seen lots of evidence that sound creates vibrations. Is it possible that sound is a vibration? What do you think? What are some experiments we could do to learn more about sound and vibrations?

ACTIVITY INTRODUCTION VIDEO

In today's activity, you're going to try to make a telephone using just two paper cups and a piece of string. Now, maybe you're saying, hey, that's not a telephone. Actually, it kind of is. It's an early version, going way, way back. The word telephone comes from two ancient Greek words. Tele means distance, and phonos means sounds. Put them together, and you get telephone-- a sound traveling over a distance. Now, does this really work? And can it teach you anything about sound? Well, see what you can find out. I'll show you how to make one right now, step-by-step.

ACTIVITY STEP 1

Get your supplies. Each person needs these items. When you're done with this step, click the arrow on the right.

ACTIVITY STEP 2

Tie a knot in one end of the string, like this.

ACTIVITY STEP 3

Hold the paperclip exactly like this. I'll give you a few seconds to do this. OK, now push down the back. Slide in the loop of string. Take the two ends and twist them apart like this. Make sure it looks like this when you're done.

ACTIVITY STEP 4

Use the pencil to poke a hole in the cup like this. Then push the paperclip through the hole. This will stop the string from falling out.

ACTIVITY STEP 5

Let's do a few quick experiments. Experiment one, hold a cup over your mouth and say a few words. Do you feel anything in the cup? For 30 seconds, try making different sounds. Like, what happens if you talk with a deep voice? Or what happens if you sing? Are you ready? Go!

ACTIVITY STEP 6

Experiment two, hold the string, and talk into the cup. Do you feel anything in the string? Try it with the string loose and when you pull it straight. Does that change what you feel? Try it out now.

ACTIVITY STEP 7

Experiment 3-- gently rub the string. Can you hear it? Then put the cup to your ear. What do you notice?

ACTIVITY STEP 8

Experiment 4. Pull the string tight and pluck it gently. What do you notice? Try it with the cup on your ear and away from your ear.

ACTIVITY STEP 9

It's time to make your telephone. Find a partner and decide who will be Voice and who will be Ear. Don't worry. You'll switch jobs later.

ACTIVITY STEP 10

Tie the loose end of your string to the loose end of your partner string like this. Now you have a paper cup telephone.

ACTIVITY STEP 11

Let's make sure everyone has room to experiment. Ears, go to one side of the room. Voices, go to the other side. Be careful not to tangle your string with anyone else's. Pull the string straight. Now you're ready.

ACTIVITY STEP 12

Watch this whole step before you do anything. You're all going to do this together. Voice, say a number between one and five very softly into the cup. Ear, use your fingers to show the number you hear. Then switch jobs and do it again. OK. I'm going to count down from three to one. Wait until I say go. Three, two, one, go.

ACTIVITY STEP 13

Go back to your desk and answer number 1 with your partner.

ACTIVITY STEP 14

Discuss as a group.

ACTIVITY STEP 15

Soon, you're going to decide on some experiments to do. But first, find out what materials you have available.

ACTIVITY STEP 16

Do question number 2 with your partner. Decide on two ideas that you think will make your phone better-- either louder or more useful. You can use our ideas or come up with your own. Just make sure all the materials you want to use are available.

ACTIVITY STEP 17

Do question number three with your partner. Do both the experiments you decided on, and record the results. If you have extra time, do some more experiments and write your results on the back. After your experiments, discuss the questions on the next slide.

ACTIVITY STEP 18

When you're all done, discuss these questions.