

CURIOSITY AT HOME

AMP IT UP



The speakers on a radio or stereo help to make sound louder, or amplify it. They carry the vibrations of the music or voices so that they are easier for you to hear. Discover what types of common objects make the best amplifiers!

MATERIALS

- A fine-toothed comb
- A variety of non-breakable objects around your home (suggested items: a chair, a table, a door, a window, a book, a cup, a box, a wall, your head, your knee, your stomach, a pillow, the floor, get creative!)
- Science notebook or paper
- Something to write with

PROCEDURE

- First hold the comb in one hand, and run your fingernails along the teeth of the comb. What do you hear? Is the sound loud or quiet?
- Now try holding the back side of the comb against a table top as you run your fingernails along the teeth of the comb. Does it sound the same or different? Is it amplified to make the sound louder, is it quieter, or is it the same as before?
- Continue to hold the comb against different objects as you run your fingernail on them. Try to predict how good of an amplifier each object will be before you test it. Write or draw in your science notebook each object you try, what it is made out of, and how it affects the sound of your comb.



Experiment continued on next page...



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EXPLORE MORE

You can use amplification to listen through walls and doors! Place a cup with the rim flat against a wall or closed door, and put your ear to the glass. See if you can hear what's happening on the other side! You may need to experiment with different kinds of cups to find the one that works best.

Being careful not to spill the water, try holding your comb against a cup or a bowl with water in it. What do you see happening to the water? Why do you think that is? Want to talk to a friend across the room without anyone else hearing you? You can make a telephone from two plastic cups or empty cans, and a long piece of string. Carefully poke a hole in the bottom of the cups or cans. Then put the string through the holes and tie a large knot so the string does not slip back through the hole. Now hold onto one cup while your friend holds the other end, and walk apart until the string is tight. Whisper into your cup while your friend holds their cup to their ear, then trade. Can you hear your friend whispering? How?

WHAT'S HAPPENING?

All sound is caused by vibrations. Objects, like a comb, a drum, or a person's vocal cords, all vibrate to make sound. Those vibrating objects in turn vibrate the air around them. The vibrating air bumps into more air, making it vibrate, and the sound travels through the air through these vibrating bits of air. We hear sounds when the air vibrates tiny bones inside our ears, which sends a signal to our brain, and our brain interprets those signals as sound. When you held the comb against a table top, it spread the vibrations from the small comb directly to the larger surface it touched. Larger objects touch more air, and so they make more air vibrate when they do, and the result is a louder, amplified sound. Different materials vibrate more or less than the comb, so different kinds of objects amplify the sound more than others.

Experiment continued on next page...



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K-2 GRADE EXPLORATION

- Without holding your comb against different objects, can you change the sound that your comb makes? How?
- What kinds of objects that you tested amplified the sound the most? Were there any similarities between them?
- Did any objects you tested make the comb sound quieter? Why do you think they did that?



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3–5 GRADE EXPLORATION

Explore the following questions and write your observations in your science notebook.

- Copy the following table into your science notebook.
 - › Come up with a way of writing down how loud the result is. You could draw dots of different sizes, where a really big dot is really loud, and a really small dot is really quiet. Another way would be to simply write very quiet, quiet, medium, loud, and very loud, or have a number scale from zero to ten. Or come up with an even better (or more fun) way!
 - › Record your experiments in this table.
 - › When you're done recording your **data**, or the results of your experiment, you can sort it in a way that helps you make a conclusion. For example, put the items in order of loudest to quietest, and see which materials made the loudest and quietest sounds. Are there similarities between the objects at the top of that list? Are there similarities between objects at the bottom of the list?

Object Name	Object Material	Volume Prediction	Actual Volume

- When you make predictions for how much you think different objects will amplify the sound of your comb, write down in your science notebook why you think that. If you were wrong, write down why you think the result is different than what you predicted.



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6-8 GRADE EXPLORATION

Explore the following questions and write your observations in your science notebook.

- Make a prediction of which materials will amplify sound the best, and which will not amplify as much, or even muffle the sound. Write your prediction down in a table, with the name of the object, and what material it is made of. Then write down the results you collected, the **data**, after you do your experiment.
 - › Use the table below by copying into your science notebook, or make your own table.
 - › Come up with a way of writing down how loud the result is. You could draw dots of different sizes, where a really big dot is really loud, and a really small dot is really quiet. Another way would be to simply write very quiet, quiet, medium, loud, and very loud, or have a number scale from zero to ten. Or come up with an even better (or more fun) way!
 - › What conclusion can you draw from your data?
 - › How might you display your results in a clear and organized way that would be easy for someone else to understand?
- Why do you think some materials make better amplifiers than others?

Object Name	Object Material	Volume Prediction	Actual Volume



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