RADIO EXPLORERS

Radio Silence

How would you block a radio wave?

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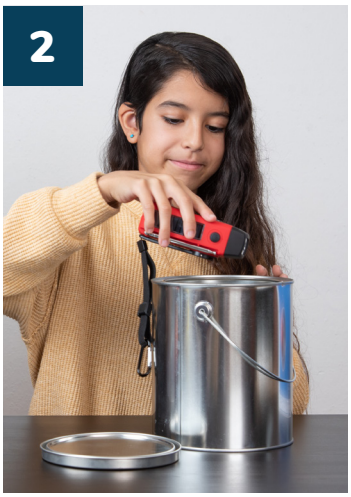
MAKING WAVES with radio

1

First, lay out a selection of items. Turn on the radio and tune to a station. **How does the radio signal sent from a station's transmitter miles away get to your device?**

Tip: After a station has been selected, place a piece of tape over the tuner and volume dials so they do not change during the experiment.

2



Try making a shell of wrapping materials around your device or placing it in a container. Try to block the signal! **Which materials work best at blocking the radio waves?**

3

What changes when you raise or lower the antenna? Does your shell have to cover the whole radio or just part of it to affect the radio waves? Try touching the radio inside your container. What happens? **Are you surprised?**

4

Now, try testing your shell again with another radio device, like a Bluetooth speaker or a walkie-talkie. **Is it easier or harder to block the signal to these devices? Do the same materials work?**

Radio waves transfer energy that can be reflected or absorbed, or pass through materials.

Radio waves are all around us and invisible. Radio waves are a type of electromagnetic radiation, a kind of energy, like the sunlight we can see or the microwaves that cook our food. Some materials that conduct electric currents, like metal, can be used to reflect and absorb radio waves. These materials can be used to make a *Faraday cage*, which protects people and equipment from electromagnetic radiation or actual electrical currents, like lightning strikes. Because Faraday cages interfere with radio waves, they will disrupt the normal function of devices that receive or transmit radio waves—like radios, cell phones, Bluetooth speakers, or walkie-talkies. Did the Faraday cage you made in this activity completely block signals to all the devices you tested?

Wikipedia / Antoine Taveneaux

A woman in a Faraday cage holds her hand up to an electrical bolt without getting shocked.

Adobe Stock

By tuning a car radio to a station that plays your favorite music you are selecting a radio wave frequency.

There are many uses of radio technologies in modern communications, from broadcasting a band's latest song on a radio station to receiving important navigation signals from a satellite. To prevent a giant mix-up of radio waves and their functions, **different devices use different radio frequencies**. Low radio frequencies have longer radio wavelengths, while high radio frequencies have shorter radio wavelengths. These differences mean that some radio waves travel better through certain materials. That's why we can receive cell phone calls inside a house but not inside an underwater tunnel, or why AM radio signals can get lost going under overpasses but FM radio keeps working. The choice of materials for your Faraday cage may allow you to examine some of the differences in radio waves used by various communication devices.