Online Oscilloscope

DISCOVERY WORLD @HOME

Introduction

How can you see sound? Explore a free resource that shows what the sounds around you look like.

Think About This

How are sounds different from each other?

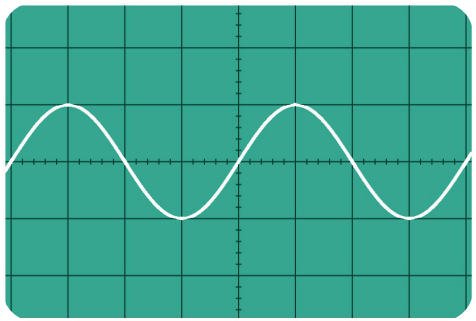
Materials Needed

- ☐ Open thSmartphone, tablet, or laptop
- ☐ Open thYour voice

Directions

An oscilloscope (o-SILL-o-skope) is a tool that measures changes in waves and shows them as a pattern. Investigate the patterns made by voices and sounds around your home.

1. Visit this site to access the online virtual oscilloscope.
2. Allow the website to access your microphone so that it can show the patterns of the sounds around you.
3. Watch the screen while someone talks or music plays.
4. The grid on an oscilloscope helps us "see" what is happening. The grid is divided into larger boxes (the solid dark lines). Each box measures a certain amount of time.



5. Clicking the box next to "Freeze Live Input" will freeze the pattern so that you can look more carefully.
6. The other settings on the oscilloscope probably will not need to be changed. Here is what they do, in case you want to explore:

   a. **Gain** - multiplies the signal coming from the microphone. Numbers less than one will make the wave smaller. Numbers higher than one will make the wave bigger. It's usually best to leave the gain at "1".

   b. **Seconds/div** - changes how many parts of a second each large black line equals. It is usually set at 1 ms (one millisecond) - there are 1000 milliseconds in each second.

   c. **Volts/div** - does not need to be adjusted. Changing this will make waves taller or shorter.

   d. **Horizontal Offset** - moves the signal line back and forth

   e. **Vertical Offset** - moves the signal line up and down

Take It Further

- How do the voices of two different people look? Draw out the pattern for one person, then freeze the pattern for a second person. Compare them!
- Try humming or singing different notes. Can you get a smooth wave that stays in one place?

What's Happening?

All sounds are caused by vibrations – the rapid back-and-forth movement of particles. A vibrating object causes the air around it vibrate, and this sound energy is carried in all directions. The energy in a sound wave will cause another object to vibrate when they hit it.

Online Oscilloscope Continued

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Sound waves have both a **frequency**, how many sound waves pass a point in a second, and an **amplitude**, how much energy the sound wave has. Sound waves with high frequencies have thousands of waves in a second, sound waves with low frequencies have tens or hundreds.

Oscilloscopes measure the changes in waves that are too fast for us to see. Oscilloscopes give us the chance to "slow" things down so that we can study the sound.

Sound waves on an oscilloscope often look "rough" or "crazy". Our voices are made of many different frequencies that are all carried on the same sound wave at the same time. Items like tuning forks can create a smooth sound wave because they only produce one frequency.

Check out how complicated sounds actually are! This **spectrum analyzer** lets you see all of the frequencies in sounds you might have heard. Even though sounds are made of so many frequencies, our brains can figure out how to separate these waves from each other, which is how you can hear a friend's voice, even when lots of other things are happening around you.

Show us your sounds! Email us at
AtHome@discoveryworld.org
and share what your voice looks like!