

Do Try This at Home

From the Institute of Physics

Whistling Waveforms



What you need:

- A laptop (or a smartphone)
- Two different sized bottles with long necks (optional)

Oscilloscope apps

If you have a Windows laptop, download Soundcard Oscilloscope from www.zeitnitz.eu/scope_en

Alternatively, use an oscilloscope app on a phone or tablet. Download a free one which allows you to stop the trace on the screen, such as:

- **Oscilloscope (xyz apps)** from the Play store (tap screen to stop trace)
- **Oscilyzer** from the App Store (use pause button to stop trace)

Did you know

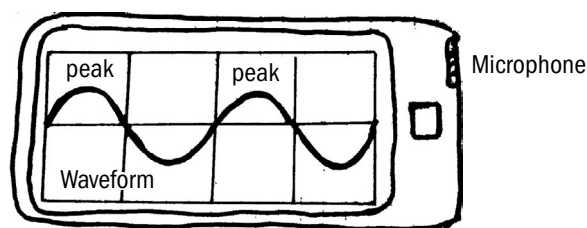
The highest pitch sounds humans can hear are those that make the air vibrate at 20,000 times a second. A dog can hear vibrations well above that at over 40,000 times a second.

What you need to do:

1. Watch the video at www.bit.ly/DTTAHWaveforms
2. Open the oscilloscope on your laptop (or phone).
3. Whistle and observe the trace on the screen. If you can't whistle, ask someone else to help or blow over a bottle to make a sound.
4. Whistle a loud, steady note and stop the trace. If you missed it, repeat to try to catch the waveform mid-whistle.
5. Repeat, but this time whistle more quietly. How does the waveform change with loudness?
6. Whistle with a high pitch and then a low pitch. How does the waveform change with pitch?

Now do this:

The waveform for a sound is shown below.



Copy the waveform and then sketch one for:

- a louder sound of the same pitch
- a quieter sound with a higher pitch.

Something else to try:

In music, the waveform for a note that is an octave higher has twice the number of peaks. Blow over two bottles to make low and high pitch sounds. Compare waveforms and add water to tune your bottles so that they are an octave apart.