

Stupendous Stethoscopes

What's The Plan?

Have you ever had a doctor listen to your lungs or heart? Why can they hear inside of us, but we can't? They have a special tool called a stethoscope! Stethoscopes don't have any special magic that makes sounds louder, but it *amplifies* the *sound waves* as they bounce around in the tube! Follow along to make your very own stethoscope!



What You'll Need:

Here's a list of everything you'll need! Don't have something exactly? Get creative! Some of our suggested swaps are listed in Grey.

- A cardboard tube, like from a paper towel roll | Vinyl tubing
 - 2 Funnels | Only one funnel is needed if you use a cardboard tube, not vinyl tubing. If you don't have a funnel, you can get an adult to carefully help you cut the top off of a plastic water bottle to make a funnel
 - A Balloon | Saran Wrap
 - Any Tape
 - Scissors
 - A Stopwatch | Phone Clock, or any other piece of technology you can count seconds on!
- (Optional) Materials to decorate with such as markers, pipe cleaners or stickers.

What To Do:

1. Build Your Stethoscope

Take the short end of your funnel and place it inside your cardboard tube/ vinyl tubing. Cut the neck off of the balloon. Stretch the cut balloon over the wide opening of the funnel and secure it with some tape. If you have a second funnel, place its thin end into the other end of the tube/roll, and secure it with tape. Decorate your stethoscope with stickers, pipe cleaners, or markers, and get ready to use it!

2. Using Your Stethoscope

Either you, or a volunteer, can be the one to hear the *sound waves* from your heart. It may be easier to hear the heartbeat of a volunteer if you used a non-flexible cardboard tube to be your stethoscope. To begin, find a nice comfortable chair to sit down in, relax for a minute, and then put your stethoscope up to your chest. You may need to move the stethoscope around until your heartbeat is *amplified* and you can hear it clearly. Get your stopwatch and start it. Count your heartbeats for 15 seconds, then multiply the number of heartbeats you heard by 4. This is the *frequency* of your resting heart rate measured in bpm or beats per minute.

Next, let's find your heart rate while exercising. Set a timer for one minute and run in place until it ends. Then start your stopwatch and count your heartbeats for 15 seconds. Multiply this by 4 and see how it compares to your heart rate when resting.

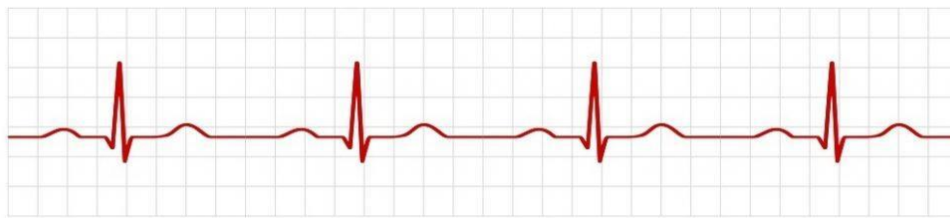
Do you see this tall spike on the graph, it has a large *amplitude*. This means it will sound louder than the parts of the graph that are flat.

Do you see how close together the heartbeats on the top are, and how far apart the ones on the bottom are? The ones on the top have a higher *frequency* and sounds fast. The ones on the bottom have a lower *frequency* and sounds slow.

Fast Heartbeat



Slow Heartbeat



Why Did We Do It?

Here is a list of important words we use during the project!

- *Sound Waves:* When we talk about sound, we are talking about tiny particles that move through the air like a wave. When the vibrations caused by the waves in the air enter our ear, we perceive it as sound.
- *Amplification:* when we make a sound louder by channeling it through something like a funnel. Amplification works by taking

the sound waves that usually spread throughout the air around the object and concentrating them through something like a tube to stop them from spreading out and make them louder.

- *Amplitude*: the height of a sound wave. The taller the sound wave is, the louder it sounds, and the more amplitude we say it has. Was it you're resting or exercising heartbeat that sounded louder, and which one had a higher amplitude?
- *Frequency*: How many sound waves pass by in each unit of time, such as a second. When we talk about the frequency of your heart rate, we might say it is the number of beats per minute. A heart rate after exercising would have a higher frequency than a resting heart rate.

How Did It Go?

We'd love to hear about all the amazing STEM projects you're doing! Show us your finished projects on any of the following social media platforms by tagging us!

Twitter: @MyMindsInMotion
Facebook: @mindsinmotion2014 || @ucactiveliving
Instagram: @ucalgaryactive



Let us know how you felt about the project! Please [click here](#) or scan the QR code above to fill out a short survey!