

Stethoscope

Overview: Stethoscopes are instruments used to amplify sounds like your heartbeat. Your doctor is trained to use a stethoscope not only to count the beats, but he or she can also hear things like your blood entering and exiting the heart and its valves opening and closing. Pretty cool!

Today you will make and test a homemade stethoscope. Even though it will be pretty simple, you should still be able to hear your heart beating and your heart pumping. You can also use it to listen to your lungs, just like your doctor does.

Materials

- rubber hose (3, 12-inch lengths)
- “T” connector
- funnel
- stopwatch or clock with a second hand

Experiment

1. Take two pieces of hose and work them onto the top ends of the “T” connector. Put the remaining piece of hose onto the bottom of the “T.” The tool you have made should look like a simple stethoscope, but there are no super cold metal end pieces to worry about with yours.
2. Put the funnel into the bottom hose – the one hanging from the bottom of the “T” connector. You now have a functioning stethoscope. One word of warning: **NEVER YELL INTO THE FUNNEL WHILE THE STETHOSCOPE IS ATTACHED TO SOMEONE’S EARS. THIS COULD DAMAGE EAR DRUMS!**
3. Gently insert the side tubes into your ears. Put the funnel on your chest, just to the left of your breastbone. Listen for your heartbeat. If you are in a sufficiently quiet room you may even be able to hear the opening and closing of your heart’s valves.
4. After you’ve found your heart, try moving the stethoscope to various areas of your chest and listen for different sounds made by your heart. Ask if you can listen to a friend or family member’s heart. Are the sounds made by another heart the same or different?
5. Now listen to your lungs, placing the end of the stethoscope just above and to the left of the bottom of your ribcage (Point A), to the right of the bottom of your ribcage (Point B), and just below where your ribs start (point C). Also listen in the middle of your back to the left (point D) and right of your spine (point E). In each spot, take a deep breath and listen for the sound of air entering and exiting the lungs.
6. For your data records, record how many times your heart beats in a minute while you are quiet and sitting.
7. Next, do 100 jumping jacks. Sit down immediately and check your heart. Record the number of beats per minute for jumping jacks in your data.
8. Finally, go outside and run for 3 minutes, non-stop. Then sit and immediately check your heart rate one more time. Record the beats per minute for running in your experiment data.

Stethoscope Data Table

Location Tested	Did You Sit Still, Do Jumping Jacks, or Run?	Heartrate <i>(measure in seconds)</i>
<i>Point A</i>		
<i>Point B</i>		
<i>Point C</i>		
<i>Point D</i>		
<i>Point E</i>		
<i>Point A</i>		
<i>Point B</i>		
<i>Point C</i>		
<i>Point D</i>		
<i>Point E</i>		
<i>Point A</i>		
<i>Point B</i>		
<i>Point C</i>		
<i>Point D</i>		
<i>Point E</i>		

Reading

The cardiovascular system is made up of the heart, blood, and blood vessels. Exercise creates a demand for oxygen in your muscles, which is received from work done by your heart and lungs. They get a message from your brain and start to work harder. You can see the proof of their hard work in your recorded data.

Blood circulates through the heart chambers, lungs, and body. Carbon dioxide (CO₂) and oxygen (O₂) are exchanged in the lungs and tissues. Contractions of the heart generate blood pressure, and heart valves prevent backflow of blood in the circulatory system.

Exercises

1. Approximately how big is your heart?
2. Which body system is the heart a part of?
3. What are some of this system's jobs?
4. How many chambers does your heart have and what are they called?
5. How did the heart rate change when you exercised?

Answers to Exercises: Stethoscope

1. Approximately how big is your heart? (about the size of a fist)
2. Which body system is the heart a part of? (cardiovascular system)
3. What are some of this system's jobs? (delivering nutrients and oxygen, disposing of waste, regulating body temperature, fighting disease, maintaining homeostasis)
4. How many chambers does your heart have and what are they called? (four chambers – left and right ventricle, left and right atrium)
5. How did the heart rate change when you exercised? Why did this happen? (The heart rate increases because of activity – increased activity means an increased need for oxygen in the muscles, so the heart works harder to deliver this oxygen.)