

Make Your Own Stethoscope



BIG IDEA

In the film *Superhuman Body*, we discover how advances in technology and medical devices have been key to successfully treating and healing patients.



ACTIVITY

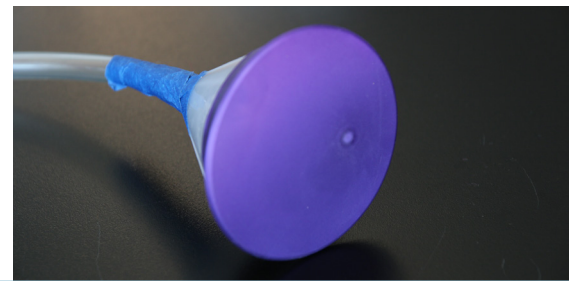
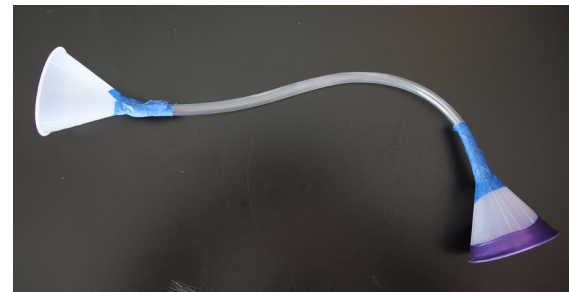
1. Place a cardboard paper towel tube against a friend's chest to hear their heartbeat. Place your ear on the other end of the tube. Can you hear a heartbeat?
2. Remove the tube and tape a funnel securely into one end of the cardboard paper towel tube.
3. Position it on your friend's chest once more.
4. Observe any differences in the heartbeat and assess if the sound is clearer.
5. Use the stopwatch to count the number of heartbeats that you hear in 15 seconds. Multiply that number by 4 to get an estimated number of heartbeats in 1 minute.
6. Remove the tube and have your friend engage in 1 minute of jumping jacks.
7. Replace the tube and use the stopwatch again to count the number of heartbeats that you hear in 15 seconds. Multiply that number by 4. Compare the differences in the heart rates before and after doing 1 minute of jumping jacks. What do you notice?

MATERIALS

- Cardboard paper towel tube
- Gaffer tape/Duct tape
- 3 funnels
- 1 balloon
- Measuring tape or meter stick
- Clear plastic tubing
- Scissors
- Stopwatch

After completing the initial steps above, gather materials for the second Stethoscope design and follow these instructions.

1. Cut approximately 1/3 of a balloon from its open end.
2. Stretch the remaining portion of the balloon over a small funnel.
3. Secure the balloon in place with tape.
4. Cut a 40 cm length of clear plastic tubing.
5. Insert the narrow end of the funnel into the tube.
6. Secure it tightly. Use tape if the tube does not fit over the funnel properly.
7. Attach the second funnel to the opposite end of the tube. You do not need to cover this end with a balloon.
8. Place the balloon-covered end of the stethoscope over a friend's heart and position the other end of the DIY stethoscope over your ear.
9. Use a stopwatch to again record your heart rate and observe the stethoscope's functionality.



DIG DEEPER

Which stethoscope design proves to be more effective?

How might you enhance these designs?

What observations can you make about the sounds produced by the body?

What information do you think these sounds convey?

WHAT'S THE SCIENCE

The vibration of the human body directly generates acoustic pressure waves, which travel through the connected tube of the stethoscope to the listener. The disc and the stethoscope's tube amplify subtle sounds, such as those of the lungs or heart. The amplified sound travels up the stethoscope's tube to the earpieces, allowing for attentive listening. Physical activity causes the body's muscles and organs to work faster to move oxygen to the body's muscles, and thus increases the rate of a beating heart.

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WHAT'S THE SCIENCE? (continued)

Stethoscopes are instrumental in diagnosing numerous conditions beyond the heart. In fact, they were initially used to understand lung function. The sound of breathing changes if there is fluid in the lung or if the airways are obstructed. The stethoscope gives the doctor a non-invasive way to check on the heart and lung function of a patient.

This device can help medical professionals identify issues associated with some of our body's organs, like arrhythmia (abnormal heart beats) or fluid in the lungs (a sign of pneumonia or tuberculosis.)

Entire texts have been written to better explain the sounds our bodies make and what they mean. You can learn more about these early attempts to understand these sounds in the "Watch" section below.

ADDITIONAL LEARNING

READ



["How Stethoscopes Work"](#)

This highly informative site walks through every facet of how stethoscopes work and the science behind them.

WATCH



[The Invention that Revolutionized Medicine \(youtube.com\)](#)

This video features an in-depth exploration of the history of the stethoscope.

The narrator discusses the state of medicine in Europe before the invention, as well as the various iterations the invention went through as doctors improved the design.

DO

Use the stethoscope to listen to other things around the house. Investigate how sound travels through different objects in your home.

What does this tell you about how sound travels through matter?

How far away from a source of sound can you get before the stethoscope stops working?