



American Heart Association.

**KIDS HEART CHALLENGE** | **AMERICAN HEART CHALLENGE™**

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# BUILDING A HEART MODEL

*STEAM Lesson Plan*



The American Heart Association recognizes the importance of building healthy bodies and minds. This lesson is an introduction into combined concepts of Science, Technology, Engineering, Arts and Math; better known as STEAM.

## Objective:

Students will learn how the heart works, pumping blood throughout the entire body, and build a prototype of how the heart functions. Students will learn why a healthy heart is important to overall health.

## Materials Needed:

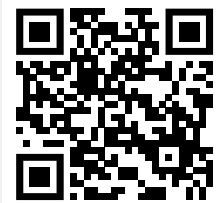
3 plastic (24-ounce) bottles, labels removed  
2 pre-drilled caps (from the bottles)  
4 bendy straws  
4 cups of water

Tape  
Marker  
Modeling clay or playdough  
Red food coloring

## Activity:

1. Students will learn about the heart and the blood flow cycle.  
**Optional:** Watch animations on blood flow and heart valves.
2. Students will then create a model heart.
3. After the prototype is built, host a class discussion.

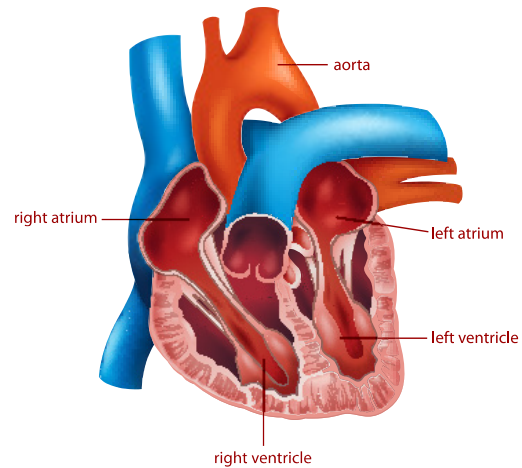
Scan the QR code to see a [3-D model](#)



## Discussion Questions:

- What are some interesting facts about the human heart that you learned today?
- What is the difference between the right and left ventricle?
- What would be the impact if you had a congenital heart defect? (A structural problem with the heart that's present at birth.)

## Anatomy of the Human Heart



### Overview

A normal heart is a strong, hard-working muscle. It's about the size of your fist, and is located in the middle of your chest, on the left side.

The heart acts as a pump that helps push blood through your body. Blood is pumped through the chambers, aided by four heart valves. The valves open and close to let the blood flow in only one direction.

The heart has four chambers. The upper two chambers are the right and left atria, and the lower two are the right and left ventricles. Blood will flow in only one direction – into the heart, to the lungs to be oxygenated, back into the heart, then back out into the body. The four valves of the heart are important for ensuring this one-way blood flow.

As your heart beats, it pumps blood through a system of blood vessels called the circulatory system. When your heart beats, it is actually squeezing and relaxing, pulling oxygen-poor blood from your body and pushing it into your lungs, where the blood cells pick up more oxygen as you breathe. The heart then pulls in and pumps out the oxygen-rich blood, where it travels around your body.

The normal blood flow is a cycle that flows like this: body-heart-lungs-heart-body.

### Vocabulary:

**Muscle:** rubber-like organ that helps you move

**Right Atrium & Ventricle:** receives blood that needs oxygen

**Left Atrium & Ventricle:** receives blood full of oxygen, then pushes blood through the aorta to the rest of the body

**Aorta:** a tube that helps send blood throughout the body

**Septum:** a wall of tissue that separates the chambers

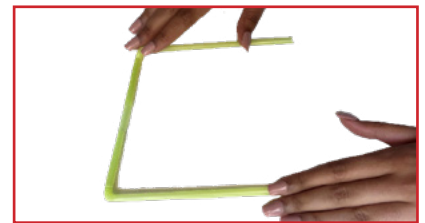
## Building a Model Heart

**Step 1 – Pre-drill holes in bottle caps.** One bottle cap should have two holes equal distance apart. Each hole should be big enough for the straws to slide through. On the second bottle cap, drill one smaller hole than the first two holes.

**Step 2 – Mix 4 cups of water and food coloring in a pitcher to create ‘blood’.** Add a few drops of red food coloring and stir.



**Step 3 – Connect two straws and bend them to create two 90-degree angles.** Pinch one straw at the end of the tip to make it smaller and insert it into the tip of the other straw. Adjust the bendable portion of the straws so each one is 90 degrees. Tape the straws together at the point where they connect. Keep the long portions of the straws parallel and facing downward. Repeat the above process with the remaining 2 straws.

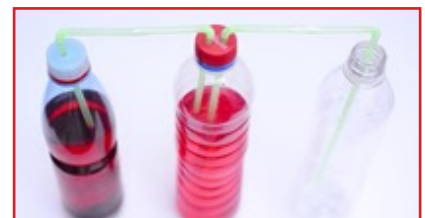


**Step 4 – Fill two of your bottles about 80% full of red water.** Carefully pour the red water into each of your bottles.

**Step 5 – Line the three bottles in front of you and insert the final straw.** Place the two bottles with ‘blood’ in front of you in a straight horizontal line. Now, place the empty bottle to the right of them. Attach the cap with one hole to the left bottle and the second cap with two holes to the middle bottle.

**Step 6 – Slide straws through the caps of the bottles with water.** Start by carefully sliding the long end of a straw through the bottle with 1 hole in it, taking care not to bend it. Now, take the other long end and slide it through the cap with two holes. Leave the third bottle empty.

**Step 7 – Attach the final two connected straws to the middle and right bottle.** Insert one end of the final straw into the remaining hole on the middle bottle’s cap. Now, insert the remaining end into the empty bottle with no cap. Seal any open space between the holes and the straws with clay.



**Step 8 – Label each bottle with masking tape.** Attach a piece of tape to each bottle horizontally and label each one. Mark the left bottle as the atrium of the heart, the second as the ventricle, and the third as the lungs (or body). Your fingers act as the heart’s valves.

**Step 9 – Squeeze the middle bottle and pinch the first straw connector.** Pinch the left straw connector that runs between the left bottle (heart) and the middle bottle (ventricle). Now, squeeze the ventricle and watch the blood flow into the body! Afterward, let go of the left straw connector and pinch the right straw connector between the ventricle and the body while keeping the ventricle squeezed. Now, watch the blood move from the heart to the ventricle!

Repeat this process to pump blood from the heart into the ventricle, and then distribute it into the body! When the blood in the heart is low, remove some from the body and distribute it back to the heart. Now, you can start the process over.