

# The Heart

## OVERVIEW:

In this activity, students will construct a 3-D model of a heart for an alien and explain how it functions. In addition, students will label the parts of a heart on a diagram and follow the flow of blood through the body.

## CONCEPTS:

### National Science foundation Standards:

#### Standard C: Life Science (Structure and Function in Living Systems)

- Cells as the fundamental unit of life.
- Levels of organization in living systems for structure and function, e.g., cells, organs, tissues, organ systems, whole organisms, and ecosystems.
- Life functions in cells.
- Specialized cells, tissues, and organs and their functions.

### Benchmark 6: The Human Organism

#### A: Human Identity

- Like other animals, human beings have body systems for obtaining and providing energy, defense, reproduction, and the coordination of body functions.

#### C: Basic Function

- Organs and organ systems are composed of cells and help to provide all cells with basic needs.
- Interactions among the senses, nerves, and brain make possible the learning that enables human beings to cope with changes in their environment.

## OBJECTIVES:

### Students will:

- Identify the parts of a heart
- Describe the function of the heart
- Design and correctly label a model heart for an alien
- Follow the steps of blood flowing through the body

## PROCEDURES:

- Allow 1.5 hours to present the background information and to complete the activity.
- Present background information: The heart
- Have students listen to their hearts and describe the rhythm
- Complete the activity (Part A.) “Alien Heart” (This activity can be completed with partners.)
- Follow up activity with discussion questions (see Part B.) These questions may be used for assessment purposes.

## MATERIALS:

- Background information
- Transparency master: The Heart

- Play dough (colored)
- Pipe cleaners
- Toothpicks
- Plain slips of paper (to label the parts of the model)
- Stethoscope

### **BACKGROUND:**

When using a stethoscope to listen to your heart beat, you usually hear a steady rhythm that your heartbeat follows; lub-DUB, lub-DUB, lub-DUB. But, have you stopped to think about what your heart is doing when it is pumping that hard?

Getting straight down to the heart of the matter, the heart's main job is to move blood to and from various parts. Its primary function is to pump blood to all parts of the body, bringing nutrients and oxygen to the tissues and removing waste products.

These are the steps followed by blood flowing in your body:

1. Oxygen-poor blood flows from the body into the right atrium.
2. Blood flows through the right atrium into the right ventricle.
3. The right ventricle pumps blood to the lungs, where the blood releases waste gases and picks up oxygen.
4. The newly oxygen-rich blood returns to the heart and enters the left atrium.
5. Blood flows through the left atrium into the left ventricle.
6. The left ventricle pumps the oxygen-rich blood to all parts of the body.

When the body is at rest, it needs certain amount of blood to achieve its primary function. During exercise or times when greater demands are placed on your body, more blood is required. To meet these variable demands, the heartbeat increases or decreases, and blood vessels dilate to deliver more blood or constrict during times when less blood is required.

Other components in your body that are used include veins, which bring blood to the heart; and arteries that take blood to the body. Vena Cava, both inferior and superior, is veins that carry blood into the right atrium.

Additional notes taken from: <http://www.pbs.org/wgbh/nova/heart/heartmap.html> and <http://www.pbs.org/wgbh/nova/heart/treating.html>

### **Consider these amazing heart facts:**

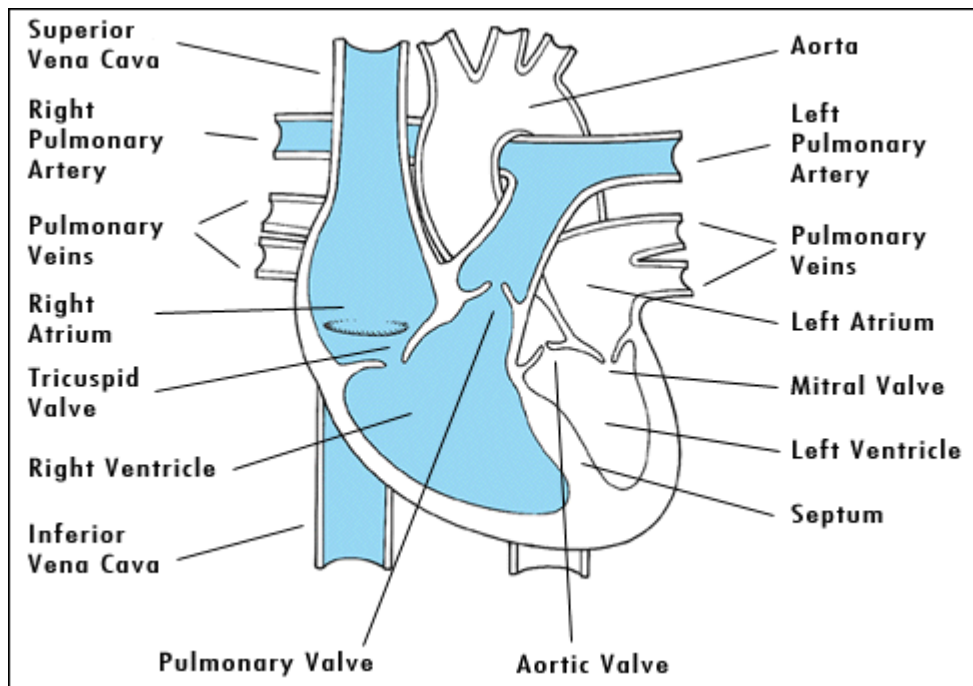
- Hold out your hand and make a fist. If you are a kid, your heart is about the same size as your fist, and if you are an adult, it is about the same size as two fists.
- Your heart beats about 100,000 times in one day and about 3.5 million times a year. During an average lifetime, the human heart will beat more than 2.5 billion times.
- The aorta, the largest artery in the body, is almost the diameter of a garden hose. Capillaries, on the other hand are so small that it takes ten of them to equal the thickness of a human hair.
- Your body has about 5.6 liters (6 quarts) of blood. These 5.6 liters of blood circulates through the body three times every minute. In one day, the blood travels a total of 19,000KM (12,000 miles)—that is four times the distance across the US from coast to coast.

For more heart facts go to <http://www.pbs.org/wgbh/nova/heart/heartfacts.html>

## ACTIVITY:

### Part A: Alien Heart

**Model of a Human Heart**



An alien species has landed on planet earth. Your team of scientists and engineers has gone to meet them. Upon meeting the group, you learn that one alien is in need of an artificial heart transplant. To perform the transplant, you first need a working artificial heart that conforms to the anatomy of the aliens. The aliens are able to give you some information about their heart anatomy.

#### **Alien heart anatomy:**

- Three heart chambers
- Two heart valves
- One lung
- Three major vena cavas entering the heart
- Two pulmonary arteries
- Three pulmonary veins
- Two aortas

**Directions:**

- Use the play dough and other props to make a 3-D cross-section of the alien heart.
- Label each part clearly.
- You and/or your partner should explain to the class how you chose the model and how it could work to pump blood.

**Part B:**

**Ask the following questions and allow time for discussion.**

**Share:**

How is your alien's heart different from a human heart?

**Process:**

What is the function of the heart?

**Generalize:**

Based on what you have learned and the models you have seen, what structures must all hearts, from fish to elephants, have?

**Apply:**

How does your heart help your body when it is under physical stress? What can you do to keep it healthy?

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