

## *Major Organs of the Body*

### **OVERVIEW:**

In this activity, students examine the functions of the major organs in the body. In addition, students will build a 3-D model of one of these major organs and explain its role within 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 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.

#### **Benchmark 11: Common Themes**

##### **A: Systems**

- Thinking about things as systems means looking for how every part relates to others. The output from one part of a system can become the input to other parts. Such feedback can serve to control what goes on in the system as a whole.
- A system is usually connected to other systems, both internally and externally. Thus, a system may be thought of as containing subsystems and as being a subsystem of a larger system.

### **OBJECTIVES:**

#### **Students will:**

- Examine a model of a brain and label the parts on a diagram
- Examine a model of the lungs and label the parts on a diagram
- Examine the model of the heart and label the parts on a diagram
- Understand the role of the major organs of the body.
- Construct a 3-D model of one of the major organs

### **PROCEDURES:**

- Allow 2 hours to present background information and to complete activities.
- Present background information.
- Allow time for students to explore the models of the brain, spinal cord, lungs, and heart.
- Students complete the activities: (Part A.) “Labeling the Organs and “Building a 3-D Organ.” Answer keys follow the activity.

- Follow up activities with discussion questions (see Part B). These questions may be used for assessment purposes.

### **MATERIALS:**

- Background information.
- Models: brain, spinal cord, lungs, and heart.
- Poster board
- Markers/crayons
- Glue
- Household materials
- Human Template
- Handouts: The Brain, The Heart, and The Lungs

### **BACKGROUND:**

You enter a room, and see three light switches, and one light. Just by looking, how would you determine which switch to pull for the light to go on? This is something our brain might not automatically know, but sometimes we do such things without even thinking about how or why we do them. Our body as a whole is unique; a very incredible machine.

- **The Skull:** It protects the brain. The area that the brain sits on in the skull is very sharp.
- **The Brain:** Did you know that when you clasp your hands together in a very loose fist-like posture with your fingers barely touching, that is the size of your brain? The brain is about the consistency of jello. It is covered in dura, which is only a quarter inch of fluid, and when injured, it can cause internal bleeding. It is very important to wear helmets when riding bicycles, in case of accidents, and also very important to avoid shaking people, because this might cause an injury to the brain. Boxers are some of the people in our societies who suffer brain damage because of the blows they get to their heads. An important discovery is that the more wrinkles we have in our brain, the more intelligent we are.
- **The Spinal Cord:** It holds the brain in place. The spinal cord consists of nerve bundles that are responsible for sending messages to the brain. These nerve bundles in turn connect to the vertebral column.
- **The Heart:** The heart has two pumps that are considered gas exchangers. It is divided into four chambers: right and left atrium; right and left ventricle. The heart's main purpose in our body is pumping blood into the different body parts. The blood is pulled by gravity from the ventricles into the atriums. Then the pulmonary vessel pumps blood to the lungs. When people go through heart surgery, then have pace makers installed, the pace makers serve as signal senders to the ventricle walls to pump blood regularly.
- **The Lungs:** These basically perform the exchange of carbon dioxide and oxygen. The diaphragm, which is a muscle, aids the functioning of the lungs. The lungs filter everything that goes into them. There is a great difference between the lungs of a healthy person and those of a smoker. A smoker's lungs are smaller and darker.

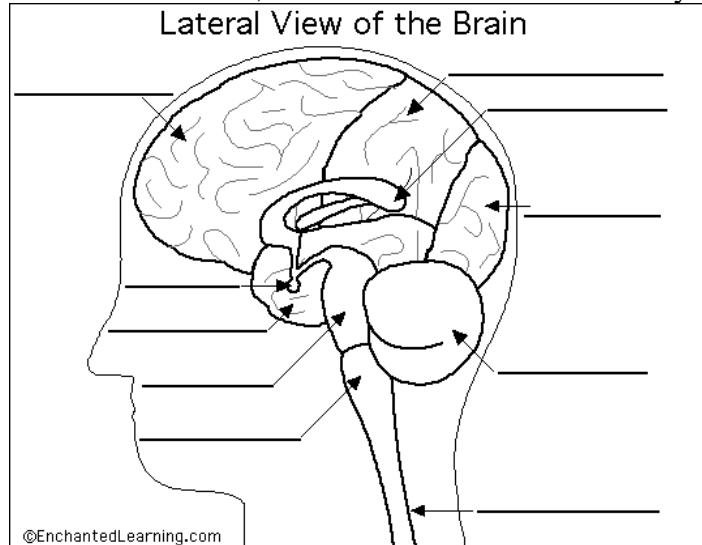
### **ACTIVITY:**

#### **Part A:**

**Activity 1: As you examine the model of the brain, label the parts on the diagram.**

## Label the Brain Anatomy Diagram

Read the definitions below, and then label the brain anatomy diagram.



**Cerebellum** - the part of the brain below the back of the cerebrum. It regulates balance, posture, movement, and muscle coordination.

**Corpus Callosum** - a large bundle of nerve fibers that connect the left and right cerebral hemispheres. In the lateral section, it looks a bit like a "C" on its side.

**Frontal Lobe of the Cerebrum** - the top, front regions of each of the cerebral hemispheres. They are used for reasoning, emotions, judgment, and voluntary movement.

**Medulla Oblongata** - the lowest section of the brainstem (at the top end of the spinal cord); it controls automatic functions including heartbeat, breathing, etc.

**Occipital Lobe of the Cerebrum** - the region at the back of each cerebral hemisphere that contains the centers of vision and reading ability (located at the back of the head).

**Parietal Lobe of the Cerebrum** - the middle lobe of each cerebral hemisphere between the frontal and occipital lobes; it contains important sensory centers (located at the upper rear of the head).

**Pituitary Gland** - a gland attached to the base of the brain (located between the Pons and the Corpus Callosum) that secretes hormones.

**Pons** - the part of the brainstem that joins the hemispheres of the cerebellum and connects the cerebrum with the cerebellum. It is located just above the Medulla Oblongata.

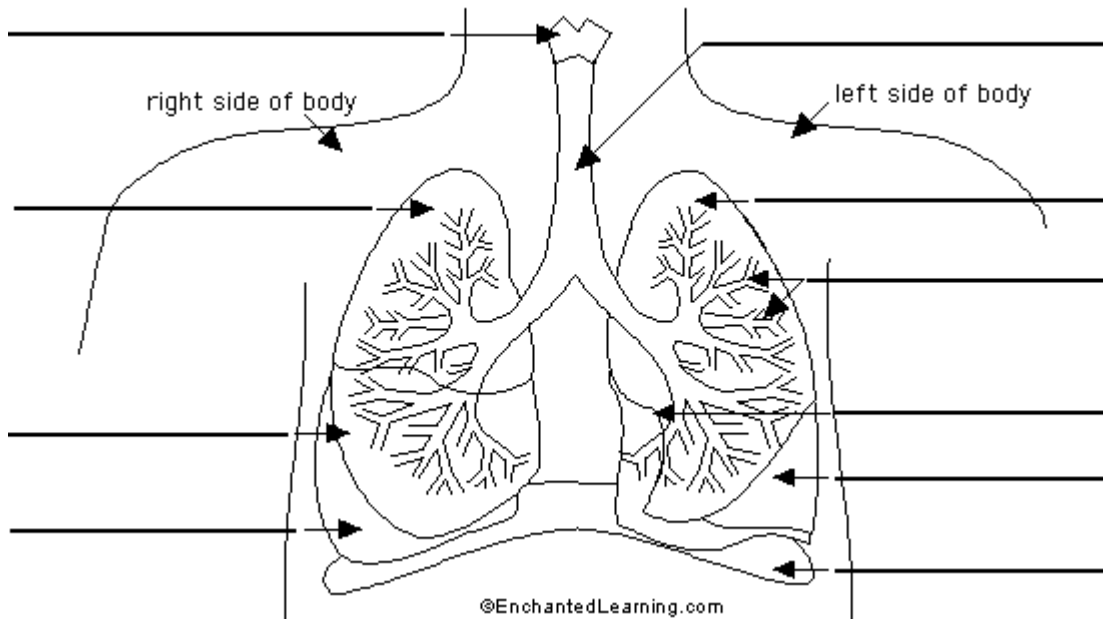
**Spinal Cord** - a thick bundle of nerve fibers that runs from the base of the brain to the hip area, running through the spine (vertebrae).

**Temporal Lobe of the Cerebrum** - the region at the lower side of each cerebral hemisphere; contains centers of hearing and memory (located at the sides of the head).

**Activity 2:** As you examine the model of the lungs, label the parts on the diagram.

# Label the Lungs

Read the definitions below, and then label the lung anatomy diagram.



**Bronchial tree** - the system of airways within the lungs, which bring air from the trachea to the lung's tiny air sacs (alveoli).

**Cardiac notch** - the indentation in the left lung that provides room for the heart.

**Diaphragm** - a muscular membrane under the lungs.

**Larynx** - a muscular structure at the top of the trachea, containing the vocal cords.

**Left inferior lobe** - the bottom lobe of the lung on the left side of the body.

**Left superior lobe** - the top lobe of the lung on the left side of the body.

**Right inferior lobe** - the bottom lobe of the lung on the right side of the body.

**Right middle lobe** - the middle lobe of the lung on the right side of the body.

**Right superior lobe** - the top lobe of the lung on the right side of the body.

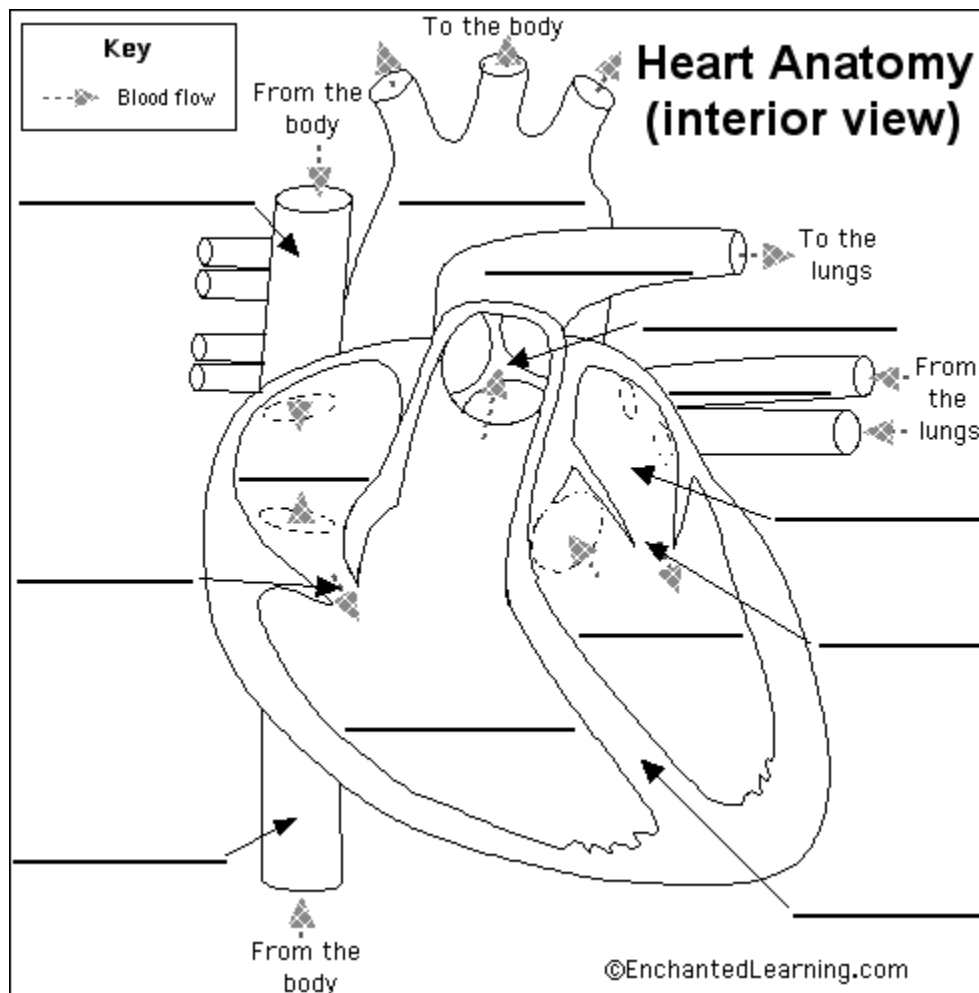
**Trachea (windpipe)** - the tube through which air travels from the larynx to the lungs.

**Activity 3:** As you examine the model of the heart, label the parts on the diagram.

## Label Heart Interior Anatomy Diagram

The heart is a fist-sized, muscular organ that pumps blood through the body. Oxygen-poor blood enters the right atrium of the heart (via veins called the inferior vena cava and the superior vena cava). The blood is then pumped into the right ventricle and then through the pulmonary artery to the lungs, where the blood is enriched with oxygen (and loses carbon dioxide). The oxygen-rich (oxygenated) blood is then carried back to the left atrium of the heart via the pulmonary vein. The blood is then pumped to the left ventricle, then the blood is pumped through the aorta and to the rest of the body. This cycle is then repeated. Every day, the heart pumps about 2,000 gallons (7,600 liters) of blood, beating about 100,000 times.

**Label the heart anatomy diagram below using the heart glossary. Note: On the diagram, the right side of the heart appears on the left side of the picture (and vice versa) because you are looking at the heart from the front.**



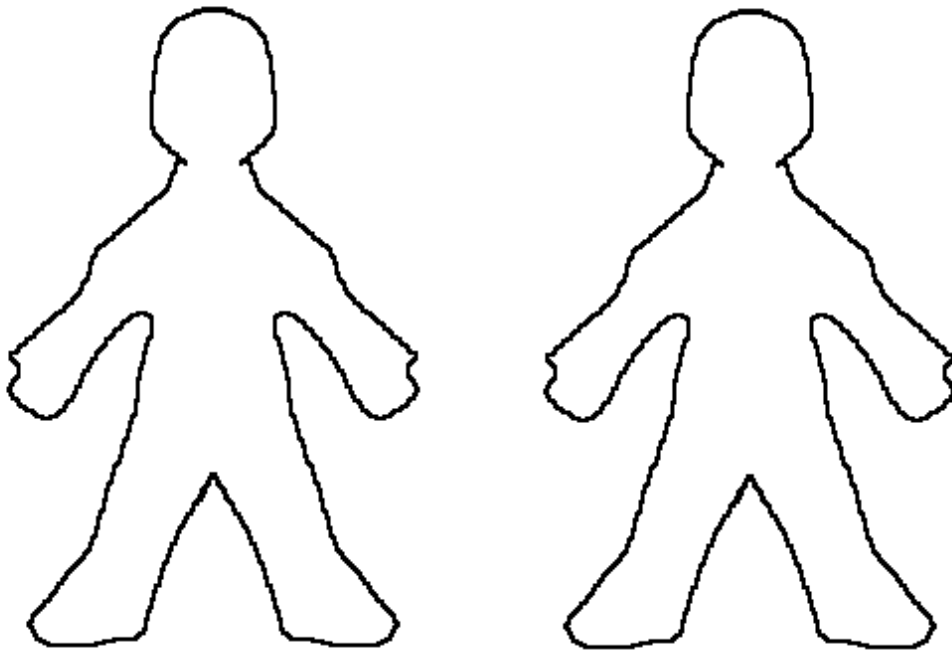
- **Aorta** - the biggest and longest artery (a blood vessel carrying blood away from the heart) in the body. It carries oxygen-rich blood from the left ventricle of the heart to the body.
- **Inferior vena cava** - a large vein (a blood vessel carrying blood to the heart) that carries oxygen-poor blood to the right atrium from the lower half of the body.
- **Left atrium** - the left upper chamber of the heart. It receives oxygen-rich blood from the lungs via the pulmonary vein.
- **Left ventricle** - the left lower chamber of the heart. It pumps the blood through the aortic valve into the aorta.
- **Mitral valve** - the valve between the left atrium and the left ventricle. It prevents the back-flow of blood from the ventricle to the atrium.
- **Pulmonary artery** - the blood vessel that carries oxygen-poor blood from the right ventricle of the heart to the lungs.
- **Pulmonary valve** - the flaps between the right ventricle and the pulmonary artery. When the ventricle contracts, the valve opens, causing blood to rush into the pulmonary artery. When the ventricle relaxes, the valves close, preventing the back-flow of blood from the pulmonary artery to the right atrium.
- **Pulmonary vein** - the blood vessel that carries oxygen-rich blood from the lungs to the left atrium of the heart.
- **Right atrium** - the right upper chamber of the heart. It receives oxygen-poor blood from the body through the inferior vena cava and the superior vena cava.
- **Right ventricle** - the right lower chamber of the heart. It pumps the blood into the pulmonary artery.
- **Septum** - the muscular wall that separates the left and right sides of the heart.
- **Superior vena cava** - a large vein that carries oxygen-poor blood to the right atrium from the upper parts of the body.
- **Tricuspid valve** - the flaps between the right atrium and the right ventricle. It is composed of three leaf-like parts and prevents the back-flow of blood from the ventricle to the atrium.

#### Activity 4: 3-Dimensional Model

This activity should be completed the day after the students have completed Activities 1-3. It is necessary for groups to meet prior to completing this activity. Advanced preparation is needed on their part.

#### Directions:

- Groups are to make a 3-D model using common household items (Example: balloons, pipe cleaners, cotton, pasta, string, etc.)
- Divide students into groups of 4.
- Assign (brain, heart, spinal cord) to one group and (heart, lungs) to the next group. Continue in this manner until all groups have been assigned a group of organs.
- Provide time for students to meet as a group and decide what materials to bring to build a 3-D model of their group of organs.
- Use the template to make an outline of the body on chart paper/poster board.



- Use household materials to construct a 3-dimensional model of your group of organs on the poster board outline.
- Label your model correctly.
- Share you model with the class.

**Part B:**

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

**Share:**

Which organ of the body do you feel is the most important and why?

How is each organ important to the organism as a system?

**Process:**

What are the things that all organs have in common?

What is the primary function of the brain, heart, spinal cord, and the lungs?

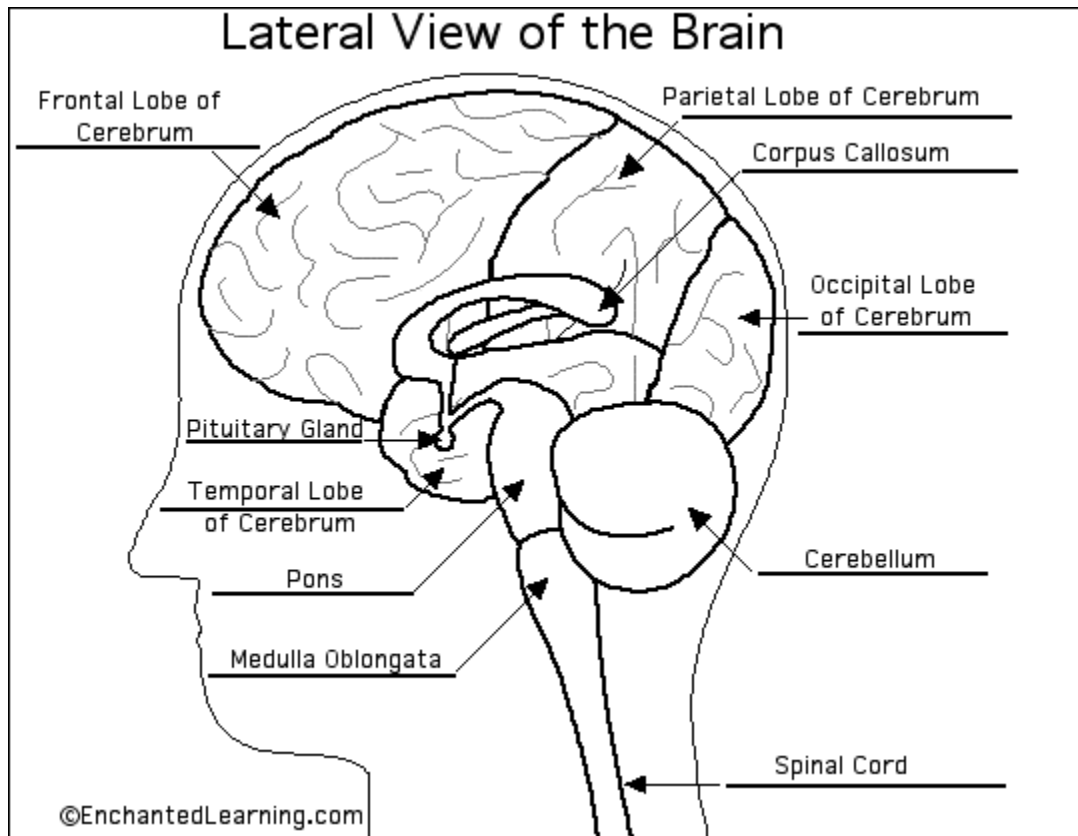
**Generalize:**

Why is it important for us to know about our organs and organ systems?

**Apply:**

How can we take better care of our organ and organ systems?

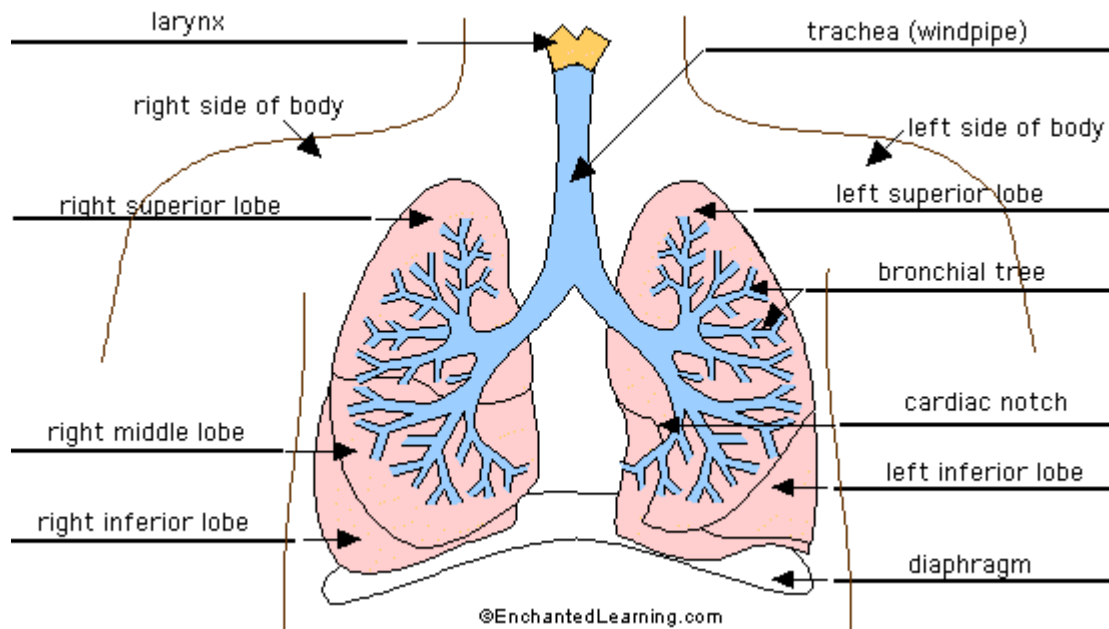
## Answers: Label the Brain



Reference:

<http://www.enchantedlearning.com/subjects/anatomy/brain/label/lateralbrain/labelanswers.shtml>

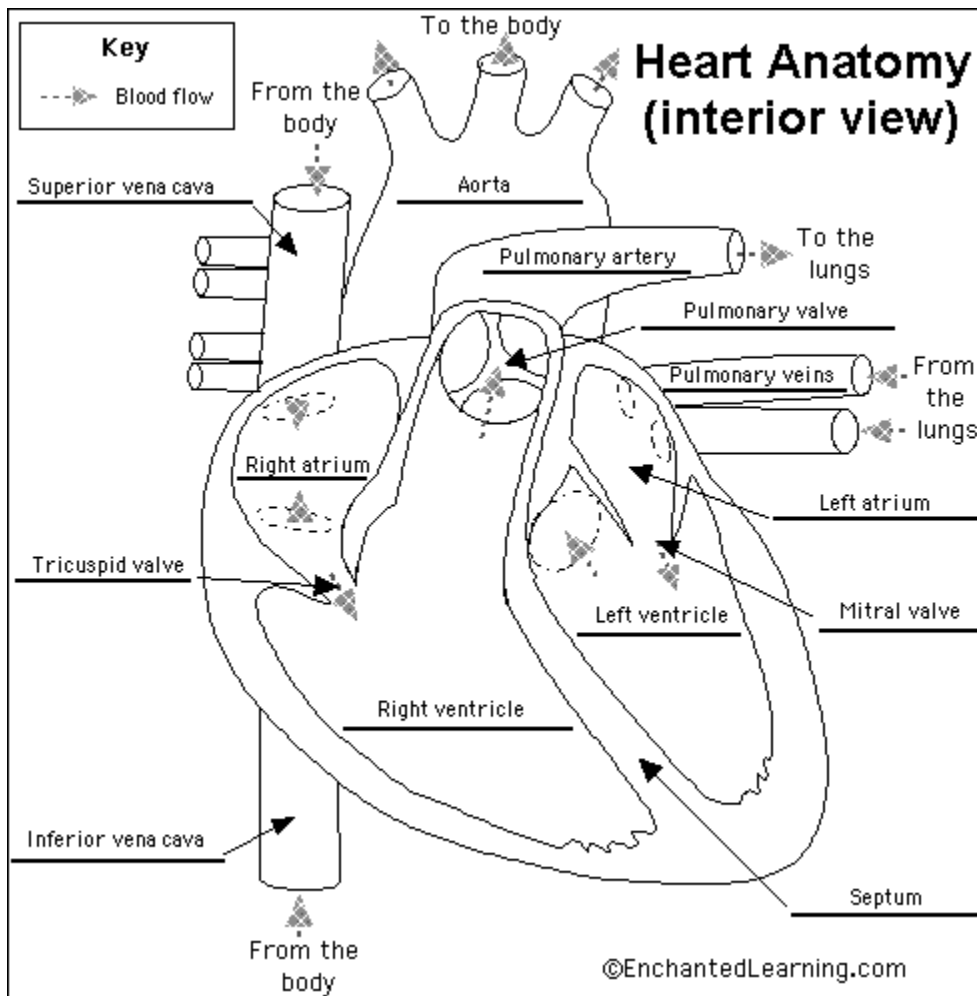
## Answers: Label the Lungs



References:

<http://www.enchantedlearning.com/subjects/anatomy/lungs/label/labelanswers.shtml>

## Answers: Label the Heart



Reference: <http://www.enchantedlearning.com/subjects/anatomy/heart/labelinterior/label.shtml>