The human circulatory system brings oxygen and nutrients to the cells for cellular respiration. The circulatory system moves blood to all parts of the body.

The main functions of the circulatory system are to transport blood and other materials, bring supplies to cells and carry away their wastes, and keep oxygen-poor blood from mixing with oxygen-rich blood. The circulatory system also helps maintain body temperature by distributing or conserving internal heat.

The main parts of the circulatory system include the heart and blood vessels that keep blood moving through a closed system. The circulatory system includes three types of blood vessels—arteries, veins, and capillaries—that act as a transportation network for blood.

- **Arteries** are strong and flexible. They must carry blood away from the heart under great pressure. Their thick muscle layer and elastic fibers allow the artery to expand and contract to help move the blood. Smaller arteries, called arterioles, connect arteries to capillaries.

- **Veins** carry blood under much less pressure back to the heart. They have a larger diameter and thinner walls than do arteries and contain valves that prevent blood from flowing backwards. Veins need the pressure of skeletal muscles pushing against their walls to keep blood moving. Smaller veins, called venules, connect larger veins to capillaries.

- **Capillaries** have thin walls, only one cell thick, that allow materials to diffuse into and out of the blood. In some organs such as the liver or kidneys, capillary beds move a large volume of blood into and out of the organs.

The structure and tissues of the heart make it a powerful, efficient, and self-regulating pump. The heart is composed of the right atrium and left atrium and the right and left ventricles, which are the larger chambers. Heart valves prevent blood from flowing backward. Because the heart is small, the strong cardiac muscles can exert a great deal of force on the chambers. The heart can also adjust to the speed and force of its pumping action as the body’s level of activity changes.

The heartbeat consists of two contractions that take place first in the atria and then in the ventricles. The first contraction begins at a signal from the SA node, or pacemaker, which stimulates the atrium to contract. The signal then spreads through conducting fibers to the AV node, which stimulates the ventricles to contract.

Blood flow through the heart follows a specific pathway.

- Oxygen-poor blood enters the right atrium, which contracts and sends the blood into the right ventricle.

- The right ventricle contracts and sends the blood into the pulmonary artery, which carries it to the lungs, where gas exchange takes place.

- Oxygen-rich blood returns through the pulmonary vein to the left atrium of the heart. The atrium contracts and sends the blood into the left ventricle.

- The left ventricle contracts and sends the blood out of the heart to the rest of the body, except for the lungs.

The blood follows two pathways that meet at the heart. **Pulmonary circulation** occurs only between the heart and lungs. Its main function is to carry oxygen-poor blood to the lungs where gas exchange can occur, and carry oxygen-rich blood back to the heart. The main function of **systemic circulation** is to carry oxygen-rich blood to all the cells and transport oxygen-poor blood back to the heart. Homeostasis is maintained by matching heart and respiration rates with the oxygen needs of the body.

1. Describe how capillaries differ from arteries and veins. ________________________________________

2. What is the function of valves in both the heart and veins? ________________________________________

3. Describe the two pathways of circulation that the blood follows in the body. ________________________

__________________________________________________________
Human Body | The Circulatory System – Part 1

**Blood Vessels:** As blood flows through the body, it passes through three types of blood vessels – arteries, veins, and capillaries. Complete the table below.

<table>
<thead>
<tr>
<th>Blood Vessels</th>
<th>Structure</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arteries</td>
<td>Thick walls containing smooth muscle</td>
<td>4.</td>
</tr>
<tr>
<td>5.</td>
<td>Thinner walls containing smooth muscle; large ones also have valves to control the direction of blood flow</td>
<td>Carry blood toward the heart</td>
</tr>
<tr>
<td>Capillaries</td>
<td>6.</td>
<td>Gas exchange; allows materials to diffuse into and out of the blood</td>
</tr>
</tbody>
</table>

Use Figure 37.2 on page 944 of your textbook to help you label the parts of the heart below.

- Aorta
- Pulmonary veins
- Left atrium
- Left ventricle
- Right atrium
- Right ventricle
- Pulmonary arteries

Fill in the diagram below to summarize blood flow through the body.

- Oxygen-poor blood, filled with ____ , flows into the right __________
- then is pumped into the right __________
- The right ventricle pumps the oxygen-poor blood into the __________ arteries and it travels to the lungs for __________ exchange.

- Oxygen-filled blood travels back to the heart in the pulmonary __________ and flows into the __________ atrium and then is pumped into the left ventricle.

- The left ventricle pumps the blood into the __________, a main artery, for travel to the __________ and __________.