The heart is found in the **mediastinum**, the medial compartment in the thoracic cavity. It is surrounded by two layers of **pericardial serous membrane**, which prevent the heart from being damaged when it contacts the thoracic cavity wall. Internally, the heart has four distinct chambers: two **atria**, where blood flows into the heart, and two **ventricles**, where blood leaves the heart. The left and right sides of the heart are really two separate circulatory systems. The right side of the heart pumps deoxygenated blood to the lungs to get more oxygen while the left side of the heart pumps freshly-oxygenated blood to the rest of the body.

Structurally, the heart wall is made up of three layers. The outermost layer is the **pericardium** (really, the visceral pericardium), which is serous membrane. The middle layer is the thick **myocardium**. The myocardium is made mostly of cardiac muscle, which allows the heart to contract forcefully in order to pump blood into the arteries. The myocardium also has a network of connective tissue forming the semi-rigid **skeleton of the heart**, which helps the heart keep its shape and allows the heart to recoil during diastole. The innermost layer is the **endocardium**, which is a thin, smooth layer of endothelium that reduces friction and keeps the blood flowing smoothly and efficiently.
The ventricles of the heart pump blood into the body’s largest arteries. The left ventricle pumps blood into the aorta, which carries blood out to all body tissues (except the lungs). The right ventricle pumps blood into the pulmonary trunk, which divides into the left and right pulmonary arteries. The pulmonary arteries carry blood to the lungs.

Blood in the aorta is oxygenated (thus the red color in the figure) – If it wasn’t it wouldn’t make much sense to pump it out to body tissues! Blood flowing through the pulmonary trunk is deoxygenated – so it’s moving to the lungs to get fresh oxygen and get rid of carbon dioxide.
The atria of the heart receive blood from the major veins. The left atrium receives freshly-oxygenated blood from the lungs via the four **pulmonary veins** (two on the left and two on the right). The right atrium receives deoxygenated blood from the rest of the body via the **superior vena cava** (drains blood from the upper part of the body) and the **inferior vena cava** (drains blood from the lower part of the body). The right atrium also drains blood from the heart tissue itself via the **coronary sinus**.
Although the heart is filled with blood, the heart tissue does not use the blood in its chambers for oxygen, nourishment, etc. Instead, the heart tissue gets blood through the **coronary arteries**, which branch off the ascending aorta. Each of the two coronary arteries branches into two major arteries, giving us a total of four major arteries providing blood to the heart tissue. Blockage of any of these arteries can be life-threatening, since heart muscle can die if it doesn’t get enough oxygen. Sometimes, a partially-blocked coronary artery is replaced through **coronary bypass surgery**.

Blood returns from the heart tissue through the **coronary veins**, which drain into a very large vessel at the back of the heart called the **coronary sinus**. Blood from the coronary sinus, then, drains into the right atrium (as does all deoxygenated blood returning to the heart).
External Anatomy

Can you name each part?
Four **valves** in the heart serve two functions: the keep blood flowing in just one direction, and they allow pressure to build up in the ventricles before the blood is forcefully expelled into the arteries. The four valves are categorized as **atrioventricular valves** (which connect each atrium and its ventricle) or **semilunar valves** (which connect each ventricle with its major artery). The AV valves include the **tricuspid valve**, on the right side of the heart, and the **mitral valve** (sometimes called the bicuspid valve) on the left side. These valves are named based on their shapes.

When the atria contract, blood is forced the curved AV valves open (see the figure), forcing blood into the ventricles. As pressure builds up inside the ventricles, and especially as the ventricles contract, the blood pushes the concave sides of the valve cusps closed.
The **semilunar valves** connect each ventricle with its major artery. The **pulmonary valve** is on the right side (connecting the right ventricle with the pulmonary trunk) and the **aortic valve** is on the left side (connecting the left ventricle with the aorta). The flaps of the semilunar valves are shaped like half-moons (thus the name, “semilunar”) and form pockets of tissue, with the convex side facing the ventricles. When the ventricles contract (ventricular systole), blood is forced past the SL valves into the major arteries. When the ventricles relax and expand (remember the skeleton of the heart), “suction” is created in the ventricles, which sucks some blood backwards. This blood fills the pockets of the semilunar valves, making them expand and closing the way for blood. (Note that the suction continues, though, so the expansion of the ventricles (diastole) serves to “suck” blood from the atria into the ventricles).
Both AV valves open and close at the same time, and both SL valves open and close at the same time. This is what causes the sound of “heart beat” The **first heart sound** (informally called “lub”) is the sound of the AV valves closing. The **second heart sound** (“dupp”) is the SL valves closing. If you hear a third heart sound, you have a problem. That means that the valves are not synchronized like they should be. This can be caused, for example, by a problem with conducting action potentials to the ventricles: if the signal reaches the two ventricles at different times, they will contract at different times and the SL valves will close at different times.
Be sure you know the path that blood takes through the heart and valves. You should be able to start in an arbitrary location and trace the entire circuit (including all chambers, major vessels, valves, etc.).