

Project FOCUS
Best Lessons
MIDDLE SCHOOL

Title of Lesson: The Human Cardiovascular System Activity

Theme: Pathway of Blood through the Heart

Unit Number: Chapter 4 **Unit Title:** Body Systems

Performance Standard(s) Covered (enter code):

S7L2

Enduring Standards (objectives of activity):

Habits of Mind

- Asks questions
- Uses numbers to quantify
- Works in a group
- Uses tools to measure and view
- looks at how parts of things are needed
- Describes and compares using physical attributes
- Observes using senses
- Draws and describes observations

Content (key terms and topics covered):

Key Terms:

1. Cardiovascular System = also known as the circulatory system; consists of the heart, blood vessels, and blood; carries needed substances to cells and carries waste products away from cells
2. Heart = a hollow, muscular organ that pumps blood throughout the body; some additional fun facts about the heart:
 - It is about the size of your fists
 - Located in the center of your chest-→ it lies behind the breastbone (sternum) and inside the ribs, these bones help protect the heart from injury
3. Pulse = the number of times your heart beats in a minute; it is your heart rate
4. Blood vessels = a tubular structure carrying blood through tissues and organs; there are 3 different kinds of blood vessels: a vein, artery, and capillary.
5. Veins = blood vessels that carry blood back to the heart
6. Artery = blood vessels that carry blood away from the heart
7. Capillaries = the place where substances are exchanged between the blood and body cells
8. Atrium = each of the two upper chambers of the heart that receives blood that comes into the heart
9. Ventricle = each of the two lower chambers of the heart that pumps blood out of the heart
10. Valve = a flap of tissue in the heart or a vein that prevents blood from flowing backward
11. Aorta = the largest artery in the body

Topics covered:

1. To answer the questions: what is the largest muscle in the body and why?
2. To describe the pathway of blood through the heart and body
3. To understand the gas exchange process that takes place in the capillaries

Abstract (limit 100 characters): This is an active lesson that involves the participation of all the students and a big spacious area/room like a gym or somewhere outdoors with cement. The students will be given the opportunity to play the actual roles of the different components of the heart and experience the pathway of blood through the heart by playing the role of blood.

Details: Arrive early and set up the gym or concrete area by taping a huge rectangle on the floor with two semicircles: one on the top and one on the bottom of the rectangle. The rectangle represents the heart and should be divided into four sections which are going to represent the right/ left atriums and right/left ventricles. The semi-circles represent the capillary in the lungs and capillary in the body. Optional: Include tape down arrows to show the entry way of where blood enters in the heart through the right atrium, the exit where the blood goes out from the right ventricle through the artery to the lungs, the entry back to the left atrium of the heart from the lungs through a vein, and the exits the heart through the aorta to be distributed throughout the body. Begin the lesson by discussing the vocabulary or key terms. Discuss about the components of the heart such as what is their role or purpose in the heart, what happens there, and what type of blood flows through there. Be sure to discuss that your heart makes a lub-dup sound because of the closing and opening of the valves. Then pull up the labeled heart picture/diagram on the smart-board and draw arrows to show the pathway of blood and discuss the components of the heart that was mentioned earlier in the vocabulary terms. In summary, draw a rectangle on the board and split it into 4 parts (this should be mimicking the rectangle that you taped down in the gym or on the concrete). Label each section of the rectangle. Imagine this as a rough representation of the heart and explain the pathway of blood by drawing arrows. This is how I explained the pathway of blood:

1. When the heart muscles relax, deoxygenated blood (= oxygen poor blood has a lot of Carbon dioxide but very little oxygen) will flow into the right atrium.

2. Then the heart will contract to squeeze the blood out of the right atrium through the valves into the right ventricle

3. This contraction is going to open the valve between the atrium and ventricle very quickly, making the lub sound. Also with this contraction, it is going to squeeze and push the blood through an artery that is connected from the heart to the lungs.-> But then the valve will quickly close up to make the Dup sound

****So basically every time the heart contracts you will hear a lub dup sound-> the first sound = lub = when the valves open up then the second sound = dup =when the valves close

4. (At this point the blood is STILL deoxygenated) -> The deoxygenated blood moves through the artery to the lungs where there is a capillary. In the capillary is where the deoxygenated blood is going to be exchanged to oxygenated blood or more in particular: where the exchange of carbon dioxide for oxygen takes place.

5. The oxygenated blood then flows from the lungs into a vein that is going to dump the oxygenated blood into the left atrium

6. When the heart contracts then the valve will open up allowing the oxygenated blood to flow into the left ventricle

7. Then a powerful contraction takes place to push the blood through another valve (called the aortic valve) to get into the aorta which is where the blood is then sent out throughout the body

8. As the blood circulates throughout the whole body it is going to give away its oxygen to different parts of your body that needs it -> now it is deoxygenated -> returns back to the heart for the cycle to repeat all over again

Now that they are familiar with the pathway of blood through the heart, we can play the human cardiovascular activity to test and see how well they do understand the pathway of blood. Take the students to the designated area where you prepare the activity. Explain to them what you taped down and tell them where the right/left atrium is and where the right/left ventricle is. Then show them the general pathway or direction they would be moving through this tape down heart. Next, have the students stand in a straight line and randomly assign all the components of the heart first, then once those are all passed out assign the deoxygenated blood last. The oxygenated blood signs belong to the capillary in the lung because they will be the people who will “exchange” or switch the deoxygenated blood for oxygenated blood. Once all the signs are passed out, have the students one by one tell what sign they have and what the function of that component is. Therefore, the following should be what they should say or understand before starting the activity:

- Oxygenated blood → which means what? -> has a lot of oxygen
- Deoxygenated blood -> which means what? → has very little oxygen and more carbon dioxide
- Capillary in the lungs = where the gas exchange occurs from carbon dioxide (deoxygenated) to oxygen (oxygenated)
- Valves = open and close to let blood through
- Artery to lungs = connects from heart to lungs
- Veins from lungs = connect from lungs to heart
- Aorta = largest artery in the body that carries blood from the left ventricle to the body
- Capillary in the body = where the gas exchange occur from oxygen (oxygenated) to carbon dioxide(deoxygenated)
- Veins from body= connects from wherever in the body to the heart

Basically, (numbers in parenthesis = how many people should play that part)

- Capillary in the lungs (1) (switches the blood peoples sign from deoxygenated to oxygenated)
- Valves (2 people hold hands and let go (say lub) and rejoin (dup) when people come by or when there is a contraction)
 - o Right side of heart (2)
 - o Left side of heart (2)
 - o Aortic Valve (2)

- Artery to lungs (2) (hold hands to form a bridge and act as a police in this activity to make sure only deoxygenated blood goes through, if wrong type of blood then they catch and hold the person preventing them from proceeding through the heart)
- Veins from lungs (2) (hold hands to form a bridge and acts as a police in this activity to make sure only oxygenated blood goes through, if wrong type of blood then they catch and hold the person preventing them from proceeding through the heart)
- Aorta (2) (hold hands to allow only oxygenated blood to go through and go to body-→ run around freely and go to capillary in the body)
- Capillary in the body (1) (switches the blood peoples sign from oxygenated to deoxygenated)
- Veins from body(2)(hold hands to forma a bridge to allow only deoxygenated blood thru to go to the heart or to the right atrium-→ cycle repeats or begins all over again)

Whoever is left = Deoxygenated blood

Try to have all the students run through it at least once and each time 2 new people are playing the role of deoxygenated blood have all the other students switch signs/roles so they can learn about the function of the other heart components.

Materials Needed (type and quantity):

- Plain computer paper to make the signs for the activity
- Tape
- A big spacious room
- Smartboard
- Optional: printed out sheets of heart diagrams and key term sheet

Notes and Tips (general changes, alternative methods, cautions):

There is a beginning part of this activity that involved other hands on activities that dealt with pulse and the use of stethoscopes, but mainly this was my favorite part. If you are interested in the other activities then please refer to the attach document for an actual copy of the lesson plan. This entire lesson plan on the cardiovascular system was divided into two days.

Some general changes that I would make is to definitely prepare all the materials beforehand especially for the human cardiovascular activity. Be sure to explain the instructions in the classroom before taking them to the gym or courtyard. You should try to plan for there to be enough time to allow for all the students to have a chance to walk through the pathway of the heart.

Just be aware that the students can get rowdy and run around. If the rectangle and semi-circles are not big enough then that means that there is not enough space for the students to move and stand apart from one another, which can cause chaos.

Sources/References:

- 1) Mrs. Teresa Johns
- 2) Georgia Department of Education
- 3) Prentice Hall – Science Explorer: Human Body Systems