Cardiovascular System	Grade 5 Biology

Lesson Plan

Safety Notes: Adult supervision and extra help is always appreciated!

Description

Students will learn about the cardiovascular system by identifying the parts of the heart and the lungs, while also identifying their functions and their relation to one another.

Materials

- A pencil or pen
- Calculator
- Timer
- Your body!

Science Background

1. **Cardiovascular System** - The cardiovascular system includes 2 things, the heart (cardio) and the lungs (vascular). The heart and lungs rely on each other to transport blood, nutrients and oxygen throughout your body. This system also helps to remove CO_2. The lungs are responsible for the movement of air, while the heart is responsible for the movement of blood. Thus, the main function of this system is to move oxygenated blood out of the lungs and to your heart from which it is pumped to your entire body before the deoxygenated blood is returned to your heart then to your lungs.

2. **Heart** - The heart is a muscular organ that pumps blood throughout your body through a network of arteries and veins. There are 4 main chambers in the heart; the left ventricle, the right ventricle, the right atrium and the left atrium, and each chamber has its own important role in your heart's function**.** The left atrium of the heart receives oxygenated blood, which is blood pumped full of oxygen, through the pulmonary veins. After being pumped into the left ventricle, the oxygenated blood is then pumped away from the heart into the body through the aorta. The deoxygenated blood, which is full of CO_2, comes back to the heart through 2 main veins; the superior vena cava and the inferior vena cava. The blood enters the heart through the right atrium where it is then pumped into the right ventricle. From there, the deoxygenated blood makes its way to the lungs through the pulmonary artery where it is pumped full of oxygen once again, from there the cycle can begin again.

3. **Lungs** - When you inhale oxygen, either through your mouth or your nose, it first travels through your larynx and down your trachea, which is a long tube that splits into two separate tubes known as bronchi. Each bronchi leads into one of your lungs. The oxygen then flows through narrow tubes inside the lungs called bronchioles until it reaches tiny membranes called alveoli. These membranes are surrounded by tiny blood vessels, called capillaries. This

is where a gas exchange takes place, the oxygen from the alveoli is absorbed by the capillaries and the carbon dioxide (CO2) is transferred from the blood in the capillaries to the alveoli to then be exhaled.

Activity Procedure

For this activity we will be exploring how your cardiovascular system reacts to exercise. To do that, you'll be recording your heart rate, which you can do by either placing two fingers on your inner wrist (palms up) or on the side of your neck just below your chin. Make sure you find your pulse before starting the activity!

1. Perform each exercise below. After you complete each exercise, feel for your pulse and count the beats for 15 seconds then write down your results on the handout!
    a. Rest for 30 seconds
    b. Walk for 30 seconds
    c. Run for 30 seconds
    d. Jumping jack for 30 seconds

Alternative exercises for limited mobility:

    a. Rest for 30 seconds
    b. Punch the air 30 times
    c. Lift an object (ex. full water bottle) using both arms over top head 15 times
    d. Clap your hands as fast as you can for 15 seconds (try to get to 50 claps!)

2. Calculate your heart rate by multiplying your results by 4, which gives you your heart rate in beats per minute (BPM). For example, after walking for 30 seconds Sally counted 20 beats in a 15 second interval, multiplied by 4 she gets a result of 80 bpm).

3. Complete questions 1-4 on the handout.

Debrief

As you will notice from the results of this activity, the more effort used to perform a movement the higher your heart rate (BPM)...but why? Well, when your body is undergoing physical exertion a larger amount of CO_2 is produced in your blood meaning your heart needs to work faster to provide your muscles with enough oxygenated blood to replace the blood being used for the movement. This increased need for oxygen explains the heavy breathing that occurs while you exercise.

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Handout

For this activity we are going to record changes within your cardiovascular system! You'll need a timer to keep track of the time.

Use this equation to calculate your heart rate:

- (Number of heartbeats in 15 seconds) x 4 = BPM (Beats Per Minute)

	Heart rate at rest	**Heart rate after 30s of walking**	**Heart rate after 30s running**	**Heart rate after 30s of jumping jacks**
BPM:				

Alternative exercises for limited mobility

	Heart rate at rest	**Heart rate after 30s of punching the air**	**Heart rate after 30s of lifting an object**	**Heart rate after 30s of hand clapping**
BPM:				

1. Did your pulse increase or decrease after physical activity? When did your heart have the highest BPMs?

   _____

   _____

2. What caused your pulse to change and why?

   _____

   _____

3. Did your breathing rate change after physical activity? If so, why do you think it changed?

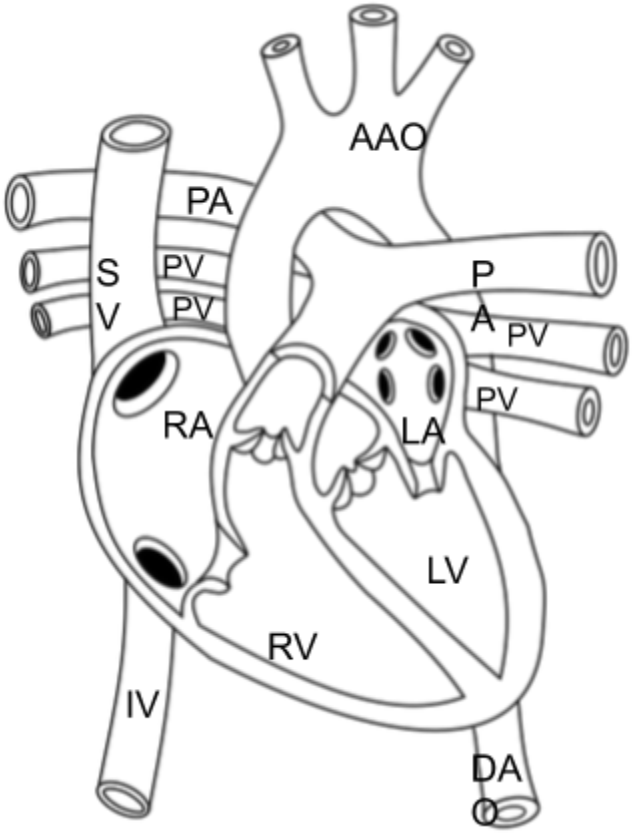
   _____

   _____

4. Lastly, what are the two main organs that work together to create the cardiovascular system?
Bonus: using arrows, draw the direction of blood flowing to and from the heart below!

_____

_____



AAO = Ascending aorta
DAO = Descending aorta
PA = Pulmonary artery
PV = Pulmonary vein
LA = Left Atrium
RA = Right atrium
LV = Left ventricle
LV = Left ventricle
SV= Superior vena cava
IV = Inferior vena cava

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Handout Answers

For this activity we are going to record changes within your cardiovascular system! You'll need a timer to keep track of the time.

Use this equation to calculate your heart rate:

- (Number of heartbeats in 15 seconds) x 4 = BPM (Beats Per Minute)

	Heart rate at rest	**Heart rate after 30s of walking**	**Heart rate after 30s running**	**Heart rate after 30s of jumping jacks**
BPM:		**Should increase**	**Should increase**	**Should increase**

Alternative exercises for limited mobility

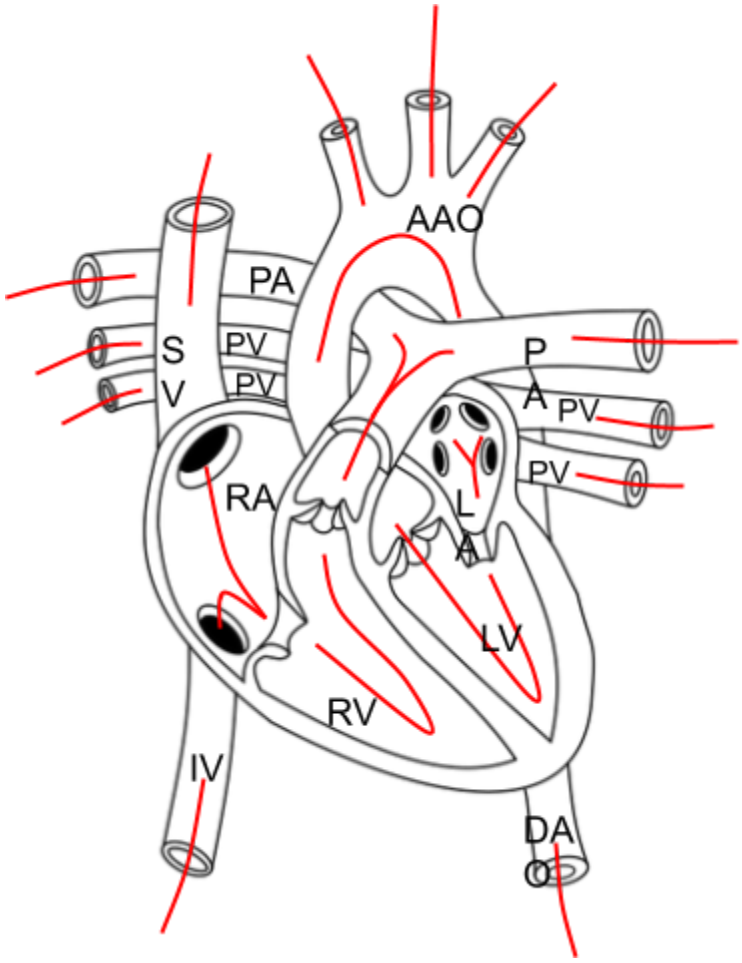
	Heart rate at rest	**Heart rate after 30s of punching the air**	**Heart rate after 30s of lifting an object**	**Heart rate after 30s of hand clapping**
BPM:		**Should increase**	**Should increase**	**Should increase**

1. Did your pulse increase or decrease after physical activity? When did your heart have the highest BPMs?
   Increase. Should be any stage except the first.

2. What caused your pulse to change and why?
   The heart began to beat faster to be able to pump oxygenated blood around the body

3. Did your breathing rate change after physical activity? If so, why do you think it changed?
   Yes because our bodies required more oxygen

4. Lastly, what are the two main organs that work together to create the cardiovascular system?
   Bonus: with arrows, draw the direction of blood flowing to and from the heart!
   Heart and lungs



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