



Science Unit: *Human Anatomy – How Do We Move?*

Lesson 3: *The Circulatory System*

School year: 2007/2008

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Grade level: Presented to grades 3-5; suitable for 3-7 with age-appropriate modifications but optimally matches Grade 5 curriculum.

Duration of lesson: 1 hour and 15 minutes

Objectives

1. Learn about the circulatory system.
2. Observe the effect of physical activity on heart rate.
3. Practice conducting a scientific experiment.

Background Information

This is the third in a six-part series of “Human Anatomy” activities that all focus around the question: “How Do We Move?” The first session focused on the skeletal system and the second session focused on the muscular system. Subsequent sessions will focus on the respiratory system (providing oxygen needed for, and getting rid of carbon dioxide created by, physical activity), digestive system (providing the energy we need to undertake physical activity), and the nervous system (the system that coordinates the activity).

Vocabulary

Word:

heart	a pump, made out of a special type of muscle, that pushes blood through the body
blood	a fluid, made up of water, special cells (called blood cells) and nutrients, that flows through the blood vessels in the body
blood vessels	tubes within the body, through which blood flows. There are several types: (a) arteries, (b) veins, (c) capillaries
artery	a type of blood vessel; blood leaving the heart and going out to the different parts of the body flows through arteries
vein	a type of blood vessel; blood returning from the different parts of the body flows through veins to get back to the heart
capillaries	a type of blood vessel; they are the tiniest blood vessel and they spread out through the tissue (e.g., muscle) to allow the contents of blood (such as oxygen, carbon dioxide and nutrients) to flow into & out of the tissue

Materials

- model of a heart
- poster of the human body, showing blood vessels
- worksheet (see last page of this document)



In the Classroom

Introductory Discussion

1. Have the children feel their pulse. Tell them about how they can feel the blood pumping through their blood vessel either at the wrist or in the neck.
 - What is happening in your wrist (or your neck) when you feel your pulse?
 - What happens to your pulse when you move around (e.g., running or doing jumping jacks)?
2. Short description of other items to discuss or review.
 - Blood is a liquid that transports things around the body to the places they need to go.
 - Our muscles need oxygen in order to work. We take in oxygen (from the air) in our lungs, but it needs to get from our lungs to the muscles in our legs so we can run. Our muscles also need a source of energy in order to work. We take in energy in the food we eat, but it needs to get from our digestive tract to our muscles. The blood brings the oxygen and energy sources from the lungs and the digestive tract to our muscles.
 - When our muscles work, they produce waste products that need to be removed. For example, they produce carbon dioxide, which needs to get back to the lungs so we can breath it out.
 - In order to get the blood (and its oxygen and energy sources) to our muscles (and then back from our muscles to our heart), the blood has to be moving around the body. To do this we have a heart, which is a big muscle that squeezes, pushing blood around the body (can show students the heart model), and blood vessels, which are the tubes that the blood flows through. Having a bunch of tubes for the blood to flow through makes sure that the blood goes to the right place!
 - You can talk about how the heart is a muscle and, just like the muscles we learned about in the first session ("The Muscular System") you can make your heart stronger with regular exercise.
3. Briefly describe science experiment/activity.
 - In today's experiment, students will hypothesize about the effect of different types of activity on their heart rate.
 - After making hypotheses, the students will test it by counting their heart rate when they are lying still and then again after doing some sort of exercise.
4. Briefly describe the processes of science that the students will focus on (prediction/hypothesis, observations, recording results, conclusions.)
 - Students will be making a hypothesis (what do they think will happen to their heart rate when they do something active).
 - Students will be making observations (counting their heart rate)
 - Students will be recording their observations (on the worksheet at the end of this document)
 - Students will be drawing conclusions (comparing their results to their hypothesis and talking about why they got the results they did)



Science Activity/Experiment

Experiment Title: How Fast Does Your Heart Beat?

Purpose of Experiment: To test the effect of different types of activities on your how fast your heart beats.

Experimental Treatments: Movement.

Control treatment:	Lying still
Test treatment:	Different activities (e.g., walking, running, jumping jacks)

Prediction or Hypothesis: Before making your prediction (or hypothesis), it helps to start with a question, or make observations and then ask a question. Use your prior knowledge of the role of the heart to predict what you think will happen when you are physically active. Record your prediction based on the following question: What do you think will happen to your heart rate when running/do jumping jacks/etc. compared to when you are lying still?

Methods and Instructions:

Set-up prior to experiment: None.

1. Ask students to name some physical activities they could do in the classroom (e.g., jumping jacks, running). Students will chose an activity and record their choice on their worksheet.
2. Students make a hypothesis about what they think will happen to their heart rate when they are doing that physical activity compared to when they are lying still. Students will record this hypothesis on their worksheet.
3. Students will all lie down and count how many times their heart beats while the teacher or scientist times them for 20 seconds.
4. Students will record their count on their worksheet.
5. Students will engage in their chosen physical activity for 1 minute, while the teacher or scientist keeps track of the time.
6. Students will and count how many times their heart beats while the teacher or scientist times them for 20 seconds.
7. Students will record their count on their worksheet.
8. Students will compare their number of heart beats while lying down compared to the number of heart beats after doing their chosen physical activity. Students will record their conclusion as to which resulted in more heart beats.

Closure Discussion

1. What made your heart beat faster – lying still or moving around?
2. Remembering why the role of the heart is, why do you think that your heart beats faster when you are moving around compared to when you are lying still?
3. What is your favourite kind of physical activity?



SCIENTIST IN RESIDENCE PROGRAM

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Extension of Lesson Plan

1. Go on a field trip to go skating, snowshowing, hiking, etc. Have students take their pulse after engaging in these physical activities.
2. Have children who are on sports team take their pulse during their games and report back to class the next day.



The Cardiovascular System: Getting Things Where They Need To Go.

WORKSHEET

Control: _____ No Movement (lying still) _____

Experimental Treatment: _____

Pick a Type of Movement (example: running)

Hypothesis:

What do you think will make your heart beat faster: no movement (lying still) or moving around? _____

Observations:

Number of times your heart beat in 20 seconds when lying still: _____

Number of times your heart beat in 20 seconds after moving around: _____

Conclusion:

My heart beat faster / slower (circle one) after moving around than when I was lying still.

Why do you think your heart beat faster / slower (circle one) after moving around than when you were lying still?
