



What Happens When You Move? A Look at Cardiovascular Health Lesson Plan

Subject Area: Science

Grade Level: Grades 6-8

Lesson Summary:

Students use an investigative, hands-on approach to explore how physical activity affects the body. With teaching strategies such as guided questions, hands-on activities and group discussions, students develop a model to describe and explain the effects and benefits of physical activity on the human body.

Lesson Duration: Up to two class periods (90 minutes)

Essential Questions:

- What methods are used to measure heart rate?
- What is the relationship between physical activity and physiological changes, such as heart rate?
- How does physical activity intensity affect physiology?

Objectives:

Students will:

- Describe methods to measure heart rate
- Infer relationship between physical activity and physiological changes, including heart rate
- Analyze effects of different physical activity intensity on physiology
- Create a simple feedback model to explain physiological changes resulting from physical activity

Standards:

- **Next Generation Science Standards**
 - MS-LS1-3 Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
 - MS-LS1-7 Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
 - MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.
- **Common Core State Standards**
 - RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
 - RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
 - RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
 - WHST.6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
 - WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
 - MP.2 Reason abstractly and quantitatively.
 - 6.SP.A.1-3 Develop understanding of statistical variability.
 - 6.SP.B.4-5 Summarize and describe distributions.
 - 7.SP.A.1-2 Use random sampling to draw inferences about a population.

Materials

- **The Heart of the Matter** reading passage
- **How Fit Are We?** worksheet
- Timer (to count seconds)
- Calculator
- **Team Fitness** worksheet
- **Healthy Habits** worksheet
- **NSTA: Peer-review sheet used by students during the double-blind peer review**
 - <https://www.nsta.org/highschool/connections/200911PeerReviewSheet.pdf>
- Computer with Internet access

Procedure:

ENGAGE

1. Ask a few students to share their favorite sports and describe what is most enjoyable to them about the sport.
2. Have students write a short passage titled: “My favorite sport and what I like most about it.”
3. Ask students to think about how their bodies change when they play their sport. Ask guiding questions such as the following:
 - How does your breathing change?
 - Can you feel your heart beating faster?
 - What other ways do you feel different?
4. Students write in their notes a description of the changes that occur during physical activity such as playing a sport.
5. Explain to students that they will create a model of changes in the body during physical activity and learn the health benefits of physical activity.

EXPLORE

1. Students read the **Reading Passage: The Heart of the Matter**, including the information on the effects of physical activity on heart rate (Fun Factitos).
2. Explain to students that their task is to conduct an experiment to learn how physical activity affects their body, and thereby benefits health.
3. Present to students the guiding question, “How do physiological changes caused by physical activity benefit health?”
4. Students work in small groups to complete the hands-on activity, including completion of the following the **How Fit are We?** and **Team Fitness** worksheets.
5. Students analyze group and class data to get statistics.
6. Students enter class data into a spreadsheet.

EXPLAIN

1. Review the guiding question, “How do physiological changes caused by physical activity benefit health?”
2. Students work in their groups to develop answers to the guiding question. Ensure groups focus on explaining the connection between physiological changes they observed during the activity to the health benefits of physical activity?
3. Lead a class discussion of the core idea that physical activity benefits health.
4. Encourage groups to consider ways to improve the investigation based on scientific inquiry.

5. Each group creates a visual graphic organizer (e.g., concept map, slide presentation, research poster) to present data.
6. Groups present their graphic organizers, along with hypotheses to explain how physiological changes caused by physical activity benefit health.

ELABORATE

1. To expand on ideas encountered earlier, students work in small groups to investigate the basis of physiological changes during physical activity. Provide students the following concepts:
 - Energy conversion
 - Energy flow
 - Food energy
 - Chemical energy
 - Thermal energy
 - Work energy
2. Challenge students to discover the connection between these concepts. Groups can research online to develop a model of energy transformation. If needed, ask a guiding question such as, “How is energy in food converted to work energy that is needed to perform physical activity?”
3. Students create a concept map to explain their model. If time allows, advanced students can include the idea of negative feedback loops to explain physiological changes resulting from physical activity.

EVALUATE

1. Each student works individually to write an investigative report based on the activity and their explanations.
2. Students work in groups for double-blind peer review of reports. Provide each student a random number. Keep a list of each student’s number. Students write their assigned numbers on their reports, but not their names.
3. Write all the numbers on a slip of paper. Each group pulls out a slip and reviews the paper that corresponds to that number. After completing their review, the group pulls out another slip and reviews the paper again.
4. Each group completes the information on the **NSTA Peer Review Sheet**.
5. Based on your key of student numbers, return the feedback to individual students.
6. Continue until all student papers are reviewed.
7. Students revise reports based on feedback then submit for evaluation. Ensure that the reports do answer each of the lesson questions.

Additional Resources

- **American Heart Association: Life’s Simple 7 for Kids** www.heart.org/LS7forKids **NSTA: Peer-review sheet used by students during the double-blind peer review**
 - <https://www.nsta.org/highschool/connections/200911PeerReviewSheet.pdf>

FOLLOW-UP

1. Working with a partner, students complete the responses in the **Healthy Habits** worksheet.
2. Students complete the **Active Homework Break** worksheet to reinforce the content of this lesson.

The Heart of the Matter

The heart is made up of a special type of muscle called **cardiac muscle**. This type of muscle is found only in your heart – nowhere else in your body. Your heart is only about the size of your fist, but it pumps blood throughout your entire body and beats about 100,000 times a day. The blood transports oxygen and other important nutrients. It also transports specialized immune cells and waste materials. The work of the heart is vital to the body's functioning. If the heart is unhealthy, the body can suffer severe health effects overall. Diseases of the cardiovascular system (heart and blood vessels) are the main cause of death among Americans today. Cardiac diseases often start as small problems, but these can snowball over time, leading to major heart problems. Some people may be more likely to get heart disease than others due to certain risk factors.

The two types of risk factors for heart disease are **controllable** and **uncontrollable**. Some risk factors for heart disease are beyond a person's control. These include gender, age, family health history or genetics. However, we can control other risk factors. These include not smoking, eating a healthy diet, and ensuring that children get at least 60 minutes of physical activity every day. By limiting controllable risk factors, we can maintain or even increase the health of the cardiovascular system.

Adapted from [What Happens When You Move? A Look at Cardiovascular Health](#)

How Much Are Our Hearts Beating?

Work with your group to complete the tasks below for each group member. Use the Team Fitness worksheet to record your data and find the average heart beat of your group!

1. Measure resting heart rate by counting the carotid or radial pulse.
2. To locate the carotid pulse, do the following:
 - a. Place index and middle fingers of right hand directly under right ear (or left hand under left ear).
 - b. Next slide fingers down until they are directly under the jawbone, pressing lightly. Each pulse is a heartbeat.
3. To locate the radial pulse, do the following:
 - a. Place index and middle fingers on the outside of opposite wrist, just below the base of your thumb. Each pulse is a heartbeat.
4. Measure pulse rate.
5. Count the number of beats in 10 seconds. Multiply that number by six to calculate the average number of heart beats per minute. Record the results in the worksheet.
6. March in place (moderate physical activity) for one minute. Take the pulse for 10 seconds, using the same method. Calculate the average number of heartbeats per minute. Record the results in the worksheet.
7. Do jumping jacks (vigorous physical activity) for one minute and repeat the procedure for measuring and calculating the heart rate.
8. Immediately after the jumping jacks physical activity, continue to measure the pulse every 15 seconds. Record in the total time needed for the pulse rate to return to the resting physical activity pulse rate.
9. Complete the calculations on the worksheet and enter your team's heartbeat.
10. Collect the heart beats from all the teams and calculate the class average heartbeat (= total of all team fitness scores/number of teams).

Team Heart Beat

Team Name: _____

Team Member	Resting		Moderate Physical Activity		Vigorous Physical Activity		
	# beats	x 6	# beats	x 6	# beats	x 6	Cool-down time
TOTAL							
TEAM AVERAGE (TOTAL/#TEAM MEMBERS)							

TEAM HEART BEAT AVERAGE* _____
 *Average team cool-down time after vigorous physical activity

CLASS HEART BEAT AVERAGE* _____
 *Average of all team heart beats

TEAM RANK HEART BEAT* _____
 *Your team's rank in class heart beat

Healthy Habits

Student Name: _____

Date: _____

Name of Partner: _____

Work with your partner to complete your responses in the space provided.

1. Why is it important to participate in physical activity every day for at least 60 minutes?
2. Bad health habits such as poor diet, lack of physical activity, and smoking often start early in life. What role, if any, can your school play in helping students learn healthy habits?
3. List at least three things you can do to help your friends and family develop healthy habits.
4. How does what you learned about the importance of your heart health and the risk factors of heart health influence how you feel about some of your habits?
5. Think about your health today (how much physical activity do you participate in daily, what you eat, etc.). What healthy habits do you currently have that you should continue as you grow older?
6. List two habits you would like to change now to live healthier.

Active Homework Break Worksheet

Student Name: _____

Date: _____

1. Teach your family members how to take their heart rate using the method you learned in class.
2. Measure resting heart rate by finding radial pulse (at the wrist) or carotid pulse (at the neck). Count the number of beats in 10 seconds.
3. Multiply that number by six to calculate the average number of heart beats per minute.
4. Together, your family and you go on a 20-minute walk.
5. Ask everyone take their heart rate four times:
 - a. Before going on the 20 minute walk
 - b. After walking for 10 minutes
 - c. Right after completing the 20-minute walk
 - d. 10 minutes after you finish the walk
6. Ask everyone share what their heart rate was for the four different times and discuss what happened to your heart rate and why.
7. Take your heart rate during other physical activities such as jogging, biking or swimming.