

Science
Life Science
Grade 7



Lesson Plans

“Your Body’s Highway”

Subject:

Science: Life Science

Level:

Grade 7

Abstract:

Using inquiry-based lessons on the structure and function of the organs of the circulatory system, students will be able to describe the flow of blood through various organisms with emphasis on the human body. The following points will be emphasized:

- Students will be able to describe the functions of the mammalian heart.
- Students will be able to describe the four chambers of the heart.
- Students will be able to describe the functions of the valves of the heart.
- Students will be able to describe the structural and functional difference between arteries and veins.
- Students will be able to find their pulse and measure their pulse rate before and after exercise.
- Students will be able to take data collected during classroom activities to statistically analyze it using an Excel spreadsheet.
- Students will be able to write a summary that explains the classroom statistics.

Invitation:

How long can you survive without food? People can live without food for a couple of weeks. How long can you survive without water? People can live without water for a couple of days. How long can people live without oxygen? Without oxygen, our cells can only survive for a few minutes. As we have learned, oxygen is important for cellular respiration. Every cell in our bodies needs oxygen and if oxygen is not delivered to those cells, the cells can die. How does oxygen get to all the cells in the body? The circulatory system is the body's transport system.

How many of you can find your pulse? What is a pulse? What causes a pulse? How does exercise affect the pulse rate? Many people rely on a pulse rate to monitor their health. These lessons will help explain why the pulse rate can be a way to rate the health of an individual.

Situations:

Where: These activities will take place in the science lab, outside, and in the computer laboratory.

When: These lessons will take place in Life Science Class after Cellular Respiration and The Respiratory System have already been covered.

How Long: These lessons will take between 5 days and 2 weeks, depending on the depth of material covered and students' computer knowledge. Without instruction on the workings of the computer programs, this lesson will take five hour-long classes.

Tasks:**Task 1:**

Students will complete the first half of an anticipation guide. (See the "Worksheet: Anticipation Guide" attachment.) This exercise is intended to spark interest and to draw upon students' prior knowledge to answer the questions. It is intended to allow students to make connections from previously learned material with the material from this lesson. After the lesson is completed, the students will revisit the questions and determine how much material was learned during this lesson.

Task 2:

The students will work in pairs to determine the direction of blood flow in the vessels of the hands or arms. (See the "Worksheet: Direction of Blood Flow" attachment.)

Task 3: The teacher will lead a discussion of the circulatory system. The major structures and functions will be stressed. The students will fill out a worksheet containing a diagram of a modified circulatory system. (See the "Worksheet: Two Loops of the Circulatory System" attachment.)

Task 4: The students will work in pairs to examine prepared slides of arteries and veins under the microscope. (See the "Worksheet: Structures of the Arteries and the Veins" attachment.)

Task 5:

The students will examine a human heart model and cow heart. (See the "Worksheet: Heart Model and Cow Heart" attachment.)

Task 6:

The students will work in pairs to determine their pulse rates under different conditions: resting, immediately after exercise, one minute after exercise, and three minutes after exercise. (See the "Worksheet: What is your Pulse

Rate?" attachment.) The students will then use Excel to calculate the average of three trials and to construct a line graph that displays the data. (See the "Step Sheet: Creating a Data Table and Line Graph" and "Sample: Line Graph" attachments.)

Task 7:

Students will write a formal lab report that will include an interpretation of the line graph. The line graphs will be copied from Excel and inserted into Word. (See the "Step Sheet" Inserting Graphs from Excel" attachment.) The formal lab report will include:

- a. The investigative question: How does exercise affect the heart rate?
- b. Hypothesis. Should be logical and include information discussed in class.
- c. Procedure (methods).
- d. Results (contains the copied line graphs from Excel).
- e. Conclusions. This includes the students' interpretations of the graphs.

Task 8:

The students will complete the final section of the anticipation guide. This will allow the students to revisit the questions presented to them at the beginning of the lesson. They will be able to self-assess their understanding of the material.

Interactions:

Class: The teacher will lead a discussion that explains the structure and function of the circulatory system. Emphasis will be placed on the heart, arteries, and veins.

Partners: Students will work with partners to determine the flow of blood in each other's arm. In addition, students will work with partners to determine their pulse rates. They will also work in pairs with the microscope to analyze the different structures of arteries and veins.

Individual: The students will execute and analyze the line charts using Excel. Individuals will write lab reports that explain the procedures and results of the pulse rate laboratory exercise.

Standards:

California Seventh Grade Life Science Standards:

- 5.b. Students know organ systems function because of contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system.
- 6.j. Students know that contractions of the heart generate blood pressure and that heart valves prevent backflow of blood in the circulatory system.
- 7.a. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
- 7.b. Use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.
- 7.c. Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.
- 7.d. Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (e.g., motion of Earth's plates and cell structure).
- 7.e. Communicate the steps and results from an investigation in written reports and oral presentations.

Assessments:

- Informal Assessments: During Tasks 2-6 the teacher will be conducting informal assessments of the students understanding of the subject. These assessments will consist of group and individual oral questions and worksheet questions.
- "Worksheet: Anticipation Guide:" The students answer questions about the Circulatory System prior to the lesson and then return to answer them after the lesson. This allows the teacher to assess the amount of material learned by the students.
- "Your Body's Highway Rubric:" Rubric completed by the teacher. This assesses the student's ability to follow the steps on the Scientific Method and to describe information presented in graphs.

Tools:

- Microsoft Word
- Microsoft Excel
- Compound microscopes
- Prepared microscope slides of arteries and veins
- Human heart model
- Cow heart

Project Tips and Alternatives:

Tip #1:

The size of the group can be increased or decreased depending on the number of students in the class.

Tip #2:

Proper use of the microscope may be reviewed or explained depending on the students' experience with the microscope.

Tip #3:

If the students are not familiar with Microsoft Excel, you might want to review the attached Excel step sheets with your students.

Tip #4:

Depending on the students' prior knowledge, it may be useful to review the steps of the scientific method.

Tip #5:

The cow heart is a great learning tool for students to experience. However there are students that have reasons for not dissecting. If the students choose not to dissect, an alternative assignment could be the NOVA web page (see resources) because it has a great section on the heart.

Attachments:

- "Worksheet: Anticipation Guide"
- "Worksheet Answers: Anticipation Guide"
- "Worksheet: Direction of Blood Flow"
- "Worksheet: Two Loops of the Circulatory System"
- "Worksheet: Structures of the Arteries and the Veins"
- "Worksheet: Heart Model and Cow Heart"
- "Worksheet: What is Your Pulse Rate?"
- "Step Sheet: Creating a Data Table and Line Graph"
- "Sample: Line Graph"
- "Your Body's Highway Rubric"
- "Step Sheet: Inserting Graphs from Excel"

Web Resources – Content:

A list of [linked web resources](#) related to the content of this lesson can be found on the Lesson Page.

Web Resources – Excel:

A list of linked web [resources for Excel](#) can be found on the Excel Resources page.

Assistive Technology:

Please refer to the [Assistive Technology section](#) for information on methods and devices to help ensure that all students have access to the curricula in the least restrictive environment.