

Lesson: The Circulatory System and Comparative Anatomy



Objective:

Students will understand the components of the circulatory system and their functions in both humans and local animals. They will create visual representations of the circulatory system for a human and a local animal using invisible ink. Finally, they will compare the circulatory systems of humans and local animals through a reflective writing activity.

Competencies Covered:

- Make observations in familiar or unfamiliar contexts
- Make predictions about the findings of their inquiry
- With support, plan appropriate investigations to answer their questions or solve problems they have identified
- Observe, measure, and record data, using appropriate tools, including digital technologies Experience and interpret the local environment
- Identify patterns and connections in data
- Identify some of the assumptions in secondary sources
- Demonstrate an understanding and appreciation of evidence
- Transfer and apply learning to new situations
- Generate and introduce new or refined ideas when problem solving
- Communicate ideas, explanations, and processes in a variety of ways

Materials:

- Baking soda (2 tablespoons) per student
- Hot water (1 cup) per student
- Hand sanitizer (8 squirts) per student
- Turmeric (1-2 pinches) per student
- Watercolor paper (1 sheet) per student
- Paintbrushes or cotton swabs
- Reference materials on the circulatory system

Background Information:

Introduction to the Circulatory System:

The circulatory system is one of the most crucial systems in the human body, responsible for the transportation of blood and essential substances throughout the body. It consists of the heart, blood vessels, and blood. Blood serves as a carrier of oxygen, nutrients, hormones, and immune cells to various parts of the body while removing waste products and carbon dioxide.

5048 – 264 Street, Aldergrove, BC Canada V4W 1N7
Tel: 604.856.6825 | gvzoo.com



The Human Heart:

The heart is a powerful, muscular organ located in the chest slightly to the left. It is responsible for pumping blood through the blood vessels to reach all the body's tissues and organs. The heart works continuously, beating approximately 60 to 100 times per minute when at rest, and can increase its rate during physical activities or times of stress.

Blood Vessels:

Blood vessels are like a vast network of tubes that carry blood throughout the body. There are three main types of blood vessels: arteries, veins, and capillaries. Arteries carry oxygenated blood away from the heart to supply the body's organs and tissues. Veins transport deoxygenated blood back to the heart. Capillaries are tiny, thin-walled vessels that allow for the exchange of nutrients and waste products between the blood and body tissues.

The Role of Blood:

Blood is a remarkable fluid composed of plasma, red blood cells, white blood cells, and platelets. Plasma is the liquid component of blood that carries blood cells and other substances. Red blood cells contain hemoglobin, a protein that binds to oxygen and carries it to body tissues. White blood cells are part of the immune system, defending the body against infections and diseases. Platelets are responsible for blood clotting to prevent excessive bleeding.

Comparative Anatomy:

Comparative anatomy is the study of similarities and differences in the anatomical structures of different organisms. By comparing the anatomy of various species, scientists can gain insights into evolutionary relationships and adaptations to different environments.

Procedure:

Introduction (15minutes):

- Begin the lesson by discussing the importance of the circulatory system in the human body and its function in delivering nutrients and oxygen to all cells while removing waste products.
- Introduce the concept of comparative anatomy and explain that animals also have circulatory systems, which may have similarities and differences compared to humans.
- Show pictures or diagrams of local animals and briefly discuss the diversity of animals in the local environment.

Activity: Creating the Circulatory System Models (30 minutes):

- Provide each student with the necessary materials: baking soda, hot water, hand sanitizer, turmeric, watercolor paper, and paintbrushes/cotton swabs.
- Instruct students to mix 2 tablespoons of baking soda with 1 cup of hot water to create invisible ink. Let the water cool down slightly before using it for the activity.
- Ask students to draw the outline of a human silhouette and the silhouette of a local animal on the watercolor paper side by side.
- Using the invisible ink (baking soda mixture), have the students paint a heart and blood vessels throughout the body of both the human and the animal. Allow the pictures to dry for 10-15 minutes.
- While waiting for the pictures to dry, have students mix the hand sanitizer and turmeric together to create the reagent that will reveal the hidden blood vessels.
- After the pictures are dry, instruct the students to paint the reagent over the picture, revealing the hidden blood vessels underneath. Allow the pictures to dry for another 10-15 minutes.
- Once the pictures are completely dry, ask the students to label the major parts of the circulatory system on both the human and the animal images. (e.g., heart, veins/arteries, capillaries, etc.)

Reflective Writing Activity (15 minutes):

- Provide students with a list of reflection prompts related to the circulatory systems they created.
- Encourage students to write a short reflection answering the provided prompts. They should consider the similarities and differences between the human and animal circulatory systems.
- Allow students to share their reflections with the class if they feel comfortable doing so.

Conclusion (5 minutes):

- Gather the students together and discuss the importance of understanding the circulatory systems of both humans and animals.
- Emphasize the value of comparative anatomy in helping us appreciate the diversity of life and the similarities that connect all living organisms.
- Encourage students to continue exploring and learning about the amazing world of biology and the wonders of the circulatory system.

Assessment:

During the activity, observe students' engagement and understanding as they create their circulatory system models and label the major parts. Assess their reflections to gauge their comprehension of the similarities and differences between human and animal circulatory systems.

