Student Exploration: Circulatory System

Vocabulary: artery, blood vessel, capillary, heart, heart valves, platelet, red blood cell, urea, vein, white blood cell

Gizmo Warm-up

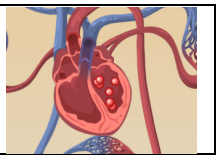
The *Circulatory System* Gizmo shows the **heart** and **blood vessels** that make up the **circulatory system**. Look at the heart.

1. How many chambers does the heart have? _____

   Do you see tiny "doors" that open and close as blood is pumped through the heart? How many are there? _____These are **heart valves**. Heart valves control the flow of blood through the heart.

2. Challenge: Why do you think the left atrium and left ventricle are shown on the *right* side of the diagram?

_____

Activity A: **Blood flow**	Get the Gizmo ready: • Turn off **Show labels**. • Turn on **Show blood flow**.	

Question: How does blood flow through the heart?

1. Observe: Blood in each chamber of the heart is represented by little balls. Click **Play** ( ) and observe the balls as they move through the heart and lungs.

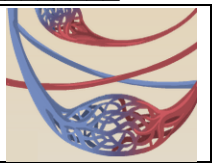
2. Collect data: Use the **syringe** to collect a blood sample from the **right** ventricle (on the left side of the heart diagram). Look at the **Data from blood sample** numbers.

   A. What is the concentration of oxygen in this sample? _____
   B. What is the concentration of carbon dioxide in this sample? _____

3. Collect data: Now collect a blood sample from the left atrium.
   A. What is the concentration of oxygen in this sample? _____
   B. What is the concentration of carbon dioxide in this sample? _____

4. Draw conclusions: Between the right ventricle and the left atrium, blood goes through the lungs. Based on the data you have collected; how do the circulatory & respiratory systems work together?

_____

Activity B: **Blood circulation**	Get the Gizmo ready: • Check that **Show labels** is on. • Turn on **Show blood flow**.	

Question: How is blood carried to different parts of the body?

1. Observe: Click **Play** and watch the blood after it leaves the left ventricle. What are some places that blood goes after leaving the heart? _____

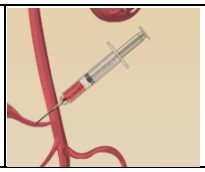
2. Compare: The Gizmo shows three types of blood vessels. **Arteries** carry blood away from the heart, **capillaries** are small vessels that carry blood to body cells, and **veins** carry blood back to the heart. Locate examples of arteries, veins, and capillaries.

   Use the **syringe** to take blood samples from several different veins and arteries.

   A. Which type of blood vessel *usually* carries oxygen-rich blood? _____

   B. Which type of blood vessel *usually* carries oxygen-poor blood? _____

   C. In which type of blood vessel is oxygen released into body cells? _____

Extension: **What's in your blood?**	Get the Gizmo ready: • Take a blood sample from any blood vessel using the **syringe**.	

Question: What is inside blood?

1. Observe: Look at the **Microscopic view of blood sample**. Sketch what you see in the space at right.

   Find and label the following objects in your sketch:

   - **Red blood cells** (small, round cells that carry oxygen)
   - **White blood cells** (large, irregular cells that fight disease)
   - **Platelets** (tiny fragments that help to stop bleeding when you are cut)

2. Collect data: Blood carries many vital substances. Four of these are listed above the **Microscopic view**. Oxygen and sugar are **needed** by all body cells. Carbon dioxide and urea are **waste** products. What are the concentrations of each substance in this sample?

   Oxygen: _____ Carbon dioxide: _____ Sugar: _____ Urea: _____

3. Investigate: Take samples of blood from all over the body. Try to determine where sugar enters the blood, and where it is removed.

   A. Where does sugar enter the blood? _____

   B. How can you tell where sugar enters the blood? _____

   C. Where is sugar removed from the blood? _____

   D. How can you tell? _____

4. Investigate: Take blood samples to determine where urea enters the blood and is removed.

   A. Where does urea enter the blood? _____

   B. Where is urea removed from the blood? _____