CIRCULATORY SYSTEM
What is the Circulatory System?

- The system of the body responsible for internal transport.

- Composed of the heart, blood vessels, lymphatic vessels, lymph, and the blood.

- The Circulatory Systems is a combination of vessels and muscle that help and control the flow of blood around the body.

- This is known as CIRCULATION.
The Main Parts of the Circulatory System

- The main parts of the Circulatory System include:
  - The Heart
  - Arteries (within the heart also)
  - Veins
  - Capillaries
Your Blood Vessels: Pathway of Circulation

- 3 types of vessels
  - Arteries
  - Capillaries
  - Veins
Artery vs. Vein

Fox, Stuart I.
Human Physiology 4th Brown Publishers
Arteries:
carries blood *Away from* heart

- Large
- Thick-walled, Muscular
- Elastic
- Oxygenated blood
  - Exception Pulmonary Artery
- Carried under great pressure
- Steady pulsating

**Arterioles**: smaller vessels, enter tissue
Veins:
Carries blood to heart

- Carries blood that contains waste and CO\textsubscript{2}
  - Exception pulmonary vein
- Blood not under much pressure
- **Valves** to prevent much gravity pull

Venules: larger than capillaries
Varicose Veins
Damaged Valves in Veins
Anatomy of the Heart

• The human heart is a muscular pump composed of cardiac muscle that allows for continued rhythmic contraction.

• Cardiac muscle is a involuntary muscle

• It is located in the middle of your chest right behind the sternum and just to the left.

• It is approximately the size of your fist.
At REST, the heart pumps about 5 QUARTS of blood a minute.

During EXTREME EXERTION (exercise) it can pump 40 quarts a minute.
Anatomy of the Heart

• Using the Veterinary Medical Terminology text:
  – Trace Figure 8-3 on page 111.
  – Use Blue and Red to represent veins and arteries.
The Structures of the Heart

**Superior Vena Cava**
Large vein that brings oxygen-poor blood from the upper part of the body to the right atrium

**Pulmonary Veins**
Bring oxygen-rich blood from each of the lungs to the left atrium

**Pulmonary Valve**
Prevents blood from flowing back into the right ventricle after it has entered the pulmonary artery

**Tricuspid Valve**
Prevents blood from flowing back into the right atrium after it has entered the right ventricle

**Inferior Vena Cava**
Vein that brings oxygen-poor blood from the lower part of the body to the right atrium

**Right Atrium**

**Aorta**
Brings oxygen-rich blood from the left ventricle to the rest of the body

**Pulmonary Arteries**
Bring oxygen-poor blood to the lungs

**Left Atrium**

**Aortic Valve**
Prevents blood from flowing back into the left ventricle after it has entered the aorta

**Mitral Valve**
Prevents blood from flowing back into the left atrium after it has entered the left ventricle

**Left Ventricle**

**Septum**
Protective Layers of the Heart

• While the epicardium forms the outer layer of the heart

• The myocardium forms the middle layer

• The endocardium the innermost layer.
• The coronary arteries - arteries that provide blood to the heart's own cells - travel across the epicardium.

• The muscular myocardium is the thickest layer and the workhorse of the heart.

• The endocardium has a smooth inner surface to allow blood to flow easily through the heart's chambers. The heart's valves are also part of the endocardium.
Anatomy of the Heart

• There are four chambers in the heart - two atria and two ventricles.
Parts of the Heart

• The atria (one is called an atrium):
  – Responsible for receiving blood from the veins leading to the heart.
  – When they contract, they pump blood into the ventricles

• The ventricles:
  – The real workhorses
  – They must force the blood away from the heart with sufficient power to push the blood all the way back to the heart.
• Between the atria and the ventricles are valves

• These are overlapping layers of tissue that allow blood to flow only in one direction.
Assignment: Define each of the valves in the heart.
Valves Defined:

- **Tricuspid valve**: is between the right atrium and right ventricle.

- **Pulmonary or pulmonic valve**: is between the right ventricle and the pulmonary artery.

- **Mitral valve**: is between the left atrium and left ventricle.

- **Aortic valve**: is between the left ventricle and the aorta.
Heart Disease Assignment:

Diseases:
1. Cardiovascular Disease
2. Heart Attack
3. Angina
4. Cardiac Arrest
5. Arteriosclerosis/Atherosclerosis
6. Heart Valve Disease
7. Hypertension Heart Disease
8. High Blood Pressure
9. Coronary Heart Disease
10. Cardiomyopathy

Assignment:
• Research the heart disease
• Include:
  – mechanism of injury/disease
  – signs/symptoms
  – treatment
• BONUS: Rehabilitation
• Create an Informational Flyer about the disease
• Create a Public Service Commercial about disease and prevention.
Requirements:

Poster: (20 points: 5 points each)
- Should include information about disease
- Should include prevention methods
- Should be eye catching
- Creativity

Public Service commercial: (50 points: 10 points each)
- Should be between 2-3 minutes long
- Should include description of disease
- Give ideas for prevention or disease
- Include any facts about disease
- Creativity counts!
- You will need to create a Storyboard including at least 5 squares detailing your commercial
BLOOD

• What is blood made of?

• **Blood is a mixture of cells** and a watery liquid, called **plasma**, that the cells float in.

• **Plasma is about 90 percent water.**
• There are **three kinds of cells** in the blood:
  - Red blood cells
  - White blood cells
  - Platelets

Red blood cells carry oxygen from the lungs throughout the body, **white blood cells help fight infection**, and **platelets help in clotting**.
• **Red blood cells** (also called erythrocytes) are the most numerous, making up 40-45 percent of one's blood, and they give blood its characteristic color.

• Red blood cells are shaped like tiny doughnuts
What is HEMOGLOBIN?

Red blood cells contain several hundred hemoglobin molecules which transport oxygen.

Oxygen binds to heme on the hemoglobin molecule.
- **Hemoglobin** is a special molecule which carries the oxygen that is found in the blood.

- Where there is a lot of oxygen, in the lungs, the hemoglobin molecules loosely bind with oxygen.

- Hemoglobin contains **four iron atoms**
  - Each atom can bind with one molecule of oxygen
  - How much oxygen can they carry?
• In the capillaries, where there is little oxygen, the hemoglobin readily sheds the oxygen it is carrying and allows it to be absorbed by the body's cells.
• What makes our blood RED?

• The iron in hemoglobin is what makes blood red.
Types of Blood

- If the red blood cell had only "A" molecules on it, that blood was called type A.
- If the red blood cell had only "B" molecules on it, that blood was called type B.
- If the red blood cell had a mixture of both molecules, that blood was called type AB.
- If the red blood cell had neither molecule, that blood was called type O.
Transfusions/Donations

• A person with type A blood can donate blood to a person with type A or type AB.
• A person with type B blood can donate blood to a person with type B or type AB.
• A person with type AB blood can donate blood to a person with type AB only.
• A person with type O blood can donate to anyone.
• What happens when different types of blood mix?

• If two different blood types are mixed together, the blood cells may begin to clump together in the blood vessels, causing a potentially fatal situation.

• What would you do in an emergency?