

I. Circulatory Systems – An Overview

A. General Characteristics

1.

2. Arthropods and most mollusks have an \_\_\_\_\_ system:

a. Blood is pumped from a heart into where organs are “bathed.”

b. Blood is returned to the heart at a rate.

3. Vertebrates have a \_\_\_\_\_ system.

a. All the \_\_\_\_\_ and the \_\_\_\_\_ are connected so that blood remains enclosed.

b. \_\_\_\_\_ as blood moves through the fine capillaries of the capillary beds.

B. Vertebrate Circulatory Systems

1. \_\_\_\_\_ and \_\_\_\_\_ have two separate circuits of blood flow.

a. The \_\_\_\_\_ half of the heart receives deoxygenated blood and pumps it to the lungs.

b. The \_\_\_\_\_ half receives from the lungs and pumps the oxygen rich blood to all the body – systemic circuit.

II. Characteristics of Blood

A. Functions of Blood

1. It carries \_\_\_\_\_ and \_\_\_\_\_ to cells, and it carries secretions and wastes away from them.
2. It contains \_\_\_\_\_ cells that fight infection.
3. It \_\_\_\_\_ body \_\_\_\_\_ in birds and mammals.

## B. Blood Volume and Composition

1. An average-sized \_\_\_\_\_ has a \_\_\_\_\_ volume of 4-5 quarts.
2. Plasma
  - a. The fluid portion of the blood volume is mostly \_\_\_\_\_.
  - b. Plasma also contains ions, \_\_\_\_\_, vitamins, hormones, and amino acids.
3. Red Blood Cells (Erythrocytes)
  - a. In mammals, red blood cells are \_\_\_\_\_ disks that transport oxygen.
  - b. Red blood cells contain \_\_\_\_\_, an iron-containing protein that binds with oxygen.
  - c. They form in the \_\_\_\_\_ from stem cells.
  - d. When mature, they have no \_\_\_\_\_; they live about 120 days.
4. White Blood cells (Leukocytes)
  - a. \_\_\_\_\_ remove dead or worn-out cells and protect us against invading microbes and foreign agents.
5. Platelets

a. Substances released from platelets initiate \_\_\_\_\_.

### III. Blood Transfusion and Typing

#### A. Concerning Agglutination

1. In a \_\_\_\_\_ it is important that there is no possibility of an interaction between \_\_\_\_\_ markers and markers from the \_\_\_\_\_, which would be recognized as “\_\_\_\_\_”.

2. If bloods from \_\_\_\_\_ are mixed, the antibodies cause agglutination (clumping).

#### B. ABO Blood Typing

1. \_\_\_\_\_ is based on surface markers on red blood cells.

2. Type \_\_\_\_\_ has \_\_\_\_\_ markers;

type \_\_\_\_\_ has \_\_\_\_\_ markers;

type AB has \_\_\_\_\_ markers;

type \_\_\_\_\_ has \_\_\_\_\_ marker.

3. Blood types of donors and \_\_\_\_\_ must be carefully determined to prevent agglutination.

#### C. Rh Blood Typing

1. An \_\_\_\_\_ person (lacks this marker) transfused with \_\_\_\_\_ blood (has this marker) will produce \_\_\_\_\_ to the Rh marker.

2. There are risks in pregnancy to a \_\_\_\_\_ child if an \_\_\_\_\_ bore a previous child who was also \_\_\_\_\_ and thus left behind some antibodies that can now seep into this second child and cause clumping.

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3. In \_\_\_\_\_, too many cells may be destroyed and the fetus dies.

4. Medical treatment (\_\_\_\_\_) given to the mother after the birth of the first \_\_\_\_\_ baby can inactivate the Rh antibodies.

#### IV. Human Cardiovascular System

##### A. Blood Flow

1. Blood travel follows this route: heart – \_\_\_\_\_ – arterioles – capillaries – venules – veins—heart
2. Pulmonary Circuit
3. Systemic Circuit

##### B. Vessels

1. Arteries – conduct blood \_\_\_\_\_ from the heart, carry oxygenated blood.
  - a. Exception: \_\_\_\_\_ arteries carry deoxygenated blood
  - b. \_\_\_\_\_ vessels that present low \_\_\_\_\_ to flow – they branch into smaller arterioles which offer greater resistance to flow.

2. \_\_\_\_\_ (sympathetic nerves) and endocrine signals cause changes in arteriole diameter by stimulating the muscle cells in the walls.

a. If the blood pressure \_\_\_\_\_, the arterioles are instructed to relax (\_\_\_\_\_)

b. If the pressure \_\_\_\_\_, the diameter of the arterioles decreases (\_\_\_\_\_).

2. Veins – Conduct blood \_\_\_\_\_ heart, carry oxygenated blood

a. Exception: \_\_\_\_\_ carry oxygenated blood

b. Blood pressure and resistance to flow are both \_\_\_\_\_; valves prevent backflow.

Veins are blood volume \_\_\_\_\_ (50-60 percent of blood volume) because their walls can distend or contract.

3. Capillaries – \_\_\_\_\_ of vessels, diffusion zones for exchanges between blood and tissues.

## V. Blood Flow through the Heart

### A. Heart Structure

1. Heart is a \_\_\_\_\_ made mostly of cardiac muscle enclosed in a tough fibrous sac called the pericardium.

2. Each half consists of an \_\_\_\_\_ (receiving) chamber and a \_\_\_\_\_ (pumping) chamber separated by an \_\_\_\_\_.

3. The \_\_\_\_\_ are smaller than the ventricles. They have less muscle and empty into the ventricles through the AV valves.

4. Blood exits each ventricle through the \_\_\_\_\_ valve.

5. Valves are \_\_\_\_\_ way valves that flap open and shut to keep blood moving in one direction.

## B. Blood Flow

Superior/Inferior Vena Cava – Right Atrium – Right Ventricle – Pulmonary arteries – Lung – Pulmonary Veins – Left Atrium – Left Ventricle.

Fill in the valves.

## C. Mechanisms of Contraction

1. Because of the close \_\_\_\_\_ of cardiac muscle cells, they contract in unison.

2. Excitation for a heartbeat is initiated in the \_\_\_\_\_ (SA) node (also known as the \_\_\_\_\_) then passes to the \_\_\_\_\_ (AV) node for ventricular contraction.

3. The nervous system adjusts rate and strength.