

Advisement Teacher & Room # _____

Biology Tutorial #27

Student Name _____ Tutor: _____

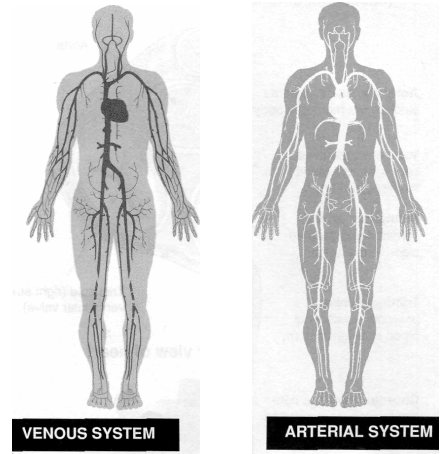
Biology Teacher's Name _____ Period _____

CA State Standard 9. As a result of the coordinated structures and functions of organ systems, the internal environment of the human body remains relatively stable (homeostatic), despite changes in the outside environment.

The **circulatory system** transports nutrients to and carries wastes away from cells. Nutrients such as oxygen and glucose are essential to cellular respiration. Oxygen enters the respiratory system and diffuses into the circulatory system. The blood vessels of the circulatory system form a vast network of tubes that carry blood away from the heart, transport it to the tissues of the body, and then return it to the heart. The arteries, arterioles, capillaries, venules, and veins are organized into specific routes to circulate the blood throughout the body.

Overview of the Human Circulatory System

Deoxygenated blood (colored gray) travels to the right side of the heart via the vena cava. The heart pumps the deoxygenated blood to the lungs where it releases carbon dioxide and receives oxygen. The oxygenated blood (colored white) travels via the pulmonary vein back to the heart from where it is pumped to all parts of the body. The **venous system** (figure, left) returns blood from the capillaries to the heart. The **arterial system** (figure right) carries blood from the heart to the capillaries.



The Human Digestive Tract

The digestive system breaks down food into a form of energy that cells can use, namely glucose. Glucose and other products of digestion diffuse from the **digestive system** into the **circulatory system**. These nutrients move through the bloodstream and into the cells where they undergo cellular respiration to form ATP.

Organs work together to break down food.

The organs of the digestive system include the mouth, esophagus, stomach, pancreas, liver, gallbladder, large and small intestines, rectum and anus, each separated by a circular ring of muscles called a **sphincter**. Digestion begins in the mouth (mechanical chewing and chemical "amylase") and continues in the stomach. In the stomach, muscles churn the food and mix it with hydrochloric acid (HCl) and the enzyme, pepsin. Pepsin helps break down bonds between proteins. The runny, liquid mixture of food is now called "chyme" and will be dumped into the small intestine for complete digestion and absorption. **Absorption** is the process by which the nutrients in your food move from the digestive organs into the circulatory and lymphatic systems.

Most digestion takes place in the **small intestine**, a long, narrow tube that is attached at one end to the stomach. The small intestine has three different sections, and each section absorbs different nutrients.

Duodenum is where most simple sugars, amino acids, and minerals are absorbed. These nutrients diffuse into the circulatory system and are carried to the liver. Glucose, some amino acids, vitamin C, most B vitamins, and some water are absorbed in the **Jejunum**. These nutrients also diffuse into the circulatory system and are carried to cells all over the body. Fat-soluble vitamins, vitamin B₁₂, fatty acids, cholesterol, and some water are absorbed in the **Ileum**. These nutrients diffuse into lymph and blood vessels and are distributed to cells all over the body. The **pancreas** makes an alkaline fluid to neutralize the pepsin that comes with chyme from the stomach. The pancreas also releases enzymes that help break down fats. The **liver** makes **bile**, a substance that also breaks down fats and stores it temporarily in the **gall bladder**.

Absorbed Nutrients and the Liver

Blood that is rich in nutrients leaves the small intestine and enters the liver. There, enzymes use these simple molecules to build more complex molecules that cells need. The liver also stores some nutrients, such as glucose, for future use. Water is absorbed and solid wastes are eliminated from the large intestine.

QUESTIONS:

1. Identify the circulation route that carries blood to all parts of the human body:
2. Identify the circulation route that carries blood to the heart:

absorption villi microvilli digestion digestive system
 chyme sphincter small intestine bile

Choose the correct term from the list above for each description below.

3. Tiny fingerlike projections on epithelial cells in the small intestine_____.
4. The process by which nutrients move from the digestive system into the circulatory and lymphatic systems_____.
5. Projections that extend out of the folds of the small intestine and are covered with epithelial cells_____.
6. Food moves from the stomach into the _____ .
7. _____ is a chemical substance produced by liver.
8. Organs that break down food into energy form the _____ .
9. _____ is the process of breaking large food molecules down into simpler molecules.
10. In the stomach, solid food becomes a semi-liquid mixture called _____.
11. A _____ separates each digestive organ from the next.
12. Name the 3 vessels that carry oxygen-poor blood in the human body (use the diagram to the right).
13. Label the parts of the digestive system on the diagram below.

