Advisement Teacher & Room #_____

Student Name_____Tutor:_____

Biology Tutorial #25

Biology Teacher's Name_____Period_____

CA State Standard 9a: Students know how the complementary activity of major body systems provides cells with oxygen and nutrients and removes toxic waste products such as carbon dioxide.

Obtaining Nutrients and Getting Rid of Wastes

The chemical reactions that take place in the human body can occur only within a narrow range of temperatures, pH levels, and salt concentrations. The organ systems of the body must work together to maintain these internal conditions to keep a person functioning and alive. By regulating the flow of incoming nutrients and the removal of wastes, cells can maintain a consistent internal environment despite changes in the external environment. Maintenance of a stable internal environment is called **homeostasis.**

HOW DOES THE BODY OBTAIN AND USE NUTRIENTS AND OXYGEN?
The digestive system breaks down food into a form of energy that cells can use, namely glucose. Glucose enters the circulatory system by way of the small intestine. The respiratory system brings oxygen into the body. Oxygen enters the circulatory system by way of the alveoli in the lungs. The circulatory system delivers glucose and oxygen to cells throughout the body. Glucose and oxygen are used in the process of cellular respiration to produce energy in the form of ATP.

HOW DO THE LIVER AND MUSCLES HELP MAINTAIN NUTRIENT LEVELS?
Cells need a certain amount of glucose to carry out cellular respiration properly. The liver and muscles help maintain homeostasis by regulating the amount of glucose in the bloodstream. The liver and muscles store extra glucose as glycogen. When glucose levels in the blood drop, glycogen is converted back into glucose and released into the bloodstream. This process helps keep glucose levels in the blood stream constant.

HOW DOES THE BODY GET RID OF THE WASTE PRODUCTS OF CELLULAR RESPIRATION?
The waste products of cellular respiration include carbon dioxide (CO_2) and water. These waste products diffuse into blood vessels, which transport them to the organs that form the excretory system. Carbon dioxide and water vapor diffuse from the blood vessels into the lung's alveoli and are exhaled into the atmosphere. Water and other waste products are filtered out of the blood by the kidneys.

WHAT IS THE ROLE OF THE KIDNEYS IN GETTING RID OF WASTES?
The kidneys regulate the levels of fluids and certain nutrients in the blood. The kidneys filter the blood, return most of its contents to the circulatory system, and collect waste products. The body generates wastes that could become toxic if allowed to build up. The breakdown of protein in the liver, for example, produces ammonia, which is toxic. Ammonia is converted to urea, which the kidneys filter out of the blood. Urea and other waste products leave the body in a watery liquid called urine.

Answer the following questions:

1. Which body systems help the body to obtain glucose and oxygen? Which body system delivers these nutrients to other cells?

2. What is the role of glucose and oxygen in the body?

3. How do liver and muscles maintain the level of glucose in the blood?

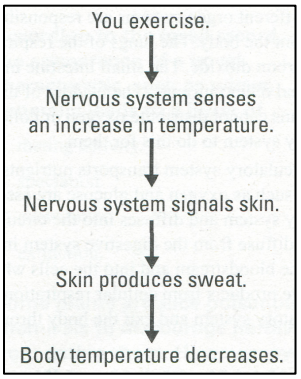
4. After eating a sugary dessert, a healthy person experiences a sudden rise of glucose levels in the blood. Receptors of the nervous system detect this increase. They send a signal to cause the liver to remove glucose from the blood and store it for later use. This is an example of how
   A) organs make glucose.
   B) cells become overactive.
   C) organ systems respond to change.
   D) tissues differentiate.

5. Keeping the internal environment within the narrow ranges that support life is called
   A) active transport B) cellular respiration C) gas exchange D) homeostasis

6. What is the *best* reason why the body must maintain a stable internal environment?
   A) Fewer waste products are produced when the internal environment is stable.
   B) Most chemical reactions take place only within a narrow range of conditions.
   C) The body cannot grow if the environment is constantly changing.
   D) Sensory receptors become confused in an unstable environment.

7. Waste products that result from cellular respiration are transported to organs that remove them from the body. The body system that transports wastes to these organs is the ____ system.
   A) respiratory B) excretory C) digestive D) circulatory

8. Which of the following is true about the process (right) described?
   A) Organ systems work together to maintain homeostasis.
   B) The skin's only role in maintaining homeostasis is sweating.
   C) The nervous system requires conscious thought to maintain homeostasis.
   D) Homeostasis was not maintained in this example.



9. What is the relationship between the circulatory system and the excretory system? Which organs excrete carbon dioxide? Water?

10. What type of molecule does the arrow that points to the left represent? Explain what happens to that molecule after it enters the alveolus.