

3. A male student who consumes 2800 Calories per day should eat only 93 g of fat per day. How many fat calories is this? You may refer to Table 38-1.

ANS: 837 fat Calories

DIF: B OBJ: 38-6

4. It is recommended that a female student who regularly uses 2100 Calories per day eat only 70 g of fat per day. How many of the Calories eaten by the female student should be fat Calories? You may refer to Table 38-1.

ANS: 630 fat Calories

DIF: B OBJ: 38-6

5. Which food from Table 38-1 has the lowest percent of fat Calories?

ANS: Yellowfin tuna has the lowest, at six percent.

DIF: B OBJ: 38-6

6. Which food from Table 38-1 has the highest percent of fat Calories to total Calories?

ANS: Sour cream, at 88 percent of the total Calories, has the highest percent.

DIF: B OBJ: 38-6

7. Calculate the percentage of fat Calories in each food in Table 38-1. (Round answers to the nearest percent.) 1 g of fat provides 9 Calories. Notice that a hamburger contains 21 g of fat. To find the Calories from fat in the hamburger, multiply the 21 g by 9 Calories = 189 Calories from fat. Divide the Calories from fat by the total Calories in a hamburger: 189 Calories/289 Calories = 0.65 or 65 percent.

ANS: 65, 34, 37, 22, 46, 31, 77, 33, 6, 9, 88, 44, 36, 13, 74

DIF: B OBJ: 38-6

CHAPTER 39—RESPIRATION, CIRCULATION, AND EXCRETION

TRUE/FALSE

1. External respiration uses oxygen in the breakdown of glucose in cells in order to provide energy in the form of ATP.

ANS: F DIF: B OBJ: 39-3

2. If you have type A blood and anti-A is added during a transfusion, no clumps will form.

ANS: F DIF: B OBJ: 39-4

3. Your pulse represents the pressure that blood exerts as it pushes the walls of a vein.

ANS: F DIF: B OBJ: 39-5

4. Breathing is controlled by changes in the chemistry of the blood, which cause the medulla oblongata to react.

ANS: T DIF: B OBJ: 39-2

5. When your diaphragm contracts, the space in the chest cavity becomes larger.

ANS: T DIF: B OBJ: 39-2

6. Carbon dioxide and oxygen are the waste products of cellular respiration.

ANS: F DIF: B OBJ: 39-3

7. The medulla oblongata of the brain produces an antidiuretic hormone (ADH) that stimulates the reabsorption of water.

ANS: F DIF: B OBJ: 39-8

8. The major waste products of the cells are ammonia and the wastes from the breakdown of proteins.

ANS: T DIF: B OBJ: 39-7

9. As the liquid passes through the U-shaped tubule in the nephron, most of the ions and water and all of the glucose and amino acids are reabsorbed into the bloodstream.

ANS: T DIF: B OBJ: 39-7

10. Blood enters the heart through the atria.

ANS: T DIF: B OBJ: 39-5

11. The only veins that carry oxygen-rich blood are the venae cavae.

ANS: F DIF: B OBJ: 39-5

12. The blood in the veins is prevented from flowing backward because of valves in these blood vessels.

ANS: T DIF: B OBJ: 39-5

13. Red blood cells are produced in the spleen.

ANS: F DIF: B OBJ: 39-4

MULTIPLE CHOICE

1. Which hormone keeps both the fluid level of the body and blood pressure from decreasing?

- a. antidiuretic hormone
- b. aldosterone
- c. cholesterol
- d. plaque

ANS: A DIF: B OBJ: 39-8

2. _____ is a hormone produced by the hypothalamus that stimulates the reabsorption of water in a nephron.

- a. Aldosterone
- b. Insulin
- c. Antidiuretic hormone
- d. Glucagon

ANS: C DIF: B OBJ: 39-8

3. Which organ filters blood that has collected wastes from cells throughout the body and maintains the homeostasis of body fluids?

- a. kidneys
- b. heart
- c. lungs
- d. pacemaker

ANS: A DIF: B OBJ: 39-7

4. Which of the following stores urine before being expelled from the body?

- a. urinary bladder
- b. urethra
- c. kidneys
- d. ureters

ANS: A DIF: B OBJ: 39-7

5. The process that uses oxygen to break down glucose, producing energy, takes place _____.

- a. only in the lungs
- b. when the diaphragm contracts
- c. in alveoli
- d. within cells

ANS: D DIF: B OBJ: 39-3

6. Which of the following is associated with cellular respiration?

- a. metabolic processes
- b. ATP formation
- c. gas exchange in cells
- d. all of these

ANS: D DIF: B OBJ: 39-3

7. Which of the following is true of breathing?

- a. homeostatic process
- b. involuntary process
- c. coordinated process
- d. all of these

ANS: D DIF: B OBJ: 39-2

8. Which of the following is the shape of the diaphragm when it is in the resting position?

- a. circular
- b. dome shape
- c. flat
- d. triangular

ANS: B DIF: B OBJ: 39-2

MATCHING

Match each item with the correct statement below. Write the answer in the space provided.

- | | |
|---------------|--------------|
| a. hemoglobin | i. aorta |
| b. antigen | j. platelets |
| c. trachea | k. pulse |
| d. nephron | l. antibody |
| e. artery | m. plasma |
| f. atrium | n. capillary |
| g. alveoli | o. ventricle |
| h. urine | p. vein |

1. _____ A filtering unit in the kidney
2. _____ Solution of body wastes consisting of excess water, waste molecules, and excess ions
3. _____ Regular surge of blood through an artery
4. _____ Largest blood vessel in the body
5. _____ A lower chamber of the heart
6. _____ An upper chamber of the heart

7. _____
A kind of large blood vessel that carries blood from the tissues to the heart
8. _____
A kind of large, muscular, thick-walled elastic vessel that carries blood away from the heart
9. _____
Protein that reacts with an antigen
10. _____
Microscopic blood vessel
11. _____
Foreign substance that stimulates an immune response
12. _____
Cell fragments that help blood to clot after an injury
13. _____
Iron-containing protein that picks up oxygen after it enters the blood vessels in the lungs
14. _____
Fluid portion of blood in which blood cells move
15. _____
Sacs of the lungs where exchange of oxygen and carbon dioxide takes place
16. _____
Passageway leading from the larynx to the lungs

1. ANS: d DIF: B OBJ: 39-7
2. ANS: h DIF: B OBJ: 39-7
3. ANS: k DIF: B OBJ: 39-5
4. ANS: i DIF: B OBJ: 39-5
5. ANS: o DIF: B OBJ: 39-5
6. ANS: f DIF: B OBJ: 39-5
7. ANS: p DIF: B OBJ: 39-5
8. ANS: e DIF: B OBJ: 39-5
9. ANS: l DIF: B OBJ: 39-4
10. ANS: n DIF: B OBJ: 39-5
11. ANS: b DIF: B OBJ: 39-4
12. ANS: j DIF: B OBJ: 39-4
13. ANS: a DIF: B OBJ: 39-4
14. ANS: m DIF: B OBJ: 39-4
15. ANS: g DIF: B OBJ: 39-1
16. ANS: c DIF: B OBJ: 39-1

SHORT ANSWER

1. The amount of salt in your diet varies considerably, and yet many processes of your body require that salt levels not vary too much. Which system helps your body maintain homeostasis of salt levels? How?
ANS: The urinary system, with help from the hormone aldosterone, stimulates reabsorption of sodium and chloride ions. If a person takes in too much salt, aldosterone production decreases and more sodium is eliminated.
DIF: A OBJ: 39-8
2. Identify the major functions of the excretory system.
ANS: The excretory system functions in maintaining homeostasis. Many chemicals are balanced in the blood by passing through the filtration system of the kidneys. In addition, nitrogenous wastes are removed from the body through this system.
DIF: A OBJ: 39-7

3. A human blood sample at a blood bank has A antigens in the red blood cells and anti-B antibodies in the plasma. What type is the blood? Who can receive it?
ANS: It is type A blood. A person with type A blood can receive it.
DIF: A OBJ: 39-4
4. How would you describe the differences between external and internal respiration to a person who has little understanding of biology?
ANS: Answers may include: External respiration is better termed *breathing*. It deals with getting oxygen from the atmosphere to the cells through lungs and alveoli. Once oxygen enters the cell, internal respiration begins. Internal respiration is all of the activities of metabolism that use oxygen in chemical reactions to release ATP.

5. How is the volume of the chest cavity increased during inhalation?
ANS: When you inhale, the muscles between your ribs contract, and your rib cage rises. At the same time, your diaphragm contracts and moves lower in the chest cavity.
DIF: A OBJ: 39-2
6. Trace a molecule of oxygen from the atmosphere through the external respiratory system.
ANS: The oxygen is inhaled through the nose. It passes through the pharynx and the larynx, and it enters the bronchi. The bronchi branch into the lungs where oxygen passes into the alveoli, enters the bloodstream, and is carried to the cells.
DIF: A OBJ: 39-1

7. How does the body get rid of excess salt?
ANS: Normally, aldosterone stimulates the reabsorption of sodium and chlorine ions in the kidneys. But when the body takes in too much salt, the body decreases its production of aldosterone so that more sodium is eliminated.
DIF: B OBJ: 39-8
8. How does a pacemaker set the heart rate?
ANS: The pacemaker generates an electrical impulse that spreads over both atria, signaling the two atria to contract at almost the same time. It also triggers cells at the base of the right atrium to send an electrical impulse over the ventricles.
DIF: B OBJ: 39-6

9. What problem may arise when a woman with Rh⁻ blood is pregnant with an Rh⁺ fetus?

ANS: Toward the end of pregnancy or at delivery, the fetal blood may leak through the placenta and mix with the mother's blood. If the mother is Rh⁻, she will produce antibodies against the Rh antigen. If she becomes pregnant again, the antibodies will cross the placenta and attack the red blood cells of an Rh⁺ fetus. If the fetus is Rh⁻, there is no problem.

DIF: B OBJ: 39-4

10. Distinguish between systolic pressure and diastolic pressure.

ANS: When the ventricles contract, blood pressure rises sharply. This high pressure is called systolic pressure. As the ventricles relax, blood pressure drops; the lowest pressure occurs just before the ventricles contract again and is called diastolic pressure.

DIF: B OBJ: 39-5

11. How does the respiratory system prevent most of the foreign matter in urban air from reaching your lungs?

ANS: The trachea and bronchi are lined with cilia that constantly beat upward toward your throat so that foreign particles can be expelled or swallowed. Also cells in the trachea and the bronchi secrete mucus that can trap the particles.

DIF: B OBJ: 39-1

12. The antidiuretic hormone (ADH) stimulates the reabsorption of water in the kidneys. Alcohol inhibits ADH secretion. Predict the effect of drinking alcoholic beverages on urine production.

ANS: Less water would be reabsorbed by the nephrons, so more water has to be excreted from the body in urine.

DIF: A OBJ: 39-8

13. Arteriosclerosis slowly reduces blood flow through the arteries to the brain. Explain how this may affect a patient who has this condition.

ANS: If the patient's blood flow is cut down, the amount of oxygen and nutrients that reach the brain is reduced. The patient may become confused and unable to perform normally.

DIF: A OBJ: 39-5

14. When a person has pneumonia, the alveoli become inflamed and the air spaces become clogged. What effect will these symptoms have on a pneumonia patient?

ANS: Gas exchange between air and blood cannot take place. Unless this is remedied, the patient will die.

DIF: A OBJ: 39-1

As the graph in Figure 39-1 shows, a marathon runner is able to increase the amount of blood pumped by the heart (cardiac output) from 5 L/min while resting to 30 L/min while competing. The runner's stroke volume (pumping capacity per heartbeat) measured in mL/beat, and heart rate, measured in beats/min, are also increased.

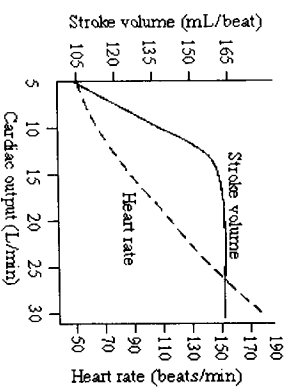


Figure 39-1

15. Based on Figure 39-1, which has the greater effect on cardiac output, stroke volume or heart rate?

ANS: The heart rate has the greater effect because as the graph shows, cardiac output is at its maximum only when the heart rate reaches its maximum. Cardiac output is well below its maximum when stroke volume reaches its maximum.

DIF: A OBJ: 39-5

16. What is the stroke volume when the cardiac output is 20 L/min? Refer to Figure 39-1.

ANS: 160 mL/beat

DIF: B OBJ: 39-5

17. When the runner's cardiac output is 20 L/min, what is the heart rate? Use Figure 39-1.

ANS: 120 beats/min

DIF: B OBJ: 39-5

PROBLEM

The vertebrate heart can beat spontaneously. If the heart of a vertebrate is removed and placed in a balanced salt solution with nutrients, it will continue to beat for hours. In fact, the muscle from each part of the heart beats at its own rate if it is not under the control of the pacemaker.

In a physiology laboratory experiment, a frog is anesthetized and the heart is exposed. Recall that the frog has a three-chambered heart, with right and left atria and a single ventricle. It also has a sinus venosus, which receives oxygen-depleted blood from all parts of the body except the lungs. The sinus venosus is where contraction begins. (This role is assumed by the pacemaker in the mammalian heart.)