

The background of the top section features a blue-tinted anatomical illustration of a human back and spine, viewed from behind. The spine is on the left, and the muscles of the back and shoulders are visible. The overall aesthetic is clean and professional, typical of a medical or scientific textbook.

MODULE 1

Introduction to Anatomy and Physiology

ON YOUR OWN QUESTIONS

- 1.1** Certain muscles are attached to your skeleton by tendons. Of the four tissue types, which kind makes up tendons?
- 1.2** Which three levels of organization in the human body are studied in gross anatomy?

Answer On Your Own 1.3–1.6 after reading: We already have discussed shivering as a response to the body being cold. Here's how it works. Receptors in the skin send temperature information to the hypothalamus (hi poh thal' uh mus), a structure in the brain. If the hypothalamus "decides" that the temperature is too low, it can send signals via the nerves to the muscles. These signals cause the muscles to start moving rapidly, which we observe as shivering. This increased movement produces heat, which warms the body.

- 1.3** Is this a negative- or positive-feedback system? Why?

- 1.4 What is the control center for the system?
- 1.5 What is the effector?
- 1.6 Based on this description, is the endocrine system involved in this process?
- 1.7 A microbiologist is looking at a cell under a microscope. It has a large number of Golgi apparatuses in it. What, most likely, is the cell's major function?
- 1.8 Substances regularly are transported into and out of cells. If a substance is transported into a cell, what is the first structure it must pass through?
- 1.9 A human cell has 46 chromosomes. If the illustration in figure 1.9 were of a human cell, how many X shapes would there be in the prophase and metaphase illustrations?
- 1.10 Suppose you placed a cell in a nonpolar fluid. Suppose furthermore that the plasma membrane was disturbed. In this kind of environment, could the plasma membrane reassemble? Why or why not?

1.11 In each of the cases below, indicate which path (dissolving through the phospholipids, channel proteins, charged channel proteins, or carrier proteins) the molecules will take to enter the cell.

a. Chloride ions

b. Simple sugars

c. Fatty acids

d. Water molecules

1.12 A chemical travels into a cell via a carrier protein. If that process required no ATP, what can you say about the relative concentration of the chemical inside and outside of the cell?

1.13 A cell uses exocytosis to secrete a hormone. This process requires ATP. What can you say about the relative concentration of the hormone inside and outside of the cell?

STUDY GUIDE QUESTIONS

1

Define the following terms:

TERM	DEFINITION
Gross anatomy	
Microscopic anatomy	
Physiology	
Histology	
Organ	
Tissues	
Homeostasis	
Effector	
Selective permeability	
Endocytosis	
Exocytosis	

2 If this course taught you only the name of each organ and where it is in the body, would this be an anatomy course or a physiology course?

3 What are the seven levels of organization in a living organism?

4 Suppose you are using a 40x, 100x, 400x, 1000x microscope to study the human body. What levels of organization would you be studying?

5 What are the four types of tissue?

6 Identify the type of tissue that makes up the following:

- a. The lining of a blood vessel or your sinuses
- b. The trapezius muscle
- c. The cartilage in your joints
- d. The frontal lobe of the brain

7

What is the general term for the processes in the environment that threaten homeostasis?

8

Suppose your heart rate began to increase significantly. If the body initiated a negative-feedback response, would your heart rate go up or down? If the body initiated a positive-feedback response, would your heart rate go up or down?

9

What two organ systems are most involved in controlling the negative-feedback systems of the body?

10

When you exercise, your blood glucose levels tend to drop because you are using the glucose for energy. To counteract that effect, the pancreas monitors your blood glucose level. If the pancreas “decides” that the blood glucose level is too low, it can release a hormone called glucagon. This hormone stimulates the liver to release glucose into the blood.

- a. What is the stress in this situation?
- b. What is the control center?
- c. What is the effector?
- d. Is the endocrine system involved?

- 12** List the phases of mitosis in order.
- 13** In which phases of mitosis do chromosomes have the X shape that most people associate with chromosomes?
- 14** What property of phospholipids gives the plasma membrane the ability to automatically reassemble?
- 15** What is the function of a glycoprotein in the plasma membrane?
- 16** What is the function of a receptor protein in the plasma membrane?
- 17** The model of the plasma membrane that we discussed in the fluid mosaic model. What is the “fluid?” To what does “mosaic” refer?

18

There are essentially four basic ways a substance can get through the plasma membrane. What are they? If you get specific, you will end up listing six. That is fine, too.

19

For each of the following substances, indicate how they will get through the plasma membrane and into the cell. In this case, consider channel proteins and charged channel proteins to be different, and use the two more precise terms for endocytosis.

a. water

b. a protein

c. a Mg^{2+} ion

d. a monosaccharide (simple sugar)

e. an invading bacterium

f. a lipid

20

A protein enters a cell. The outside of the cell has a higher concentration of that protein than the inside of the cell. Did the protein enter through active transport or a passive transport process?

21

A glucose molecule enters a cell. The concentration of glucose inside the cell is lower than the concentration of glucose outside the cell. Did the cell use ATP to get the glucose inside?