Teach, *continued*

QuickLab

Teacher's Notes A thermometer with disposable sheaths is preferable to a standard oral thermometer. Wear goggles when handling glass thermometer. Do not allow students to use glass oral thermometers.

Materials
- alcohol thermometer
- oral thermometer (digital, with disposable sheaths)

Answers to Analysis

1. It stayed the same.
2. Students should recognize that the amount of heat the body can generate in an extremely cold environment is limited.

Teaching Key Ideas

Homeostasis Explain that many diseases result from disruption of homeostasis. Have students select an endocrine disorder and write a short report about it. LS Verbal

Close

Formative Assessment

Concentration of body fluids is regulated by the _____ system.

A. circulatory (Incorrect. This system transports materials.)
B. integumentary (Incorrect. This system protects the body.)
C. nervous (Incorrect. This system regulates behavior and homeostasis.)
D. urinary (Correct! This system regulates concentrations of the body fluids by excretion or retention.)

Hands-On

QuickLab

15 min

Investigation of Homeostasis

The human body maintains a fairly constant internal temperature of about 37 °C (98.6 °F). You can test this fact by taking your temperature in a variety of conditions.

Procedure

1. Use a **thermometer** to record the air temperature inside your classroom. Use an **oral thermometer** to take your temperature, and record it.
2. Move to a location that is warmer or colder than your classroom. Record the air temperature. After 10 min, take your temperature and record it.

Analysis

1. **Explain** what happened to your body temperature when you went from your classroom to a warmer or colder place.
2. CRITICAL THINKING **Recognizing Relationships** The body produces heat through metabolism. So, why can people freeze to death?



Homeostasis

Homeostasis is the steady internal environment that your body maintains, despite changes in the external environment. **The body maintains homeostasis by sensing and responding to changes in the internal environment.**

Negative Feedback Almost all body processes use a system called *negative feedback* to maintain homeostasis. Negative feedback is a system in which the results of a process provide the signal for the process to stop. One example of this is the regulation of body temperature.

Body Temperature Despite temperature changes in the environment, our bodies maintain a fairly constant internal temperature of about 37 °C. The body regulates its internal temperature using negative feedback, in much the same way that a thermostat works. When the body senses that its internal temperature has dropped below normal, a chemical signal causes the body to produce heat. The result is shivering, a process you are probably familiar with. When your body temperature returns to normal, the chemical signal is turned off, and you stop shivering. If your body temperature rises above normal, another chemical signal is sent. This signal tells the body to begin cooling itself through the evaporation of sweat and by increasing blood flow to small vessels below the skin. This releases heat and cools the body. Temperatures that are too high cause proteins to *denature* (change shape) and stop functioning. Temperatures too far below the normal range cause cellular processes to stop.

Section 1 Review

KEY IDEAS

1. **Identify** the two characteristics that make stem cells different from other cells of the body.
2. **List** the four types of body tissue, and give an example of each type.
3. **Explain** the relationship between cells, tissues, organs, and organ systems.
4. **Describe** the system used to maintain homeostasis in most of the body's processes.

CRITICAL THINKING

5. **Inferring Relationships** How might developing a fever during illness be beneficial to the body?
6. **Forming Reasoned Opinions** Would you recommend that embryonic stem cell research be regulated by law? Explain your answer.

MAKING CONNECTIONS

7. **Predict** Recall that cytoplasm is the region inside a cell that includes the cell's fluid. Based on this information, would you expect the cells that form the surface of the skin to have more or less cytoplasm than fat cells have? Why or why not?

Answers to Section Review

1. Stem cells can divide repeatedly and give rise to many types of tissue in the body.
2. epithelial tissue—skin; nervous tissue—neurons; connective tissue—blood; muscle—cardiac
3. Cells make up tissues, tissues that work together form organs, and organs that work together form organ systems.
4. The system is negative feedback, in which the results of a process provide the signal for the process to stop.
5. High temperatures may help kill pathogens that are causing an illness, possibly by denaturing the proteins in the pathogen.
6. Accept all reasonable and well-supported answers.
7. Students should recognize that the flattened cells that form the surface of the skin would contain less cytoplasm than cells that store fat.