

The Ultimate Guide: Human Body: Teacher's Guide

Grade Level: 9-12

Curriculum Focus: Human Body

Lesson Duration: One or two class periods

Program Description

When illness strikes, how does the body react to protect itself? In segments that cover basic physiology, the immune system, and a treatment for cancer that channels the body's own resistance, students examine the human body and its built-in mechanisms to aid healing and survival. This program includes two feature segments and two short segments.

Onscreen Questions

- How does the skeleton provide protection for the human body?
 - What functions does the brain perform?
 - Which cells in the human body fight against illness?
 - How do cancer cells affect the body?
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Lesson Plan

Student Objectives

- Discuss the function of each system in the body.
- Consider how the systems work together.
- Apply their knowledge by writing a description.

Materials

- *The Ultimate Guide: Human Body* video and VCR, or DVD and DVD player
- Paper and pencils
- Newsprint and markers
- Computer with Internet access

Procedures

1. Begin the lesson by asking students what they know about the human body. Ask them to consider the following questions. If students are unsure of the answers, tell them they will learn about them during this lesson.
 - How many systems are in the human body?
 - What does each system do?
 - Is there any connection among the systems in the body?
2. Show students the “Human Body Works” segment, which illustrates the skeletal system, the relationship between bones and soft organs, and the relationship between bones and muscles.
3. Briefly discuss the segment, highlighting connections among body systems. Point out that our muscles send signals to the brain, which then sends a message about how to move. The skeletal system protects key organs, the skull protects the brain, and the rib cage protects the heart.
4. Tell students that their task is to describe the connections among the body systems in several different situations, given below. They may work individually or in pairs. Share this hint: Consider the skeletal, muscular, nervous, circulatory, and respiratory systems.
 - What happens in the body when a teammate kicks the ball to you during a soccer game and you then kick it to make a goal? Think about how many body systems are involved.
 - What happens in the body when you come home from school, smell cookies baking, run to the kitchen to see if they're done, take one, and eat it? How many body systems are involved? What role does each play?
 - What happens in the body when you're studying for a math test – reading the problems, writing the answers, getting up to stretch, and talking to a friend on the phone? How are the body systems working together to complete these tasks?
 - What happens in the body when you're sleeping? Which systems are working?
5. Direct students to classroom print resources and the following Web sites:
 - http://www.stcms.si.edu/hbs/hbs_student.htm
 - <http://sln.fi.edu/biosci/systems/systems.html>
 - <http://www4.tpgi.com.au/users/amcgann/body/skeletal.html> (focus is the skeletal system)
 - <http://yucky.kids.discovery.com/noflash/body/pg000126.html> (focus is the digestive system)
 - <http://www.worldinvisible.com/apologet/humbody/body.htm>
 - <http://web.ijay.cuny.edu/~acarp/NSC/14-anatomy.htm>
6. Give students time in class to work on the activity. Make sure they write how the body systems are connected in each situation. Students may include drawings showing these connections.
7. If time permits, ask students to share their ideas. How many body systems are involved in most of the activities? What does that tell students about the human body?



8. Conclude the lesson by reviewing students' ideas at the beginning of the lesson. What have they learned about the relationships among different systems in the body?

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- **3 points:** Students participated actively in class discussions; demonstrated a solid understanding of how body systems work; clearly described how they are connected.
- **2 points:** Students participated in class discussions; demonstrated an understanding of how body systems work; described how they are connected.
- **1 point:** Students did not participate in class discussions; demonstrated no understanding of how of body systems work; did not describe how they are connected.

Vocabulary

circulatory system

Definition: The system of blood, blood vessels, lymph vessels, and heart concerned with the circulation of the blood and lymph

Context: The heart is central to the human circulatory system; it pushes blood through the body's network of arteries and veins.

muscular system

Definition: The 600 muscles in the body, both voluntary and involuntary

Context: The heart muscle is unique in the human muscular system because it is made of smooth and skeletal muscle and is involuntary.

nervous system

Definition: The brain, spinal cord, and network of nerves that receive messages from inside and outside the body and transmit instructions about how to respond

Context: The nervous system is the control center of the body; it interprets the senses and enables you to respond.

respiratory system

Definition: The system that allows breathing; includes the nose, pharynx, trachea, and lungs

Context: The function of the respiratory system is breathing in oxygen from the air and expelling carbon dioxide.

skeletal system

Definition: The bones (206 in an adult) that give the body support and protect vital organs

Context: Without a skeletal system, the human body would be limp and floppy.

Academic Standards

National Academy of Sciences

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit <http://books.nap.edu>.

This lesson plan addresses the following science standards:

- Life Science: Interdependence of organisms; Behavior of organisms

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit <http://www.mcrel.org/>.

This lesson plan addresses the following national standards:

- Science – Life Sciences: Understands the structure and function of cells and organisms
 - Language Arts – Viewing: Uses viewing skills and strategies to understand and interpret visual media; Reading: Uses reading skills and strategies to understand and interpret a variety of informational texts
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Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>
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DVD Content

This program is available in an interactive DVD format. The following information and activities are specific to the DVD version.

How To Use the DVD

The DVD starting screen has the following options:

Play Video – This plays the video from start to finish. There are no programmed stops, except by using a remote control. With a computer, depending on the particular software player, a pause button is included with the other video controls.

Video Index – Here the video is divided into four parts (see below), indicated by video thumbnail icons. Watching all parts in sequence is similar to watching the video from start to finish. Brief



descriptions and total running times are noted for each part. To play a particular segment, press Enter on the remote for TV playback; on a computer, click once to highlight a thumbnail and read the accompanying text description and click again to start the video.

Curriculum Units – These are specially edited video segments pulled from different sections of the video (see below). These nonlinear segments align with key ideas in the unit of instruction. They include onscreen pre- and post-viewing questions, reproduced below in this Teacher's Guide. Total running times for these segments are noted. To play a particular segment, press Enter on the TV remote or click once on the Curriculum Unit title on a computer.

Standards Link – Selecting this option displays a single screen that lists the national academic standards the video addresses.

Teacher Resources – This screen gives the technical support number and Web site address.

Video Index

I. In This Skin (18 min.)

The human body is the most complex structure on our planet. Take an in-depth look at its ingenious design – from skeleton to skin.

II. Thoughts in Motion (19 min.)

Explore the inner workings of the human brain and our five senses. Then meet a scientist experimenting with sound as a way to help blind people “see.”

III. Flu Fighters (5 min.)

Examine how the flu is constantly evolving, changing its code every year so that it is unrecognizable to our immune systems.

IV. Keeping Cancer at Bay (4 min.)

Explore the differences between healthy cells and cancerous ones, and get a behind-the-scenes look at experimental treatments and technologies.

Curriculum Units

1. Our Skeletal Framework

Pre-viewing question

Q: What is the most important organ in the human body?

A: Answers will vary.

Post-viewing question

Q: How many bones are in the human skeleton?

A: There are 206 rigid bones in the human skeleton, 22 of which make up the skull.



2. Inspirational Strength

Pre-viewing question

Q: What activities are good for building bone strength?

A: Answers will vary.

Post-viewing question

Q: What reaction is triggered by an impact on bone?

A: The shock mobilizes an army of microscopic bone-building machines. Where stress occurs, these cells excrete a layer of liquid bone, which hardens to strengthen the structure.

3. Our Waterproof Shell

Pre-viewing question

Q: What do you know about skin?

A: Answers will vary.

Post-viewing question

Q: How does skin keep the body from overheating?

A: Just below the skin's surface are three million temperature-control units. Each of these sweat glands is a coiled tube loaded with liquid. As the body heats up, the tube contracts, squeezing a droplet of sweat out onto the skin. As the sweat evaporates, it draws heat from the skin and cools the body.

4. Bending and Balancing

Pre-viewing question

Q: Why do we need good balance control?

A: Answers will vary.

Post-viewing question

Q: What is the one limitation of the human balance system?

A: That it needs gravity to work

5. The Human Hand

Pre-viewing question

Q: What tasks do you rely on your hands for?

A: Answers will vary.

Post-viewing question

Q: What makes the human hand so remarkable?

A: It can perform an enormous variety of movements; a hand is capable of brute force and delicate finesse. It contains more moving parts controlled by more muscles than any other structure in the body.



6. Through the Senses

Pre-viewing question

Q: When Which of your five senses do you use most?

A: Answers will vary.

Post-viewing question

Q: How does our sense of smell work?

A: Every breath we take draws millions of odor molecules into our bodies through our nostrils. This stream of molecules winds its way up to a small patch at the top of the nose, which is packed with millions of nerve cells that register smells. The odor molecules dissolve in the sticky mucus that surrounds the tips of these cells. Each nerve ending is studded with tiny receptors that will react to only one kind of molecule. Once the odor molecules lock into the correct receptor, they trigger electrical impulses, which feed straight into the brain area that controls emotion and memory. The conscious part of the brain eventually translates all the electric impulses from the nose into what we perceive as smell.

7. Seeing Is Believing

Pre-viewing question

Q: What would it be like to be blind?

A: Answers will vary.

Post-viewing question

Q: What sounds bring images to your mind?

A: Answers will vary.

8. Patterns of Thought

Pre-viewing question

Q: How does a computer differ from the human brain?

A: Answers will vary.

Post-viewing question

Q: What is the relationship between thoughts and actions?

A: Answers will vary.

9. Inside a Cell

Pre-viewing question

Q: Is consciousness a part of our physical bodies?

A: Answers will vary.

Post-viewing question

Q: What does a cell recycling plant do?

A: It breaks down raw materials into the smaller building blocks that a cell uses to grow.



10. Antibodies, Antigens, and Pathogens

Pre-viewing question

Q: What are antibodies?

A: In the presence of harmful substances, or pathogens, these proteins are produced in the human blood. Antibodies destroy pathogens by changing their chemical composition and by preventing them from moving through the body.

Post-viewing question

Q: What are phagocytes?

A: These white blood cells absorb viruses and bacteria to destroy pathogens by engulfing them and breaking them down.

11. Influenza

Pre-viewing question

Q: Have you ever had the flu?

A: Answers will vary.

Post-viewing question

Q: Why is the flu virus so hard to fight?

A: It evolves more rapidly than any other virus. Each year, the virus changes its code so that the body's immune system does not recognize it. The flu virus causes up to 20,000 deaths annually in the United States.

12. Tumors and Cancer

Pre-viewing question

Q: What lifestyle choices can help you stay healthy?

A: Answers will vary.

Post-viewing question

Q: What are the three phases of cell division, and what takes place during each?

A: Interphase, mitosis, and cytokinesis. During interphase, the cell grows to twice its normal size, copies of the cell organelles are made, and DNA replication occurs. During mitosis, a copy of replicated DNA is distributed to the daughter cells and a new nuclear membrane forms around each region containing DNA. During cytokinesis, the cell membrane pinches off to form two new cells, each of which contains half the cytoplasm and roughly half the duplicated organelles, as well as a nucleus with an exact copy of the parent cell's DNA.

