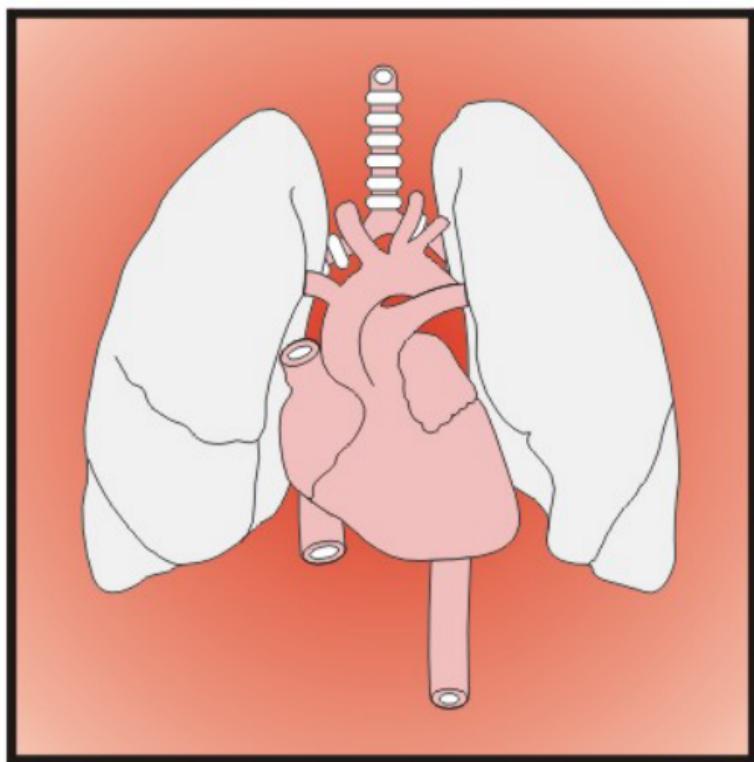


# THE HUMAN PUMP



**#3478**

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OPEN-CAPTIONED  
AMBROSE VIDEO

1994

Grade Levels: 9-12  
25 minutes

## **DESCRIPTION**

Blood, river of life and garbage collector of the body's cells, is pumped around the body in less than a minute by the heart. Discusses the composition of both blood and the heart. Microphotography offers a detailed view of the pumping heart and the circulatory system.

## **ACADEMIC STANDARDS**

Subject Area: Science

- Standard: Knows the general structure and functions of cells in organisms
  - Benchmark: Knows the levels of organization in living systems, including cells, tissues, organs, organ systems, whole organisms, and ecosystems, and the complementary nature of structure and function at each level (See Instructional Goal)
  - Benchmark: Knows that multicellular organisms have a variety of specialized cells, tissues, organs, and organ systems that perform specialized functions (e.g., digestion, respiration, reproduction, circulation, excretion, movement, control and coordination, protection from disease) (See Instructional Goal)

## **INSTRUCTIONAL GOAL**

To illustrate the features and functions of the circulatory system, including the heart, veins, arteries, capillaries, and the blood.

## **VOCABULARY**

1. hemoglobin
2. pacemaker
3. capillaries
4. valves
5. arteries
6. veins
7. kidneys
8. aorta
9. ventricles
10. circulatory system
11. chambers

## **BEFORE SHOWING**

1. Describe a mechanical pump, and apply the description to the heart.
2. Review functions of the blood and the path it uses to circulate.
3. Question why blood is red.
4. Imagine how exercise might affect the heart.
5. Hypothesize why the heart is called the “river of life.”

## **DURING SHOWING**

### Discussion Items and Questions

1. View the video more than once, with one showing uninterrupted.
2. Throughout the video, pause at visuals depicting the heart's pumping action. Compare this to the action of a mechanical pump.
3. Pause at several graphics showing the blood coursing through the veins. Compare this image to that of a fast-flowing river.

## **AFTER SHOWING**

### Discussion Items and Questions

1. Why is the heart unique among our internal organs?
2. Explain how a river and the blood are alike. Identify the major "cargo" of blood.
3. How much blood does the human body contain? How large is the network of veins, arteries, and capillaries in the body?
4. Explain how exercise and emotions affect the heart and the circulatory system.
5. What gives blood its red color? What color is hemoglobin?
6. Describe the function of the pacemaker. Explain how it coordinates the heart's rhythm.
7. Trace the path of blood through the four chambers of the heart. Emphasize the function of the valves.
8. Why does the exchange of oxygen take place in the capillaries, and not in the veins or arteries?
9. Identify the organs that receive the greatest supply of blood. Explain the function of these organs and their need for an increased blood supply.
10. What happens if a blood vessel is blocked?
11. Describe the flow of blood back to the lungs. Compare this flow of returning blood to that of blood leaving the heart.
12. How do the arteries dictate which cells receive different amounts of blood?
13. What is *blood pressure*?
14. Compare the auricles and the ventricles. Describe their functions.

### Applications and Activities

1. Conduct the following experiment to demonstrate how activity affects the rate at which the heart will pump.
  - a. Form three groups to do the following:
    - (1) Group 1 lies down and quietly rests for five minutes.
    - (2) Group 2 continuously walks for five minutes.
    - (3) Group 3 continuously runs for five minutes.
  - b. Prior to beginning, record the resting pulse of each participant in each group.
  - c. Instruct participants to begin the assigned activity for five minutes.
  - d. At the end of the five minutes, again record the pulse of each participant.
  - e. Compare the initial recordings with the second recordings.
  - f. Discuss why the rates are different.
  - g. Notice that within each group, the pulse rates may differ.
2. Create a poster comparing the circulatory system to a river. Depict the red blood cells as "boats," oxygen as the "cargo," and metabolic waste as "garbage."
  - a. Discuss what the outside temperature is on this imaginary "boat trip."

- b. Determine how long the trip will be in miles.
  - c. Discover how much time the trip will take.
  - d. Predict where most of the supplies will be deposited.
  - e. Discuss what may happen if the preplanned route is suddenly closed.
  - f. Describe why the first part of the trip might go quite quickly, while other parts of the trip may go more slowly.
3. Invite a local nurse, doctor, or fitness trainer to demonstrate how to determine a personal pulse, and also to instruct how to achieve and maintain a healthy heart.
  4. Compare the heart to a mechanical water pump.
    - a. Demonstrate how a water pump works, and compare the parts of that pump to the parts of the heart.
    - b. Contrast the size of the water pump to the size of the heart, and compare volume capacities.

## RELATED RESOURCES

### Captioned Media Program

- Heart, The: An Inside Story #1377
- Pumping Life: The Heart and Circulatory System #2516
- Two Hearts That Beat as One #2023

### World Wide Web

The following Web sites complement the contents of this guide; they were selected by professionals who have experience in teaching deaf and hard of hearing students. Every effort was made to select accurate, educationally relevant, and “kid-safe” sites. However, teachers should preview them before use. The U.S. Department of Education, the National Association of the Deaf, and the Captioned Media Program do not endorse the sites and are not responsible for their content.

- **JFK HEALTH WORLD HOMEPAGE** <http://www.jfkhealthworld.com/LivingGad/livgad.htm>

Interesting and informative site with colorful graphics. Go to the more specific information on the heart and circulatory system.
- **THE HEART AND CIRCULATORY SYSTEM** <http://www.jfkhealthworld.com/LivingGad/CIRC.HTM>

Specific information on the heart and circulatory system.
- **COLUMBIA HEALTH CARE VIRTUAL BODY SITE** <http://www.medropolis.com/vbody/heart.html>

Specific information on the heart, with an animated heart link. Requires downloading Macromedia Shockwave.
- **HUMAN ANATOMY ONLINE** <http://www.innerbody.com/htm/syselec.html>

Sophisticated yet simple medical narrative accompanies these click-on interactive pictures. Visual of inner human anatomy, overview of the muscle system, diagrams, examples of different muscle types, and more.



**PLEASE RETURN LESSON GUIDE  
WITH VIDEO**

**Lesson guide also available  
online at [www.cfv.org](http://www.cfv.org)**

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Rehabilitative Services**

**U.S. Department of Education**

