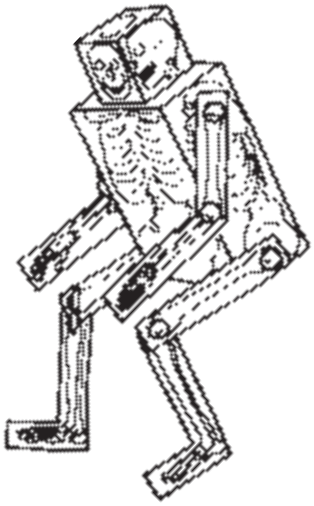
OVERVIEW
HUMAN BODY



GOALS

The **Human Body Module** consists of four sequential investigations that engage students in thoughtful activities about the form and function of a most remarkable machine, their own body.

FOSS EXPECTS STUDENTS TO

- Observe and investigate the human skeletal and muscle systems.
- Become aware of the versatility of movement provided by an articulated skeleton.
- Gain experience with the use of photographs, diagrams, and model bones to gather information.
- Build mechanical models to demonstrate how muscles are responsible for human movement.
- Compare the bones and muscles in their own bodies to photographs and models.
- Investigate response time of hands and feet.
- Develop an awareness of human bone and muscle structure and function and an appreciation for the versatility of the human body.
- Acquire the vocabulary associated with the human skeletal and muscle systems.
- Use scientific thinking processes to conduct investigations and build explanations: observing, communicating, comparing, and organizing.

OVERVIEW CONTENTS

HUMAN BODY MODULE MATRIX

SYNOPSIS	SCIENCE CONTENT	THINKING PROCESSES
1. BONES Students observe the movements of the body while jumping rope. They work in groups to determine the number of bones in their own bodies. By studying skeleton photos and diagrams, students find over 200 bones. They assemble a paper articulated skeleton. Finally they compare the bones of a human to those of a rodent.	• There are about 206 bones in the human skeleton. • A skeleton is a system of bones. • Bones have several functions: support, protection, and locomotion. • The skeletons of humans and other mammals have many similarities. • Bones have different shapes depending on where they are and what their purpose is. • The number and kinds of bones in an organism are inherited characteristics.	• Observe and describe the movement of the body while jumping rope. • Compare one's own body to skeleton photos and diagrams. • Organize and communicate findings.
2. JOINTS Students investigate the articulated skeleton by immobilizing certain hand joints and then performing everyday tasks. Students categorize the types of joints in the body and compare the movement of mechanical devices to the function of human joints.	• The place where two bones come together is called a joint. • Articulated hands with opposable thumbs are essential for performing intricate tasks. • The human skeleton has three basic types of joints: hinge, ball-and-socket, and gliding joints. • Hinge, ball-and-socket, and gliding joints allow the body to move in many different ways.	• Observe joints found in the hand. • Investigate different kinds of joints in the human skeleton. • Compare the movement of the hand with and without joints. • Organize and communicate observations. • Compare human skeletal joints to analogous mechanical structures.
3. MUSCLES Students observe the action of muscles that cause the body to move. Given a number of facts about muscles, students build operational models to demonstrate how muscles move legs, thumbs, and arms.	• Muscles contract when they work. • Muscles attach across joints to move bones. • Muscles attach to bones with tissue called tendon. • Ligaments attach bone to bone. Some ligaments serve as guides through which tendons run.	• Observe the workings of muscles to move bones. • Compare the muscle/bone functions of a model leg to a human leg. • Compare the muscle/bone functions of a model thumb to a human thumb. • Organize and communicate observations.
4. COORDINATION Students investigate hand and foot response time by using a falling-cup device. They take turns releasing the cup and trying to move their hand (or foot) from the path of the cup. Results are recorded and compared. Students repeat the coordination investigations to evaluate the effect of practice on response time.	• Coordination is when parts work together to complete a task. • A stimulus is something that triggers a response. A stimulus is often information received through the senses. • A response time is the length of time it takes for a person to respond to a stimulus. • Practice increases muscle strength and reinforces neural pathways.	• Observe the bones, joints, and muscles that move when the hand and foot respond. • Compare the response time of the right hand, left hand, right foot, and left foot. • Organize and communicate results, using a bar graph. • Investigate the effect of practice on response time.

INTERDISCIPLINARY EXTENSIONS	FOSS SCIENCE STORIES	TECHNOLOGY/HOME CONNECTION
Language Extensions • Make a bone-facts class book. • Play bone-name games. • Read about other skeletons. • Sing about bones. **Math Extension** • Problem of the week. **Science Extensions** • Make a bone museum. • Look at X rays. **Art Extension** • Create action figures.	See the Science Stories folio. • *A Marvelous Machine* • *The Shape of Your Shape* • *The Broken Radius* • *Barn Owls*	www.fossweb.com Check the FOSS website for interactive simulations, to write questions to a scientist, for teaching tips, and to talk with other classes using FOSS. Home/School Connection: Students assemble Bonita, a female skeleton model.
Language Extensions • Research joint disease. • Increase disability awareness. • Write about a girl with arms in casts. • Research artificial joints and limbs. • Collect photos of bodies in motion. **Math Extension** • Problem of the week. **Physical Education Extension** • Play Twister with a focus on joints. **Science Extensions** • Immobilize knees and elbows. • Compare dolls and other movable toys. • Compare animal movement and joints. • Research articulated machines.	See the Science Stories folio. • *Your Amazing Opposable Thumb* • *Bones on the Outside* • *Comparing Joints*	Home/School Connection: Students make rubber bones at home by dissolving the hard materials from chicken bones.
Language Extensions • Discuss jumping muscles. • Identify muscle bridges. • Describe aches and pains. • Research muscles in space. **Physical Education Extensions** • Research injuries. • Research cramps. **Math Extension** • Problem of the week. **Science Extensions** • Look closely at a chicken wing. • Add extensor muscles to the models. • Keep an exercise journal.	See the Science Stories folio. • *Muscles* • *Muscles and Bones: Working Together* • *Space Race* • *The Frozen Man*	Home/School Connection: Students and their families investigate arm and finger muscles and discover some interesting phenomena.
Language Extensions • Write a stimulus/response story. • Write captions for pictures. **Math Extensions** • Problem of the week. • Compare graphs. **Science/Physical Education Extensions** • Investigate other stimuli. • Practice jumping rope. • Practice coordination activities.	See the Science Stories folio. • *Smart Training* • *The Circulatory System*	Home/School Connection: Students work on their chosen projects at home.

FOSS AND NATIONAL STANDARDS

The **Human Body Module** emphasizes the development of observation and description skills and building explanations based on experience. This module supports the following National Science Education Standards.

SCIENCE AS INQUIRY

Develop students' abilities to do and understand scientific inquiry.

- Ask and answer questions.
- Plan and conduct simple investigations.
- Employ tools to gather data.
- Use data to construct reasonable explanations.
- Communicate investigations and explanations.
- Understand that scientists use different kinds of investigations and tools to develop explanations using evidence and knowledge.

CONTENT: LIFE SCIENCE

Develop students' understanding of characteristics of organisms.

- Organisms have different structures that serve different functions in growth and survival. Humans have distinct body structures for form, movement, and protection.
- Many characteristics of an organism are inherited from the parents of the organisms, but other characteristics result from an individual's interactions with the environment.
- The human organism has systems for movement, control, coordination, and circulation.

SCIENCE AND TECHNOLOGY

Develop students' understandings about science and technology.

- Scientists work collaboratively in teams and use tools and scientific techniques to make better observations.

SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

Develop an awareness of personal health and safety.

- Individuals have some responsibility for their own health by following safety rules for home and school. Through practice individuals can develop confidence.