No Bones about It—Part 2

Overview

This series of activities is designed to investigate the form and function of bones and joints. Students use an assembled skeleton model from the previous lesson. They then speculate about how the form of bones helps the function of joints.

Background

Joints are the places where two or more bones meet. They are classified by the structures at the joints and the types of movements they allow. Fibrous joints are held together by strong fibrous connective tissue. They allow no mobility (the suture joints in the skull) or very limited mobility (the long bone joints between the tibia and fibula in the lower leg or the radius and ulna in the forearm). Cartilaginous joints are held together by cartilage and allow slight flexibility. Examples of these joints are found between the ribs and the sternum, at the discs between the vertebrae of the spinal column, and in the growth plate regions of immature long bones. The synovial joints allow the greatest amount of movement. These joints have a small sack (bursa) around each joint containing the lubricating synovial fluid. These joints are classified by the form of the bones and the types of movement that they allow. Hinge joints allow forward and backward movements in the knee and the elbow. Ball and socket joints allow the greatest range of motion as in the shoulder and the hip. Pivot joints allow for rotation as in the neck. Gliding joints allow bending and flexing as in the wrist and ankle.

Materials

Materials for small groups

- One assembled skeleton per pair of students
- Index cards

Materials for individual students

- Science notebook

Preparation

- The teacher should prepare his or her own skeleton and tape it together.

Procedure

- Ask students to look at their forearms and hands and count up how many joints there are (starting below the elbow). Ask the students to describe their methods of counting and defining what a joint is. Develop a working definition of what a joint is through a discussion of the results.
- Ask the students to work with a partner to count and identify as many joints as they can find in their bodies. There should be lots of questions concerning their working definition of joints. Let them ask and record these questions. This is not the time for answers yet.

- Ask the students to group joints based on some scheme that they determine and justify or define.
- Ask students to look at their skeleton diagrams again and to consider the joints and movements in light of the structures of the bones. Comparing the groups of joints and their movements, are there any clues in the structure of the bones? The idea is to get students thinking about how the different joints allow for different types of movements.
- Assign the book reading on joints and have students compare their classifications to the "official" ways joints are classified.
- Ask students to work in pairs and pick the most important joint type in the body. Have them defend their selection with three bulleted statements on an index card.
- Give each pair of students *no more* then one minute to present to the class their claim for the most important joint.
- Explain to the students that there really is not a most important joint, but discuss how important it is that our bodies have so many different types of joints.

Reflection/Discussion

There are lots of opportunities for fruitful discussions about joints, movements, joint replacements, etc. This is also a time to tie in the muscle system and assign readings and talk about connective tissues and muscle function.

Assessment

Students should be able to describe the basic joint types, look at a joint and be able to describe the movements it should be able to make, and describe some of the joints in their body with respect to the bones, joints and movements. One assessment could be to compare and contrast two different joints in detail. Another assessment could be to ask them to design, draw, and describe an artificial joint/limb that allows a robot to do a particular task.