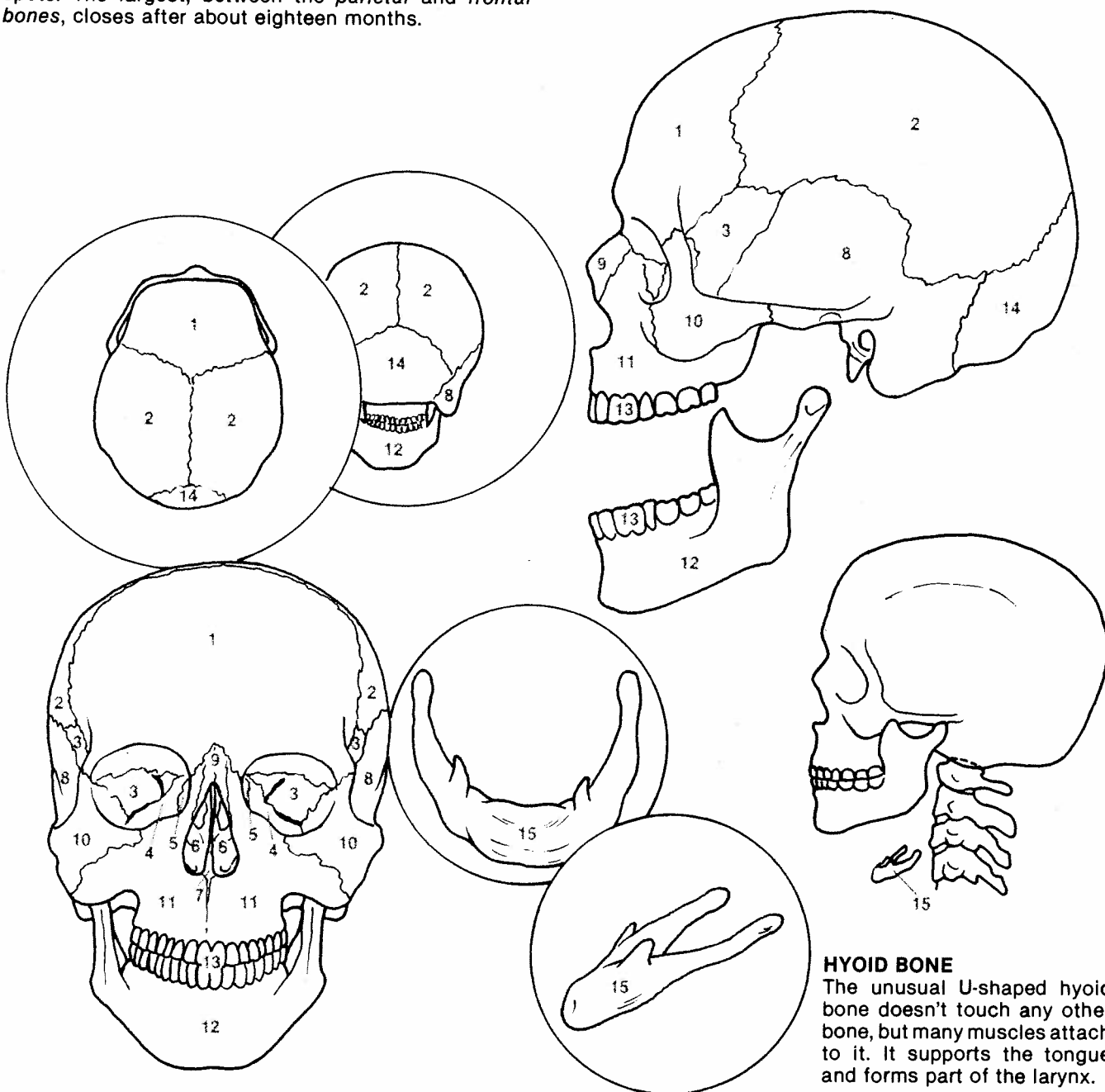


SKULL

The skull is the protective case for the brain and the organs of sight, taste, smell, hearing, and balance. It rests and pivots on the upper or superior end of the vertebral column. The skull has two main parts: the *cranium* or brain case and the *facial bones*. The base of the skull is much thicker and stronger than the sides and top and has many openings for nerves, blood vessels, and tubes to pass through. The facial bones enclose the front of the brain and form the openings for the eyes and the nasal and oral cavities. The *mandible* or jawbone is the only movable bone of the skull.

As the fetus develops, the cartilaginous membranes of the cranium *ossify* or turn into bone. At birth the ossification is not complete and membrane-filled spaces between the bones, the *fontanelles*, remain as soft spots. The largest, between the *parietal* and *frontal* bones, closes after about eighteen months.

- | | | |
|---------------------|-------|--------------|
| 1. FRONTAL BONE | _____ | Pink |
| 2. PARIETAL BONE | _____ | Turquoise |
| 3. SPHENOID BONE | _____ | Gray |
| 4. ETHMOID BONE | _____ | Brown |
| 5. LACRIMAL BONE | _____ | Green |
| 6. NASAL TURBINATES | _____ | Red |
| 7. VOMER | _____ | Light Blue |
| 8. TEMPORAL BONE | _____ | Blue |
| 9. NASAL BONE | _____ | Light Purple |
| 10. ZYGOMATIC BONE | _____ | Orange |
| 11. MAXILLA | _____ | Yellow-Green |
| 12. MANDIBLE | _____ | Gray |
| 13. TEETH | _____ | Yellow |
| 14. OCCIPITAL BONE | _____ | Light Green |
| 15. HYOID BONE | _____ | Light Brown |



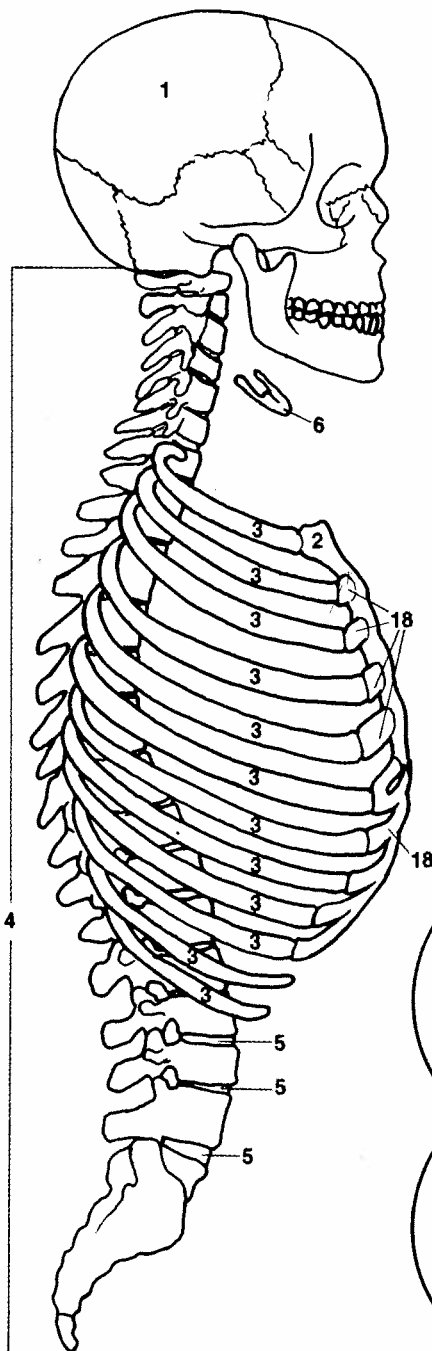
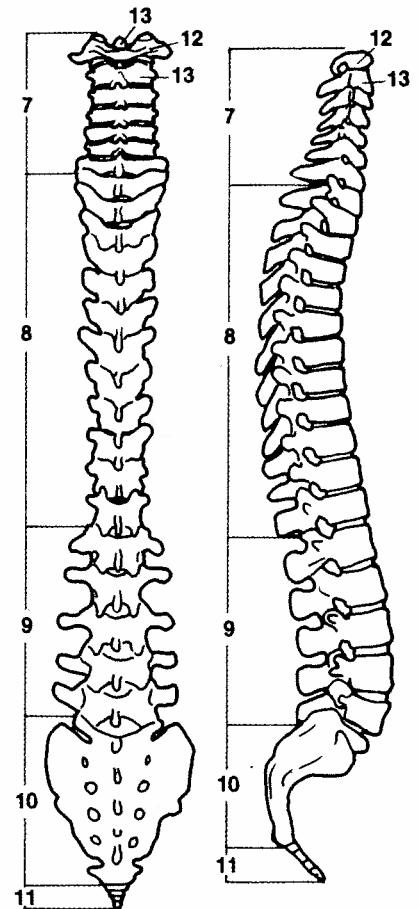
HYOID BONE
The unusual U-shaped hyoid bone doesn't touch any other bone, but many muscles attach to it. It supports the tongue and forms part of the larynx.

VERTEBRAL COLUMN – SPINE

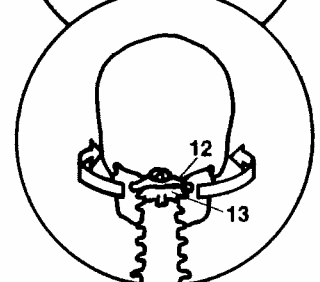
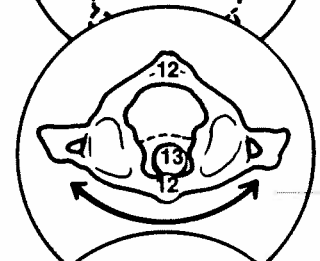
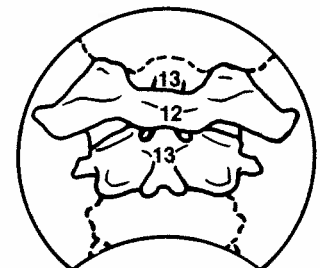
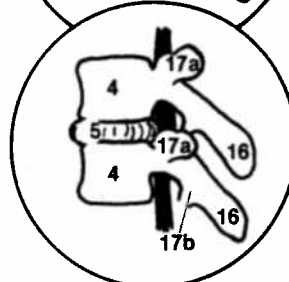
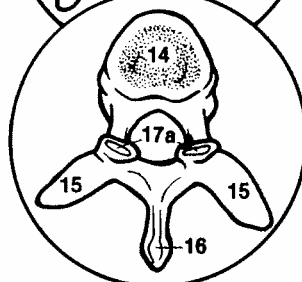
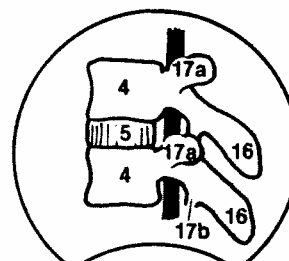
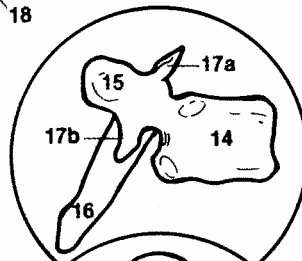
A stack of 33 irregular *vertebrae* or bones, all tied tightly together by ligaments, forms the strong, flexible column known as the spine. It can be divided into five regions. The *cervical* area forms the neck and supports the skull. The *thoracic* region, together with the ribs, forms the *thorax* or chest. The *lumbar* section makes up the lower back. The *sacrum* consists of five vertebrae fused into one triangular bone and forms part of the hip. The bottom four vertebrae, a remnant of the tail humans lost in evolutionary history, comprise the *coccyx*.

The lumbar vertebrae are the largest and thickest; the cervical are the smallest. All vertebrae have a thick body to bear weight and two wing-like *lamina* that join and form a ring, the *vertebral arch*. The ring opening is called the *vertebral foramen*. The openings are placed together to form an armored tube for the spinal cord, the *vertebral* or *spinal canal*. Each vertebra has seven *processes* or fingers that serve as anchors for muscles, contact points for vertebrae above and below, and overlapping shields to protect the spinal cord.

As a child grows, curves develop in the spine that give it strength and spring. These curves, together with the *disks* or cartilage pads between the vertebrae, protect the vertebral column by absorbing shock and concussion. The painful or numbing condition known as a *pinched nerve* occurs (usually in the lower back and occasionally in the neck) when a disk is crushed or ruptured in an accident or from lifting a heavy weight. The flattened or ruptured disk presses against or "pinches" nerves where they branch off from the spinal cord.



1. SKULL _____ Gray
2. STERNUM _____ Green
3. RIBS _____ Yellow
4. VERTEBRAL COLUMN _____ Light Purple
5. INTERVERTEBRAL DISKS _____ Flesh
6. HYOID BONE _____ Light Brown
7. CERVICAL VERTEBRAE _____ Light Blue
8. THORACIC VERTEBRAE _____ Purple
9. LUMBAR VERTEBRAE _____ Pink
10. SACRUM _____ Red
11. COCCYX _____ Orange
12. ATLAS _____ Blue
13. AXIS _____ Dark Blue
14. VERTEBRA BODY _____ Light Orange
15. TRANSVERSE PROCESS _____ Yellow-Green
16. SPINOUS PROCESS _____ Light Green
17. a. SUPERIOR and b. INFERIOR
ARTICULAR PROCESS _____ Turquoise
18. COSTAL CARTILAGE _____ Brown

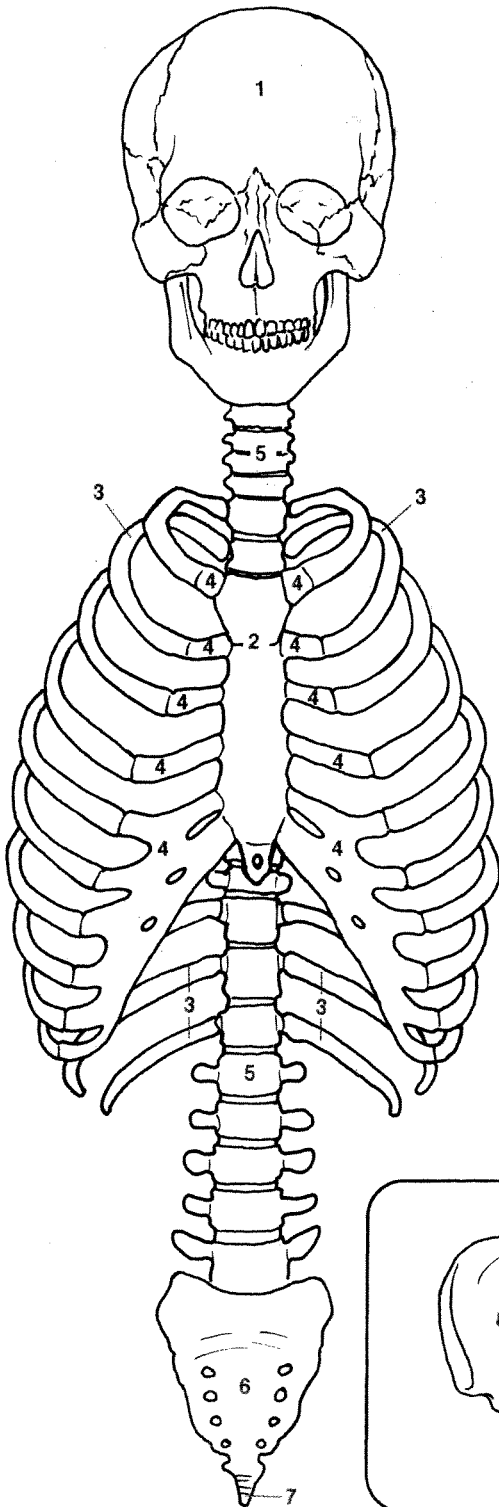


AXIAL SKELETON

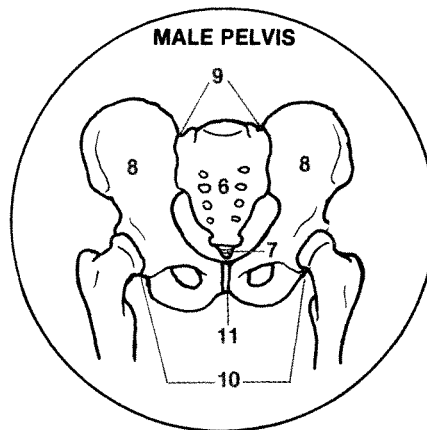
The axial skeleton consists of the *skull*, the *vertebral column*, the *sternum*, and the *thorax* or rib cage and serves to hold the body erect. It also protects most of the body's vital organs such as the heart, lungs, and liver, which the thorax encloses. The thorax is a bony and somewhat flexible cage made up of twelve pairs of thin, curved ribs, the head of each of which joins or articulates with one or two

vertebrae. The first seven pairs of ribs, the "true" ribs, are directly attached to the sternum by a strip of costal cartilage. The other five pairs, the "false" ribs, consist of the eighth, ninth, and tenth pairs, which are attached to each other and the seventh pair by cartilage, and the "floating" ribs (pairs eleven and twelve), which are not tied to the sternum at all but to the muscles of the abdominal wall. The elasticity of the cartilage and the flexible joints at the spine allow the ribs to flex in and out, reducing or enlarging the volume of the thorax.

The sternum develops in the child as three separate bones, but the three fuse into one in the adult around age 25. Pushing down on the lower third of the sternum compresses the heart and creates a pumping action that is the basis of cardiopulmonary resuscitation.

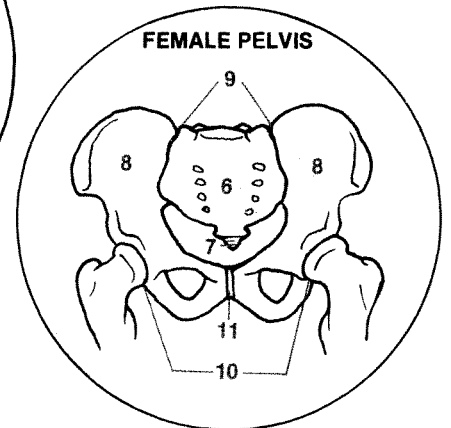


- | | | |
|--|-------|--------------|
| 1. SKULL | _____ | Gray |
| 2. STERNUM | _____ | Green |
| 3. RIBS | _____ | Yellow |
| 4. COSTAL CARTILAGE | _____ | Brown |
| 5. VERTEBRAE | _____ | Light Purple |
| 6. SACRUM | _____ | Red |
| 7. COCCYX | _____ | Orange |
| 8. HIP BONE | _____ | Pink |
| 9. SACROILIAC JOINT | | |
| 10. ACETABULUM (hip joint) | | |
| 11. PUBIS SYMPHYSIS (interpubic joint) | | |



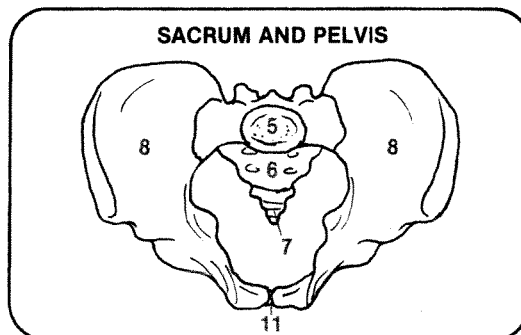
MALE PELVIS

Heart shaped and narrow, the male pelvis is stronger and heavier than the female's. The pubic angle is less than 90°.



FEMALE PELVIS

Wider, smoother, and more bowl-like than the male's in order to accommodate the fetus during pregnancy and childbirth, the female pelvis is also smaller and structurally weaker than the male's. The pubic angle is greater than 90°.

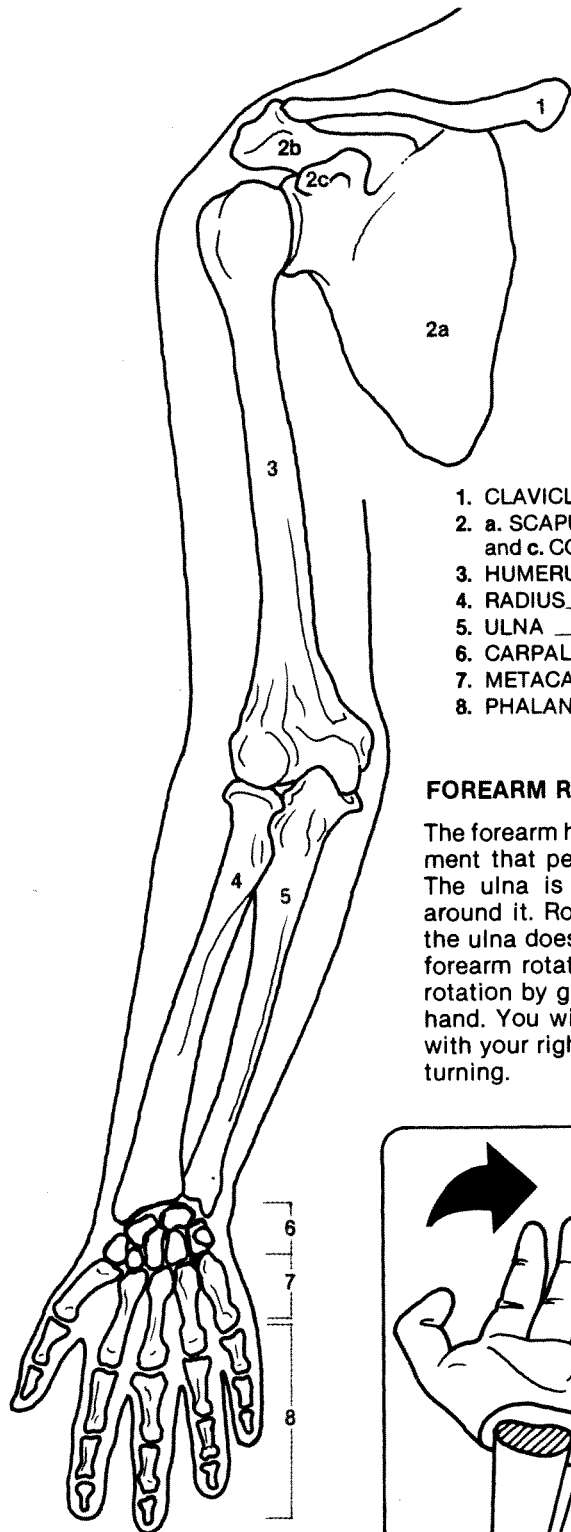


SACRUM AND PELVIS

SACRUM AND PELVIS

The sacrum forms a strong, interlocking keystone for the pelvis, which is subject to more stress than any other structure in the body.

APPENDICULAR SKELETON – UPPER EXTREMITIES



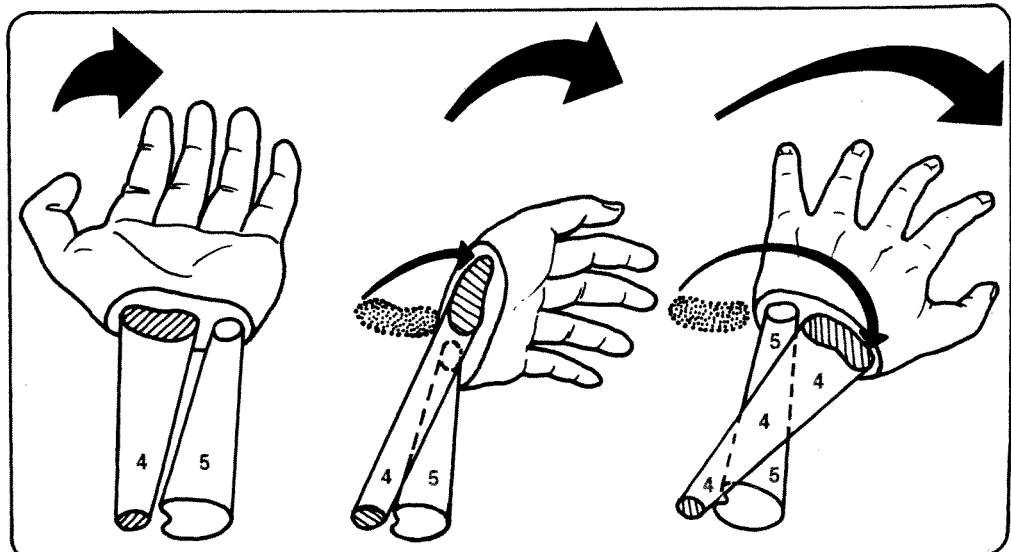
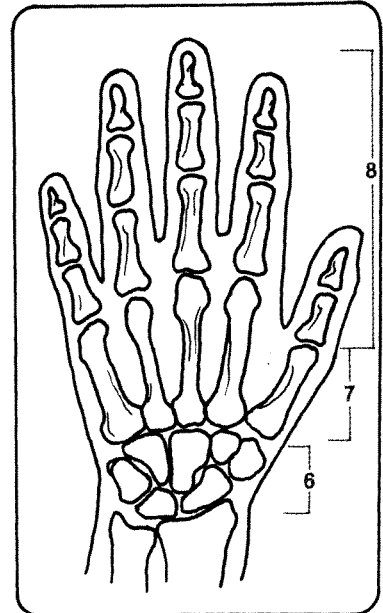
1. CLAVICLE _____ Green
2. a. SCAPULA, b. ACROMIAL PROCESS,
and c. CORACOID PROCESS _____ Pink
3. HUMERUS _____ Purple
4. RADIUS _____ Turquoise
5. ULNA _____ Gray
6. CARPALS _____ Yellow
7. METACARPALS _____ Brown
8. PHALANGES _____ Blue

The combination of simple joints and levers that make up the arm and hand produce an astounding range of movements—baseball pitchers and jewelers both employ the complex arm and hand for very different purposes. The arm is supported by the *pectoral girdle*, which consists of the *scapula* or shoulder blade and the *clavicle* or collar bone. The scapula is held in place only by muscles; hence it is free floating and capable of considerable movement.

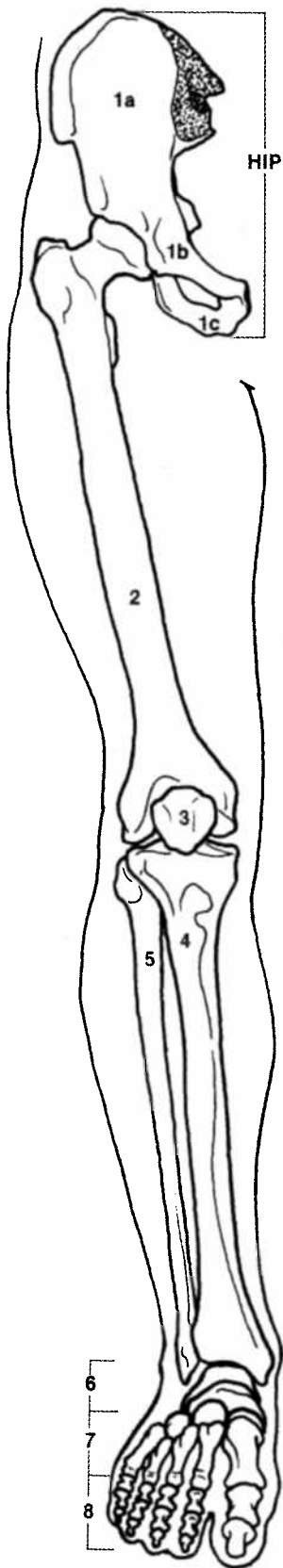
There is a ball at the top of the upper arm bone or *humerus* that rotates in a socket in the scapula. The forearm consists of the *ulna* and *radius*, which join the hand at the eight wrist bones or *carpals*; *intercarpal ligaments* tie the carpals together. The *metacarpals*, the five long bones that form the palm of the hand, join with the carpals. Beginning with the thumb, the metacarpals are numbered 1 to 5. The *knuckles* are the *heads* of the metacarpals. The finger bones or *phalanges* articulate with the metacarpals. Each finger has three bones, except for the thumb, which has two.

FOREARM ROTATION

The forearm has an interesting mechanical arrangement that permits it to rotate and gives it power. The ulna is a stationary axle; the radius turns around it. Rotate your hand and you will see that the ulna doesn't move. To appreciate the power of forearm rotation, all you need do is try to prevent rotation by grasping your left wrist with your right hand. You will have to exert a great deal of force with your right hand to stop your left forearm from turning.



APPENDICULAR SKELETON – LOWER EXTREMITIES



The bones of the lower and upper extremities are similar in many respects, but they serve different functions and, hence, have some structural differences. The leg bones must support the body's weight and are thus more solid than the arm bones, but the leg bones have a smaller range of movement.

At birth the hip has three bones – the *ilium*, *pubis*, and *ischium* – which later unite into a single bone, the *os coxa*. The left and right coxae join in the front at the *symphysis pubis* and with the *sacrum* in the back to form the bowl-shaped *pelvis*. The hip bone is connected to the thigh bone or *femur*, which has a ball-like head that rotates in the hip socket and a slight inward curve that aligns the body vertically with the knees and ankles. This alignment is important for the body to maintain its center of gravity. The lower femur and the *tibia* or shin form the knee. The small bone called the *patella* protects the knee; it is held in place by a tendon and surrounded by a *bursa*, a sac filled with fluid. Parallel to and outside of the tibia is the *fibula* or calf bone, whose lower end

forms the outer ankle bone or *lateral malleolus*. The tibia and fibula articulate with the *talus*, the uppermost of the seven *tarsal bones*. The tarsals and the five *metatarsals* (numbered 1 to 5, beginning with the big toe) form two arches that act as a spring, distributing weight and helping to balance the body. The *phalanges* of the foot are similar to those of the hand in number and arrangement – two phalanges for the big toe, three for each of the other toes.

The condition known as fallen arches or "flat feet" results from the weakening of the ligaments and tendons that hold up the arches.

- | | | |
|--|-------|-----------|
| 1. HIP: a. ILIUM, b. PUBIS, and c. ISCHIUM | _____ | Pink |
| 2. FEMUR | _____ | Purple |
| 3. PATELLA | _____ | Orange |
| 4. TIBIA | _____ | Gray |
| 5. FIBULA | _____ | Turquoise |
| 6. TARSALS | _____ | Yellow |
| 7. METATARSALS | _____ | Brown |
| 8. PHALANGES | _____ | Blue |

