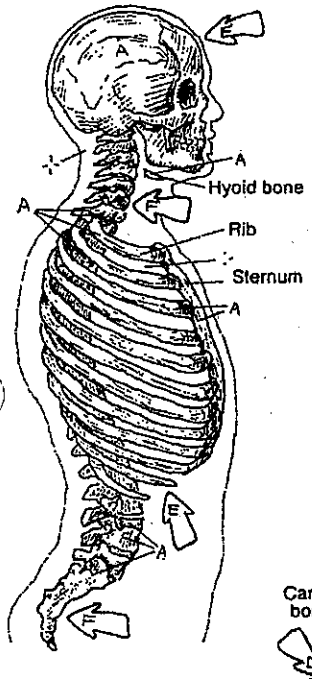
AXIAL/APPENDICULAR SKELETON

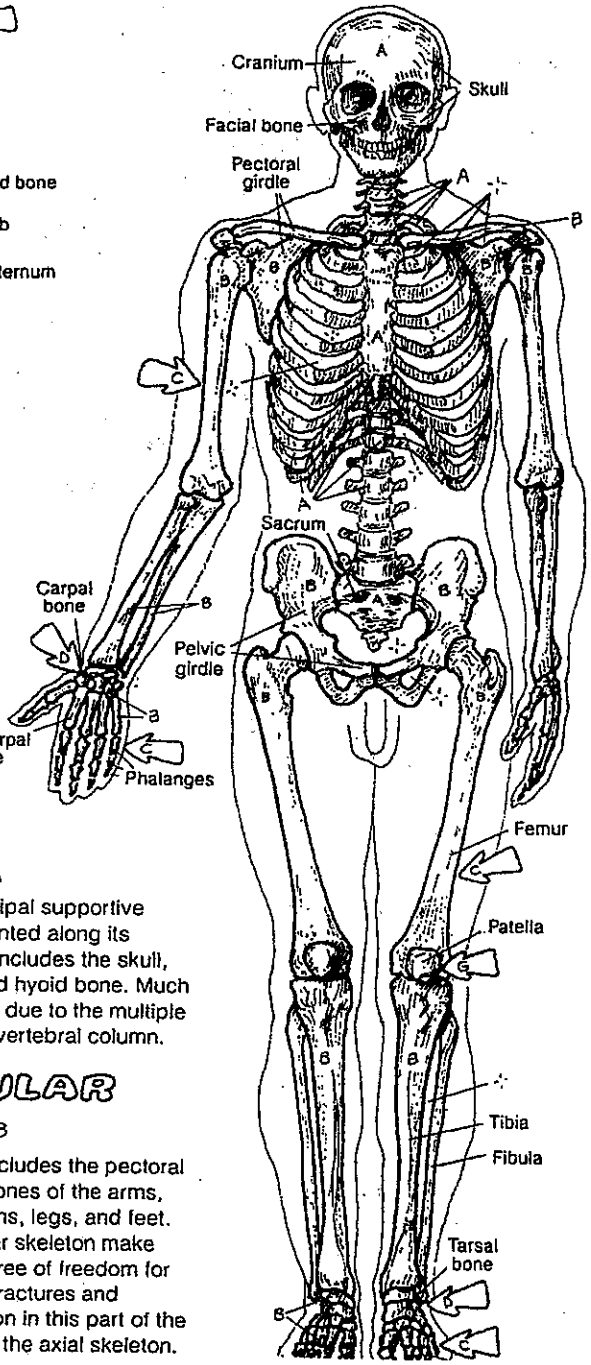
CN: Use light but contrasting colors for A and B.
(1) Color the axial skeleton (A) in all three views.
Do not color the spaces between the ribs (intercostal).
(2) Color the darker, outlined appendicular skeleton (B).
(3) Color the arrows identifying bone shape/classification.

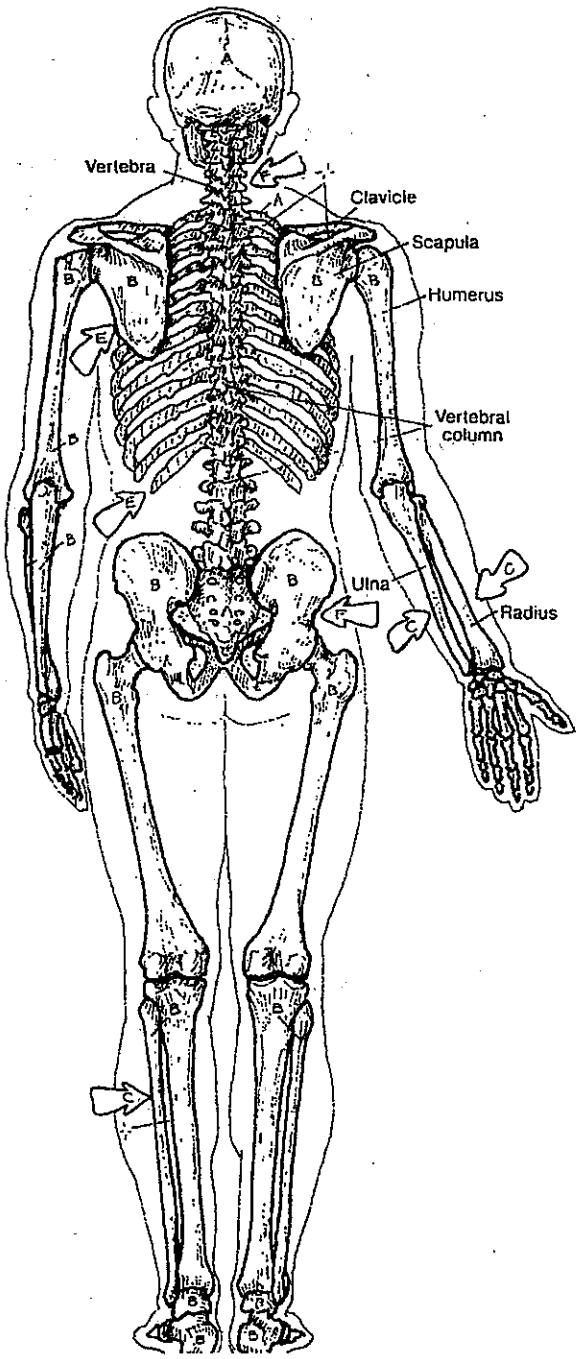
CLASSIFICATION OF BONES C

LONG C
SHORT D
FLAT E
IRREGULAR F
SESAMOID G

Bones have a variety of shapes and defy classification by shape; yet such a classification historically exists. *Long bones* are clearly longer in one axis than in another; they are characterized by a medullary cavity, a hollow diaphysis of compact bone, and at least two epiphyses—e.g., femur, phalanx. *Short bones* are roughly cube-shaped; they are predominantly cancellous bone with a thin cortex of compact bone and have no cavity—e.g., carpal and tarsal bones. *Flat bones* (cranial bones, scapulae, ribs) are generally more flat than round, and *irregular bones* (vertebrae) have two or more different shapes. Bones not specifically long or short fit this latter category. *Sesamoid bones* are developed in tendons (e.g., patellar tendon); they are mostly bone, often mixed with fibrous tissue and cartilage. They have a cartilaginous articular surface facing an articular surface of an adjacent bone; they may be part of a synovial joint ensheathed within the fibrous joint capsule. The structures are generally pea-sized and are most commonly found in certain tendons/joint capsules in hands and feet, and occasionally in other articular sites of the upper and lower limbs. The largest is the patella, integrated in the tendon of quadriceps femoris. Sesamoid bones resist friction and compression, enhance joint movement, and may assist local circulation.







AXIAL SKELETON A

The axial skeleton, the principal supportive structure of the body, is oriented along its median longitudinal axis. It includes the skull, vertebrae, sternum, ribs, and hyoid bone. Much of the mobility of the torso is due to the multiple articulations throughout the vertebral column.

APPENDICULAR SKELETON B

The appendicular skeleton includes the pectoral and pelvic girdles and the bones of the arms, forearms, wrists, hands, thighs, legs, and feet. The joints of the appendicular skeleton make possible a considerable degree of freedom for the upper and lower limbs. Fractures and dislocations are more common in this part of the skeleton, but more serious in the axial skeleton.

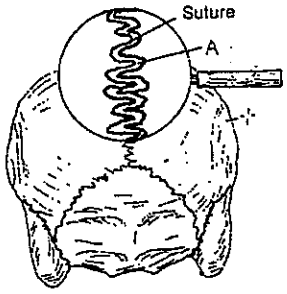
CLASSIFICATION OF JOINTS

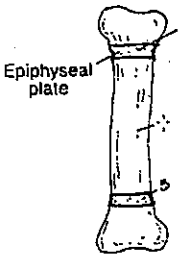
Bones are connected at joints (articulations). All bones move at joints. Joints are functionally classified as immovable (synarthroses), partly movable (amphiarthroses), or freely movable (diarthroses). The structural classification of joints is given below.

CN: Use a light blue for D, black for F, and gray for H. (1) Do not color the bones in the upper half of the plate. (2) Below, color the arrows pointing to the location of the joints as well as the joint representations.

FIBROUS JOINT
IMMOVABLE$_A$ / PARTLY MOVABLE$_{A'}$

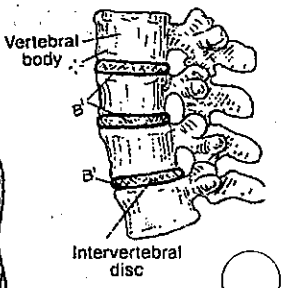
Fibrous joints (synarthroses) are those in which the articulating bones are connected by fibrous tissue. Sutures of the skull are essentially *immovable fibrous joints*, especially after having ossified with age. Teeth in their sockets are fixed fibrous joints (gomphoses). Syndesmoses are *partly movable fibrous joints*, such as the interosseous ligaments between bones of the forearm or the bones of the leg.





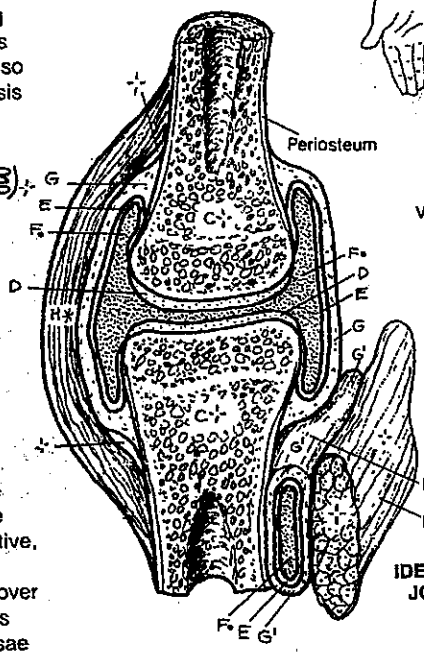
CARTILAGINOUS JOINT
IMMOVABLE$_B$ / PARTLY MOVABLE$_{B'}$

Cartilaginous joints (synchondroses) are essentially immovable joints seen during growth—e.g., growth (epiphyseal) plates (see Plate 168). Fibrocartilaginous joints (amphiarthroses) are partly movable—e.g., the intervertebral disc. Symphyses also are partly movable fibrocartilagious joints, as between the pubic bones (symphysis pubis) and the manubrium and body of the sternum (sternal angle).



SYNOVIAL JOINT (FREELY MOVABLE)
ARTICULATING BONES$_C$
ARTICULAR CARTILAGE$_D$
SYNOVIAL MEMBRANE$_E$
SYNOVIAL CAVITY (FLUID)$_{F\bullet}$
JOINT CAPSULE$_G$
BURSA CAPSULE$_{G'}$
COLLATERAL LIGAMENT$_{H*}$

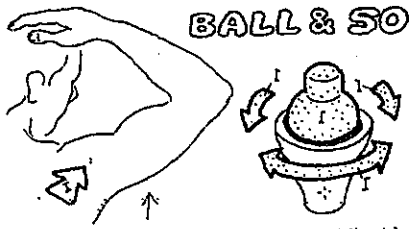
Synovial joints (diarthroses) are freely movable within ligamentous limits and the bony architecture. They are characterized by *articulating bones* whose ends are capped with *articular cartilage* and are enclosed in a ligament-reinforced, sensitive, fibrous (joint) *capsule* lined internally with a vascular *synovial membrane* that secretes a lubricating fluid within the *cavity*. The synovial membrane does not cover articular cartilage. A fibrous tissue–lined synovial sac of fluid (bursa) often exists between moving structures outside the joint, as between tendon and bone. Bursae facilitate friction-free movement; friction may induce painful inflammation (bursitis).



IDEALIZED SYNOVIAL JOINT AND BURSA

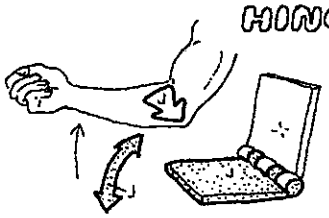
TYPES OF SYNOVIAL JOINTS

BALL & SOCKET$_I$



Ball-and-socket joints are best seen at the hip and shoulder. Movements in all direction are permitted —i.e., flexion, extension, adduction, abduction, internal and external rotation, and circumduction.

HINGE$_J$

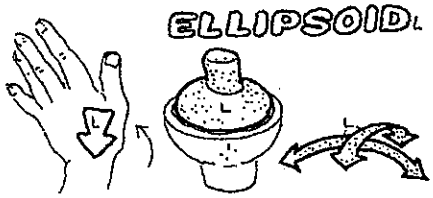


A hinge joint permits movement in only one plane: flexion/extension. The ankle, interphalangeal, and elbow (humeroulnar) joints are hinge joints.

SADDLE$_K$

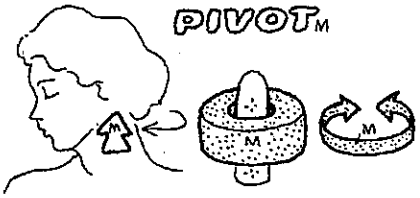
A saddle (sellar) joint—e.g., carpometacarpal jc at the base of the thumb—has two concave arti ting surfaces, permitting all motions but rotatior

ELLIPSOID$_L$



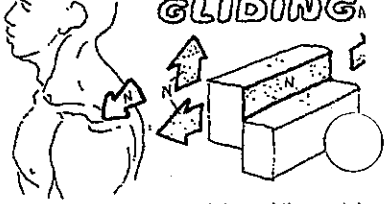
The ellipsoid (condyloid, condylar) joint is a reduced ball-and-socket configuration in which significant

PIVOT$_M$



A pivot joint has a ring of bone around a peg; e.g., the C1 vertebra rotates about the dens of C2, a

GLIDING$_N$



Gliding joints (e.g., the facet joints of the vertet the acromio-clavicular, intercarpal, and intertar