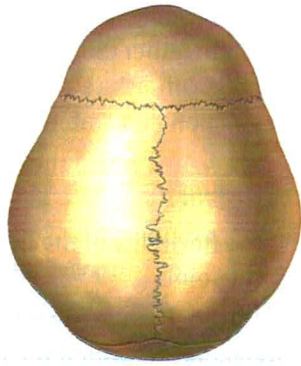
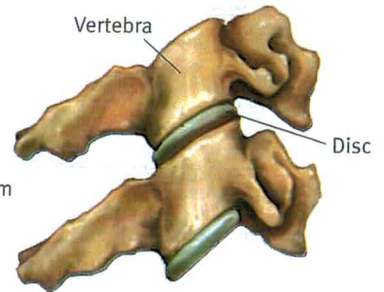
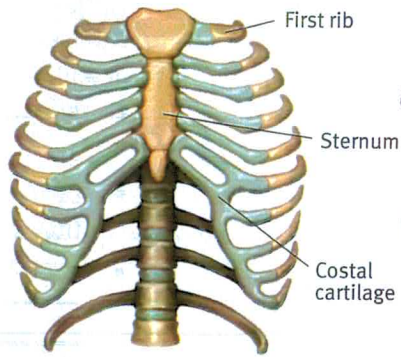
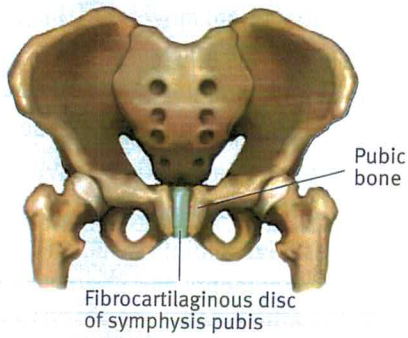


(a) Fibrous



(b) Cartilaginous



(c) Synovial

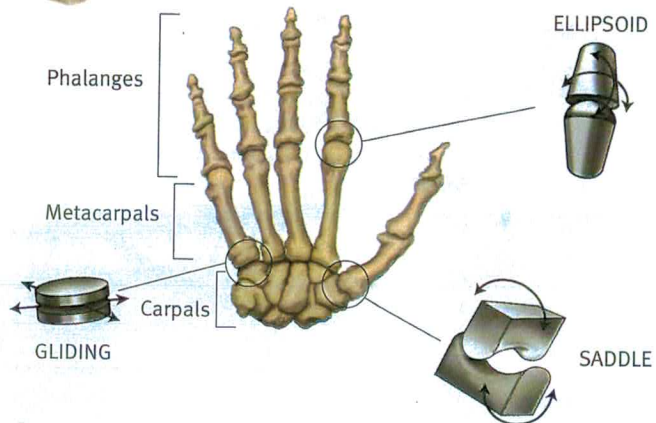
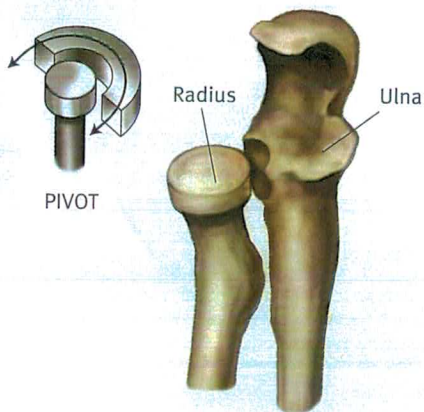
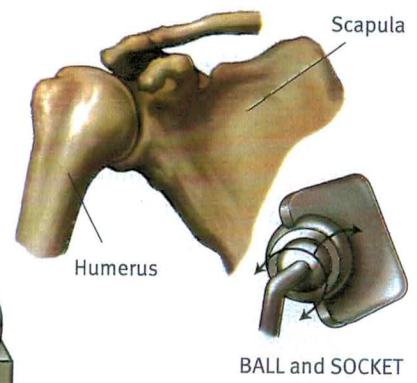
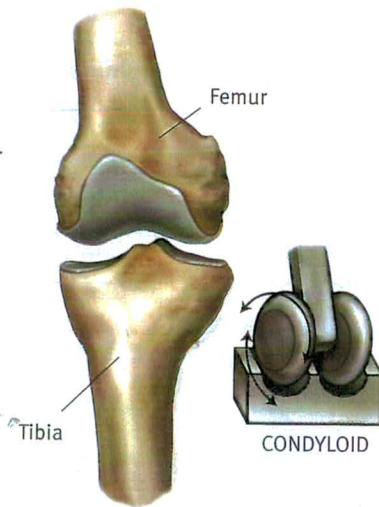
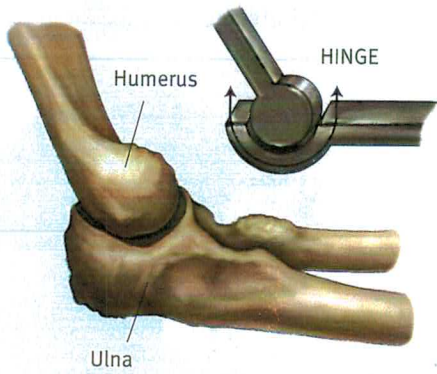


Figure 4.6 Types of synovial joint

Structure and function of synovial joints

Performance in most sporting activities relies heavily on the stability and function of synovial joints. Their stability and function are provided by a number of important structures. Within the synovial joint these structures include:

- *articular capsule*—a capsule that encloses the joint cavity
- *articular cartilage*—a connective tissue covering the surface of articulating bones
- *synovial fluid*—a secretion that lubricates and nourishes the articular cartilage
- *bursa*—a small sac containing synovial fluid, located at friction sites between bones and tendons.

Around the joint the structures providing support and function are:

- *tendons*—fibrous cords of dense connective tissue that attaches muscle to bone
- *ligaments*—dense connective tissue that attaches bone to bone.

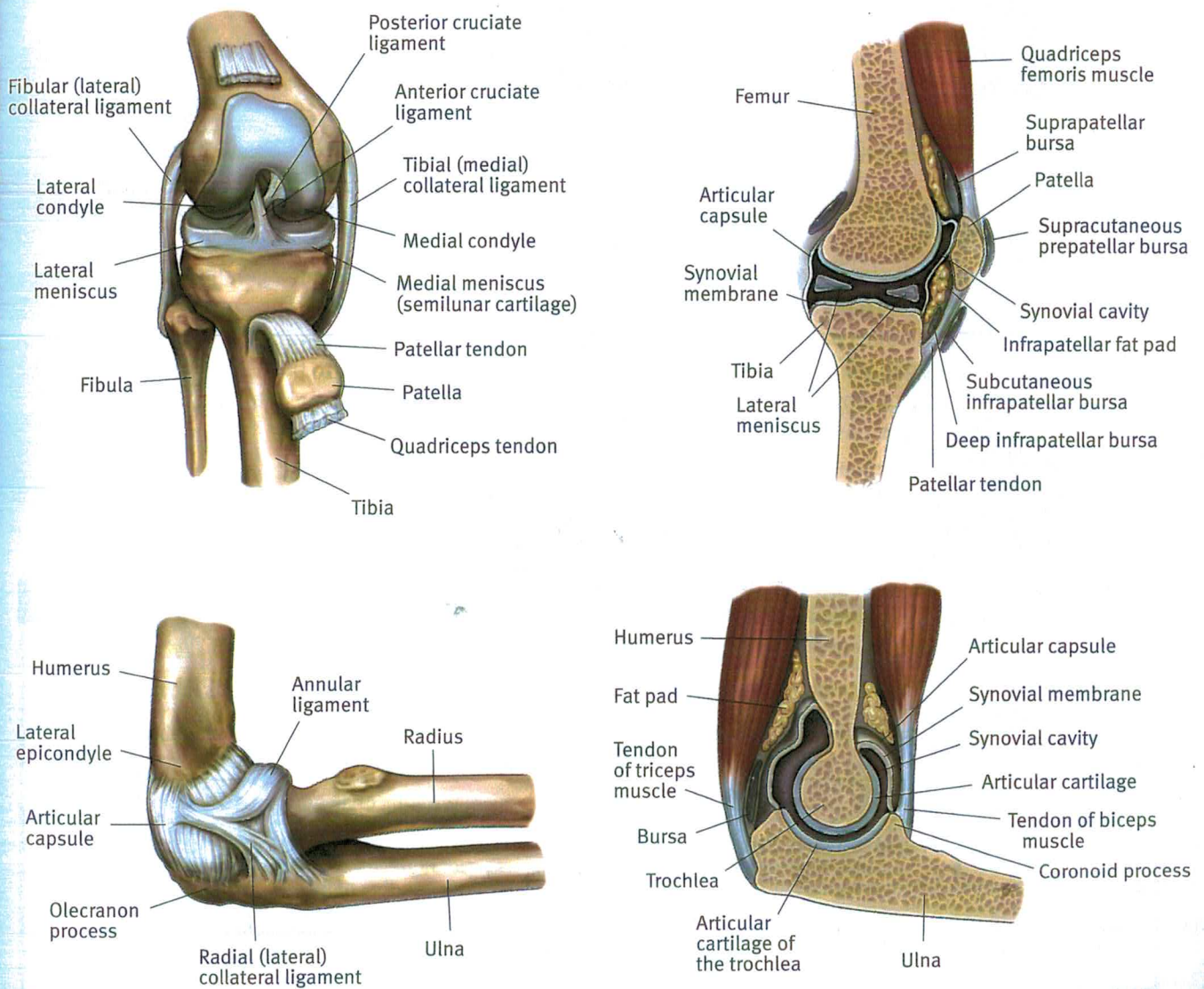


Figure 4.7 Structure of a typical synovial joint

Types of synovial joint

There are six different types of synovial joint, which permit particular types of movement, according to the shape of the bones and the structures around them. They are:

- *gliding joint*—side-to-side or back-and-forth movement is permitted across these simple, usually flat surfaces; for example, between the carpals and the tarsals
- *hinge joint*—the convex surface of one bone fits into the concave surface of another, and movement occurs in one plane. Examples are the elbow joint and knee joint
- *pivot joint*—the primary movement is rotation, where the rounded or pointed surface of one bone articulates with the depression or opening of another; for example, between the atlas and axis, or at the proximal end of the radius and ulna
- *ellipsoid (or condyloid) joint*—an oval-shaped condyle of one bone fits into the elliptical depression of another, and movement can occur in two planes. Examples are the joints between the metacarpals and the phalanges
- *saddle joint*—the articular surface of one bone is saddle shaped and the other bone sits on it like a rider. This is a modified ellipsoid joint; for example, between the carpal and the metacarpal of the thumb
- *ball and socket joint*—a rounded ball-like surface of one bone fits into a cup-like depression of another. These are very movable joints. Examples are the shoulder joint and hip joint.

These are shown in Figure 4.6 (page 76).

Joint actions

The majority of joints in the body are synovial joints. They are very mobile, and permit a great deal of movement because of the contraction of the muscles that pull bones together. All our muscles are attached to bones or other connective tissue in at least two places. The origin of the muscle is attached to the less movable bone, and the insertion is attached to the movable bone. The types of movements that can occur at joints depend on the type of joint. Not all joints have the same possible movements.

Table 4.1 lists the movements possible at joints. Note that they mostly occur in pairs of joint action.

Table 4.1 Joint actions

Paired movements	
Flexion: decreasing the angle between two bones	Extension: increasing the angle between two bones
Abduction: movement of a bone away from the midline	Adduction: movement of a bone towards the midline
Pronation: movement of forearm so that palm is posterior or inferior	Supination: movement of forearm so that palm is anterior or superior
Elevation: raising of a body part	Depression: lowering of a body part
Protraction: thrusting forward of a body part	Retraction: withdrawing of a body part
Dorsiflexion: bending of foot towards shin	Plantarflexion: bending of foot away from shin
Inversion: rotation of sole of foot inwards	Eversion: rotation of sole of foot outwards
Unpaired movements	
Rotation: movement of a bone around its longitudinal axis (can be medial or lateral)	
Hyperextension: excessive extension of a body part	

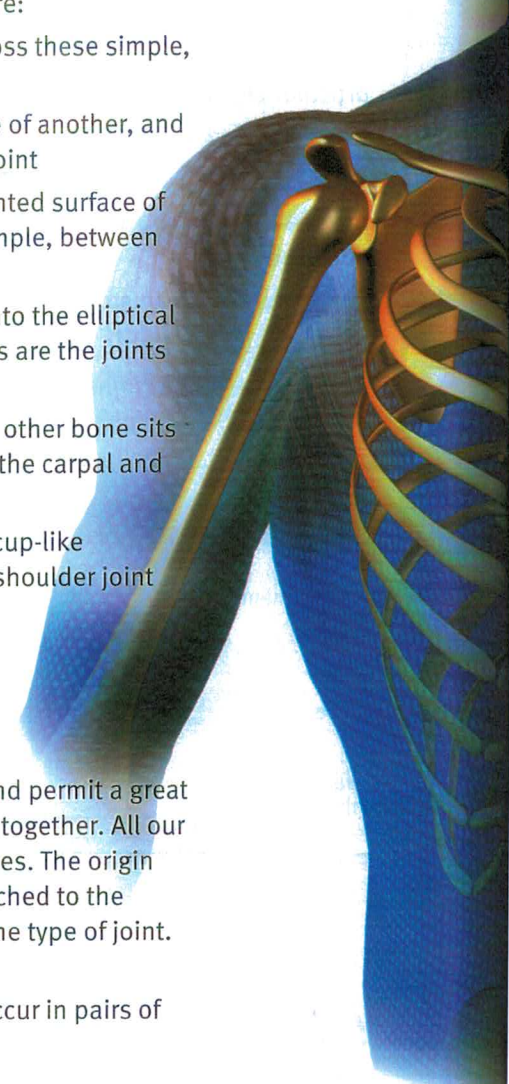




Figure 4.8 Joint actions