

# JOINTS

of the Skeletal System

*Karen Webb Smith*

Unit Two

88

URLs for this chapter:

<http://www.vh.org/adult/provider/radiology/JointFluoro/JointFluoroHP.html>

<http://www.science.ubc.ca/~biomania/tutorial/bonejt/outline.htm>

<http://www.dc.peachnet.edu/~jaliff/anahumus.htm>

## I. Introduction

\*\*\*There are over 230 moveable and partially moveable joints in the body.

- Joints (articulations) are the functional junctions between bones that are formed wherever two or more bones meet.
- Joints enable a wide variety of body movements.
  - \*bind parts of the skeletal system
  - \*allow bone growth
  - \*permit bones to change shape during childbirth
  - \*enable body respond to skeletal muscle contractions to allow movement

## II. Classification of Joints

\*\*Joints vary in structure and function.

- Joints are classified according to the type of tissue, (fibrous, cartilaginous, & synovial) that binds them together.
- Joints can also be grouped according to the range of movement possible at the junctions between bones.
  - synarthrotic – immovable
  - amphiarthrotic- slightly movable
  - diarthrotic – freely movable

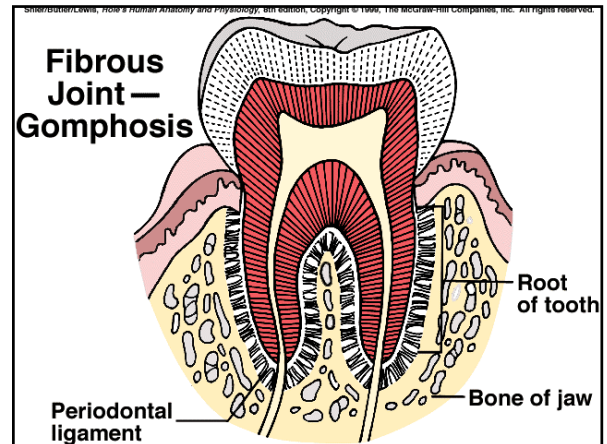
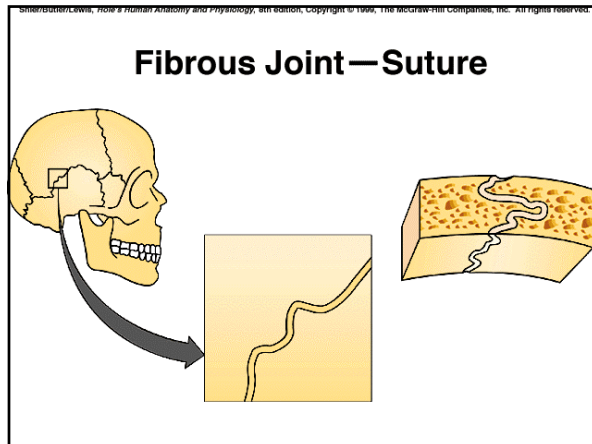
### C. Fibrous Joints - 3 types

- \*dense connective tissue holds them together & contains many collagenous fibers
- \*found where bones lie close together
- \*movement = little to none

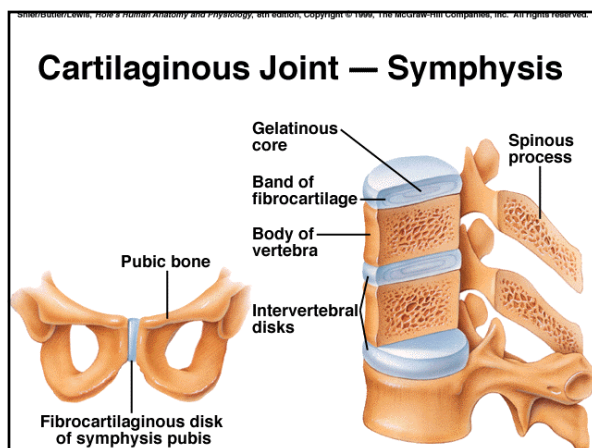
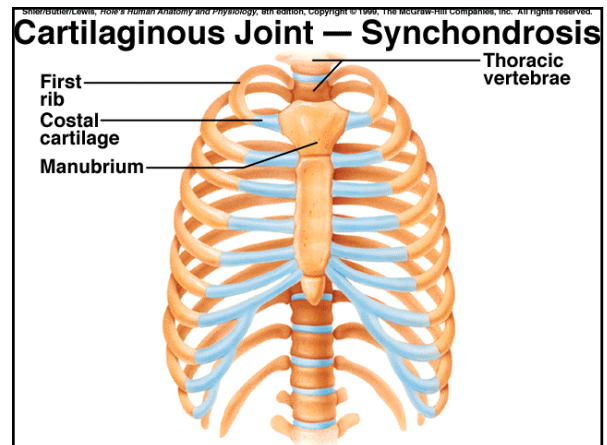
- syndesmosis – amphiarthrotic, bones are bound by long fibers of connective tissue, found at distal ends of tibia & fibula, bound by interosseous ligament
- suture – synarthrotic, found only between flat bones of skull, connected by sutural ligament
- gomphosis – synarthrotic, formed by union of a cone-shaped bony process in a bony socket, fastens tooth to jawbone, joined by periodontal ligament

### Fibrous Joint — Syndesmosis

The diagram shows the distal ends of the tibia and fibula. The fibula is on the left and the tibia is on the right. They are connected by the interosseous ligament, which is shown as a thick band of connective tissue. The lateral malleolus of the fibula and the medial malleolus of the tibia are also labeled.



- D. Cartilaginous Joints – 2 types**  
 \*bones connected by hyaline cartilage or fibrocartilage
- 1) **synchondrosis** – temporary joints formed by hyaline cartilage; ossify by age 25 years; **synarthrotic**; (Ex.- epiphyseal plate, manubrium & first rib)
  - 2) **symphysis** – articular surfaces of bones are covered by hyaline cartilage which is attached to a pad of springy fibrocartilage; **amphiarthrotic**; (Ex. – symphysis pubis, & the joint formed by 2 adjacent vertebrae separated by an intervertebral disk)
- E. Synovial Joints**  
 \*most joints are **synovial** & allow free movement, are **diarthrotic**; most complex joints; consist of **articular cartilage**, a **joint capsule**, & a **synovial membrane**

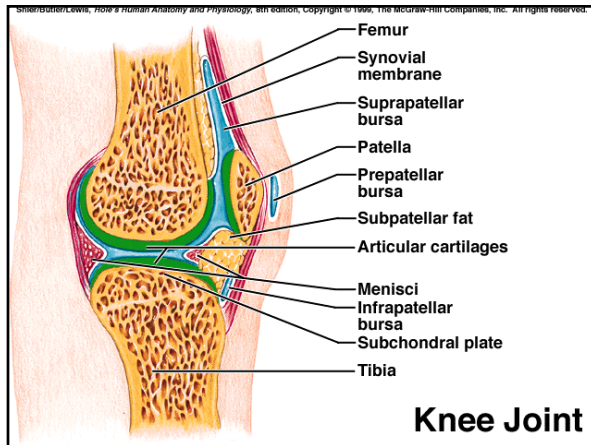
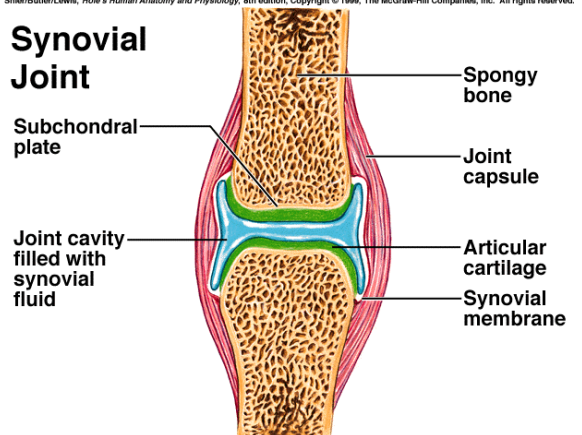


- III. General Structure of a Synovial Joint**
- A. The articular ends of bone in a synovial joint are covered with hyaline cartilage. This layer is called **articular cartilage**.
  - B. The bone beneath articular cartilage (**subchondral plate**) is **cancellous bone**, which functions to absorb shocks. It is somewhat elastic.
  - C. A tubular **joint capsule** consists of an **outer layer** of dense connective tissue that joins the periosteum, and an **inner layer** made up of **synovial membrane**.  
 \***ligaments** – bundles of tough collagenous fibers reinforce the joint capsule & bind articular ends of bones; ligament tightens when bone is stressed  
 \***synovial membrane** – inner layer of joint capsule made of shiny vascular lining of loose connective tissue; covers joint capsule; the membrane covers the **synovial cavity** into which is secreted the clear **synovial fluid** > moistens, lubricates, & nourishes

## III. General Structure of a Synovial Joint

- D. Some synovial joints contain pads of fibrocartilage called **menisci** that help to distribute body weight within the joint.
- E. Some synovial joints have fluid-filled sacs called **bursae** that cushion the movement of tendons that glide over bony prominences in the joint.
  - suprapatellar bursa
  - prepatellar bursa
  - infrapatellar bursa

## Synovial Joint



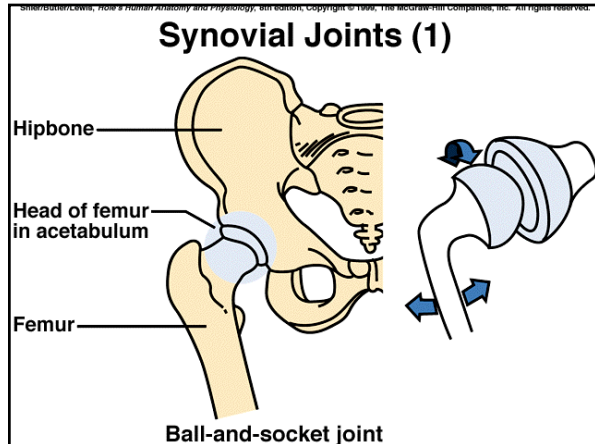
## IV. Types of Synovial Joints

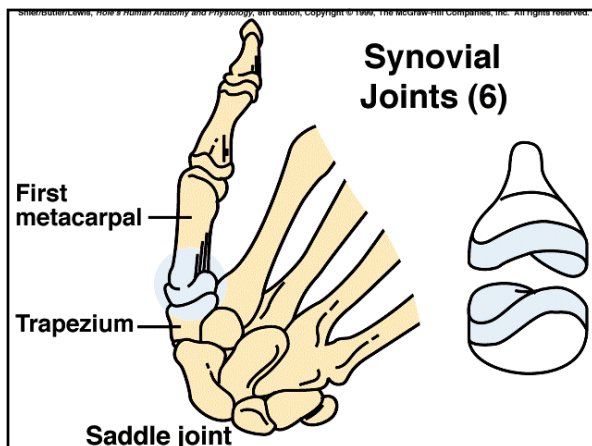
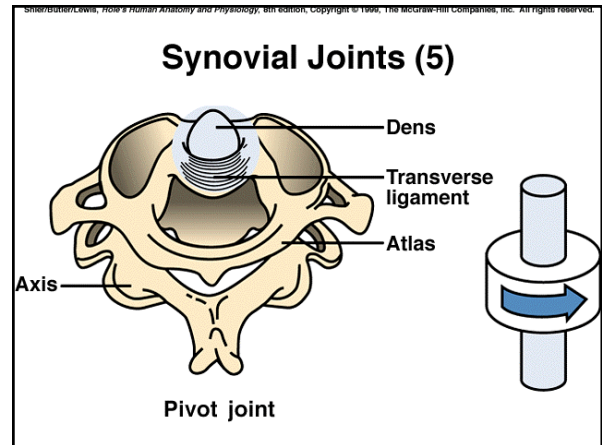
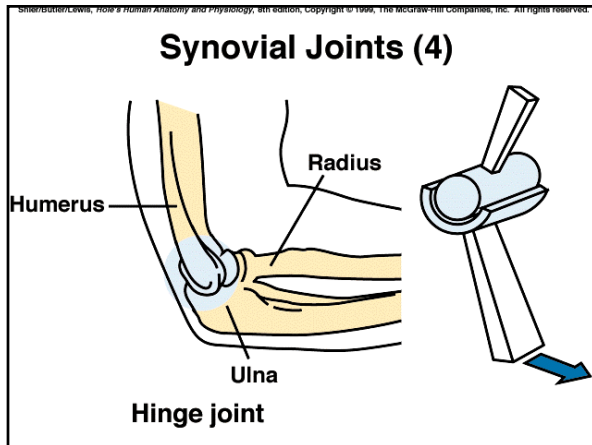
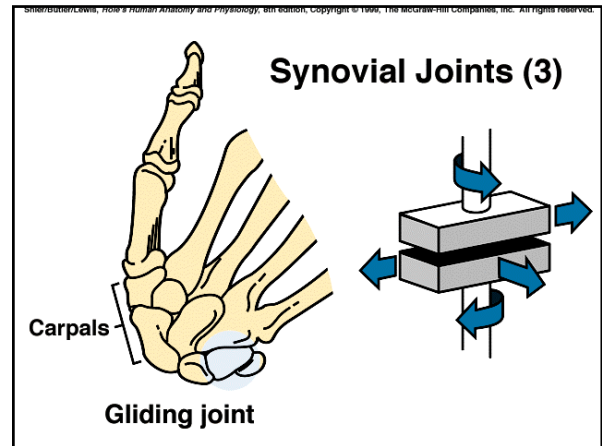
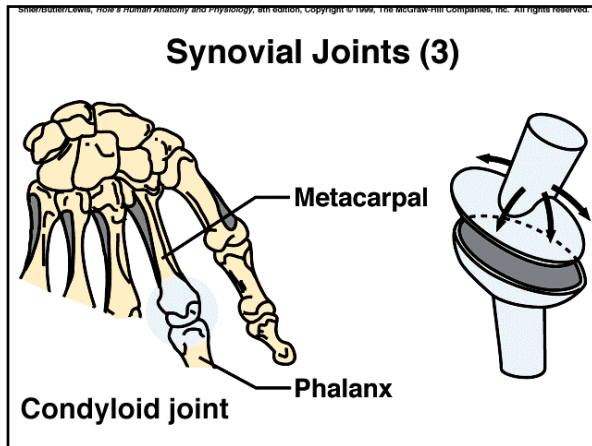
- A. A **ball-and-socket joint** consists of a bone with a globular or egg-shaped head articulating with the cup-shaped cavity of another bone; a very wide range of motion is possible. (hip & shoulder)
- B. A **condyloid joint** consists of an ovoid **condyle** fitting into an elliptical cavity, permitting a variety of motions. (metacarpals & phalanges)
- C. **Gliding joints** occur where articulating surfaces are nearly flat or slightly curved, allowing a back-and-forth motion. (joints in wrist & ankle)

## IV. Types of Synovial Joints

- D. In a **hinge joint** a convex surface fits into a concave surface, as is found in the (elbow and phalange joints).
- E. In a **pivot joint** a cylindrical surface rotates within a ring of bone and fibrous tissue. (atlas & axis)
- F. A **saddle joint** forms where articulating surfaces have both concave and convex areas, permitting a wide range of movements. (trapezium & thumb)

## Synovial Joints (1)

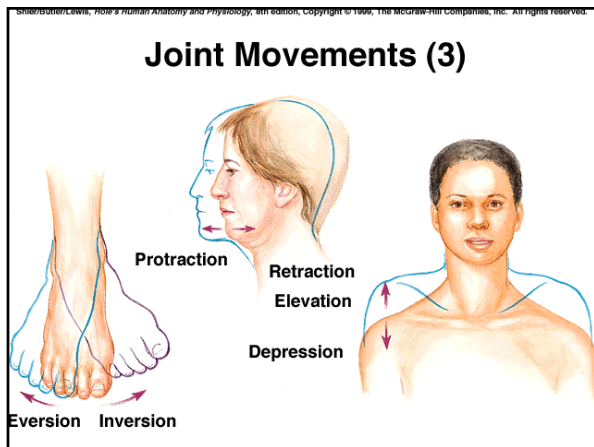
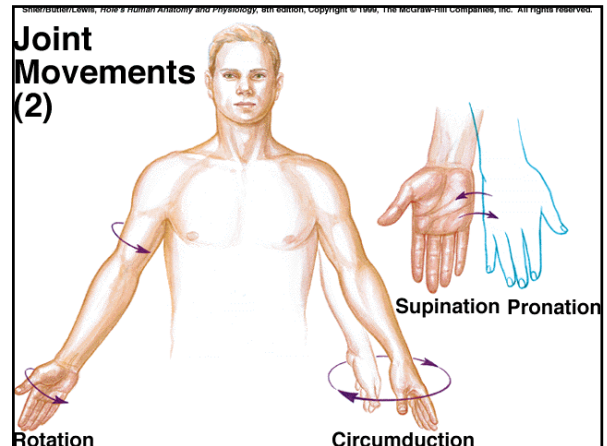
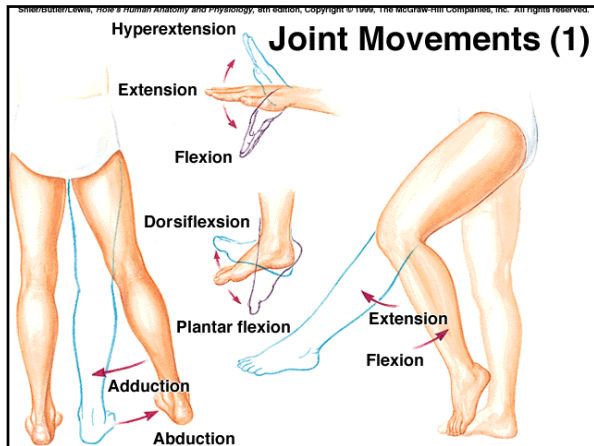




**V. Types of Joint Movements**

- When a muscle contracts, its fibers pull its movable end (**insertion**) toward its stationary end (**origin**), causing movement at a joint.
- These terms describe movements that occur at joints: **flexion**, **extension**, **hyperextension**, **dorsiflexion**, **plantar flexion**, **abduction**, **adduction**, **rotation**, **circumduction**, **supination**, **pronation**, **eversion**, **inversion**, **protraction**, **retraction**, **elevation**, and **depression**.

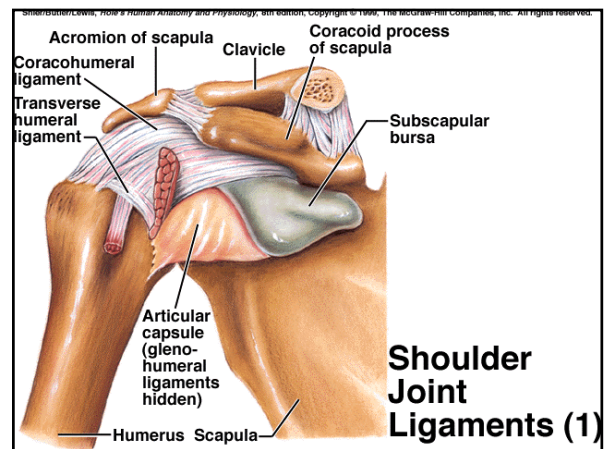
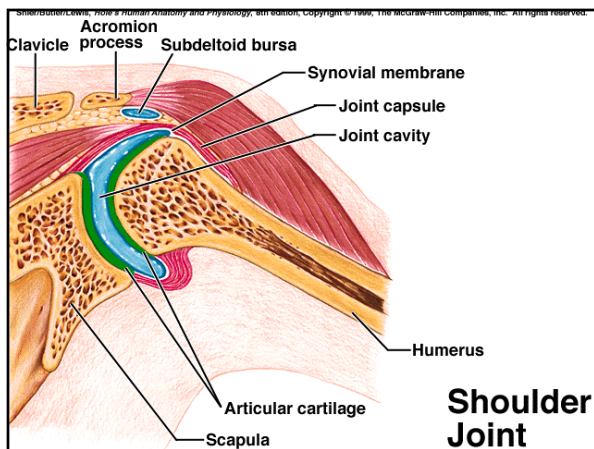


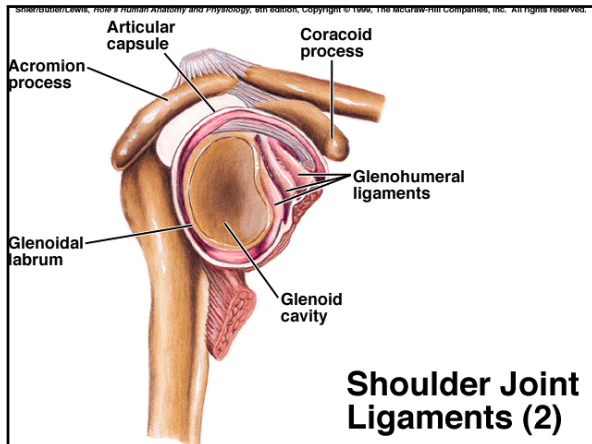


### VI. Examples of Synovial Joints

A. **Shoulder Joint**

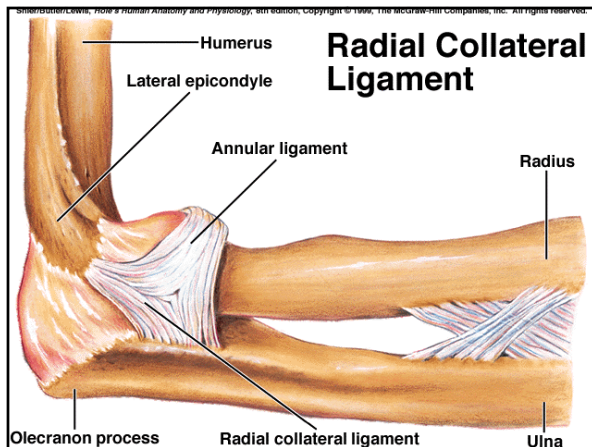
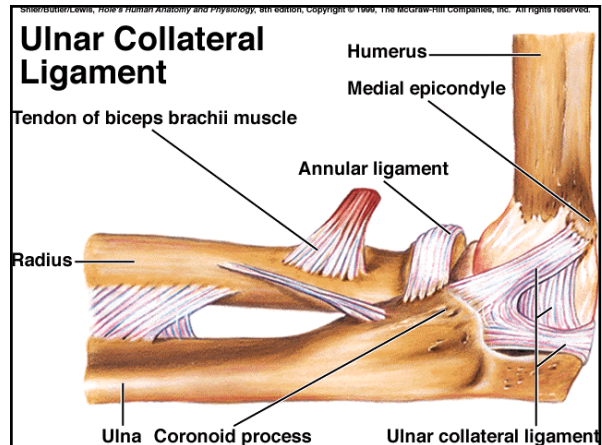
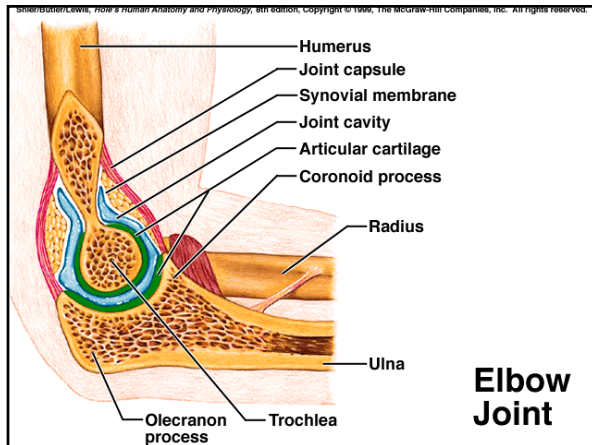
- \*ball-and-socket joint – head of the humerus & glenoid cavity of the scapula
- \*joint capsule envelops the joint; capsule is loose & cannot keep articular surfaces together by itself; it is reinforced by surrounding muscles & tendons
- \*ligaments prevent displacement of the bones: coracohumeral, glenohumeral, & transverse humeral ligaments, & glenoidal labrum
- \*several bursae are associated with the shoulder joint
- \*capable of wide range of movement due to looseness of its attachments & the large articular surface of the humerus compared to the shallow depth of the glenoid cavity





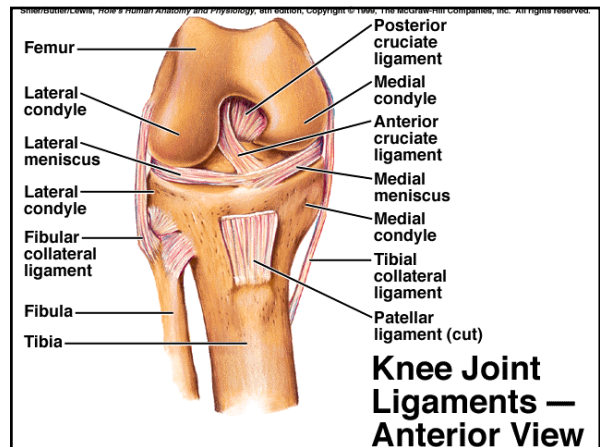
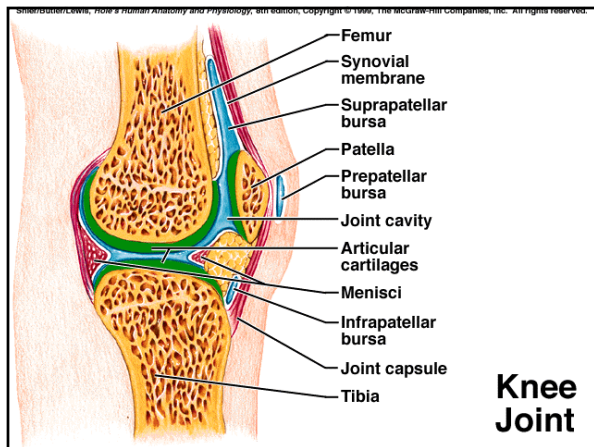
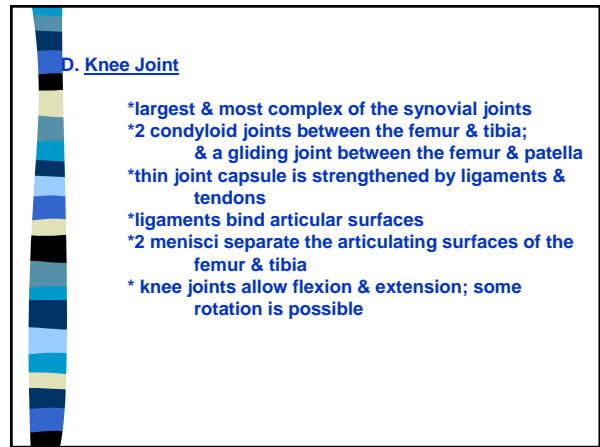
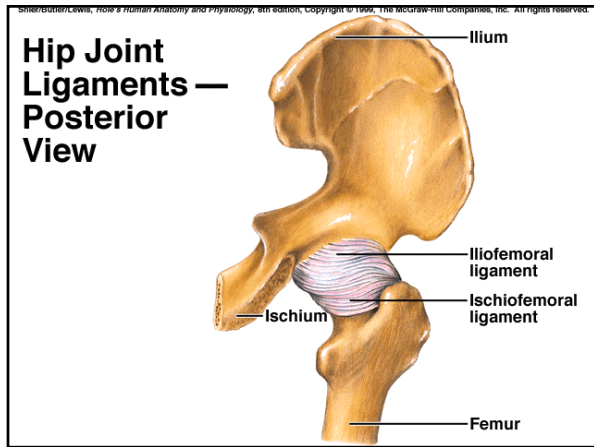
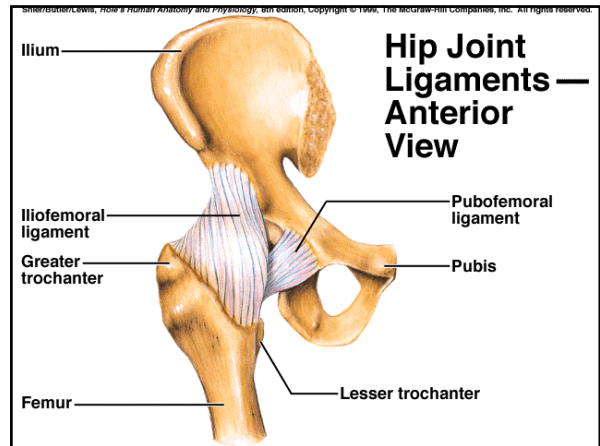
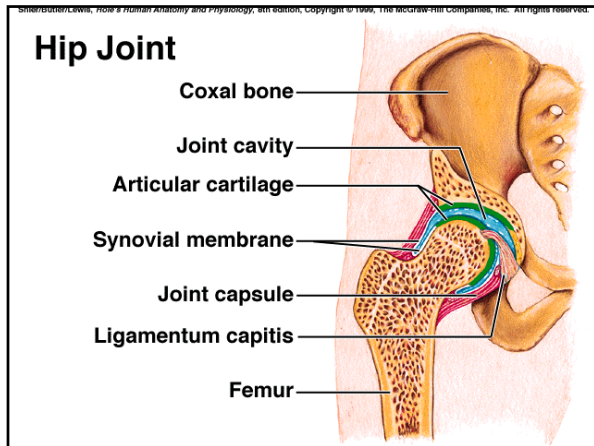
**B. Elbow Joint** - has 2 articulations

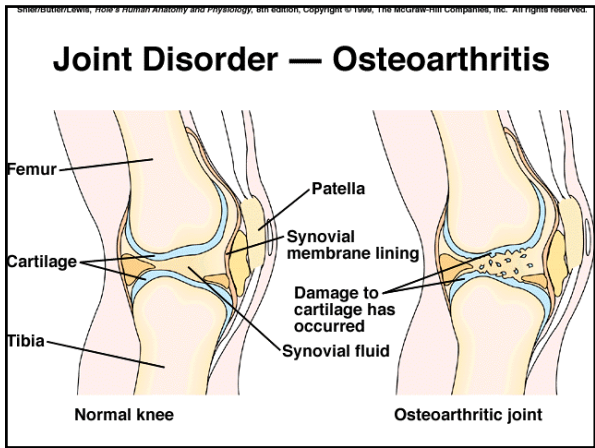
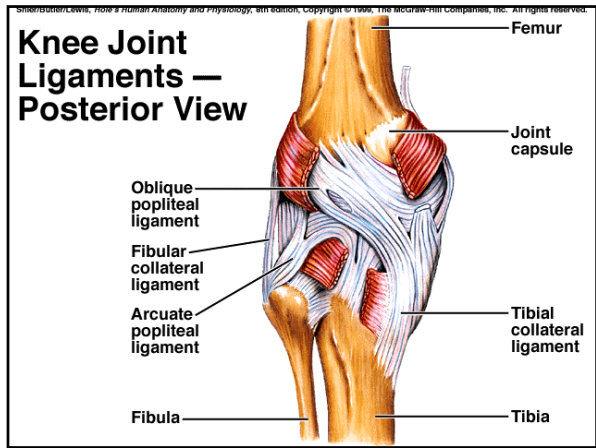
- \*has a hinge joint between humerus & ulna; also has a gliding joint between the humerus & radius
- \*joint capsule is reinforced by collateral ligaments
- \*synovial membrane partially divides the joint cavity into 2 portions
- \*movements:
  - humerus & ulna - hinge-type movements – flexion & extension
  - head of radius – free to rotate – pronation & supination



**C. Hip Joint**

- \*ball-and-socket joint between the femur & the coxal bone
- \*a ring of fibrocartilage deepens the cavity of the acetabulum
- \*many ligaments reinforce the joint capsule & the articulating surfaces
- \*the hip joint allows for a wide variety of movement





**CIAO**

**Remember** – At the end of the chapter is a Chapter Summary that is your Study Guide for the Chapter 8 test.