

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



**ANATOMY DEPARTMENT
COLLEGE OF MEDICINE
KING SAUD UNIVERSITY**

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What do I need to know

- Explain the term “Joint”.
- Classify joints & describe each type with example.
- Describe the characteristics of synovial joints.
- Classify the synovial joint & describe each type with example.
- List factors maintaining stability of joints.
- Explain “Hilton’s law”.

JOINTS- DEFINATION

JOINT

is the site where two or more than two bones meet together or union of two or more bones of the body.

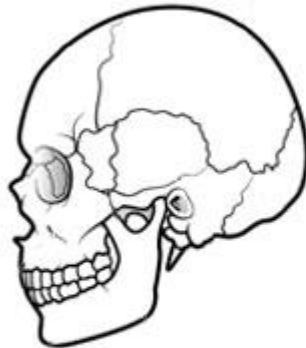


JOINTS- CLASSIFICATION

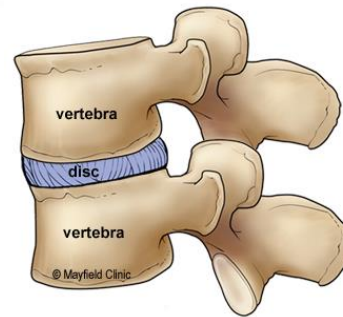
JOINTS are classified into:

1. **Fibrous.**
2. **Cartilaginous.**
3. **Synovial.**

HOW? According to the tissues that lie between the bones.



Fibrous
(Immoveable)



Cartilagenous
(Semi moveable)



Synovial
(freely moveable)

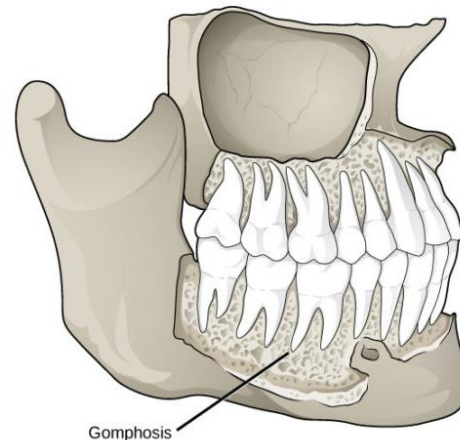
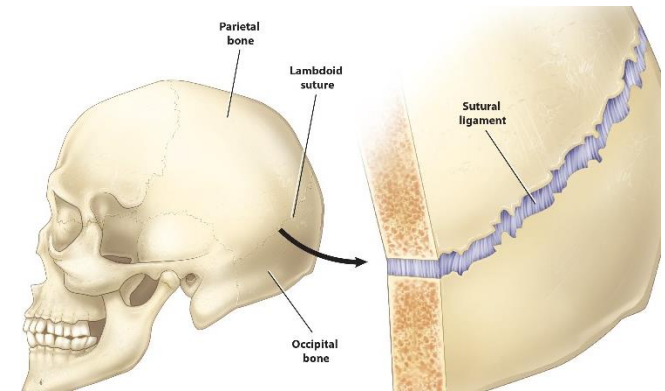
JOINTS- CLASSIFICATION - FIBROUS

Fibrous joints.

The articulating surfaces are joined by **fibrous tissue**.

Example:

1. **SKULL SUTURES: No movement or negligible , temporary** as it ossify later in middle age).
2. **INFERIOR TIBIOFIBULAR JOINTS (SYNDESMOSIS):** very Little movement, permanent joints.
3. **GOMPHOSIS: Between teeth and their socket.**



Inferior tibiofibular joint



JOINTS- CLASSIFICATION - CARTILAGINOUS

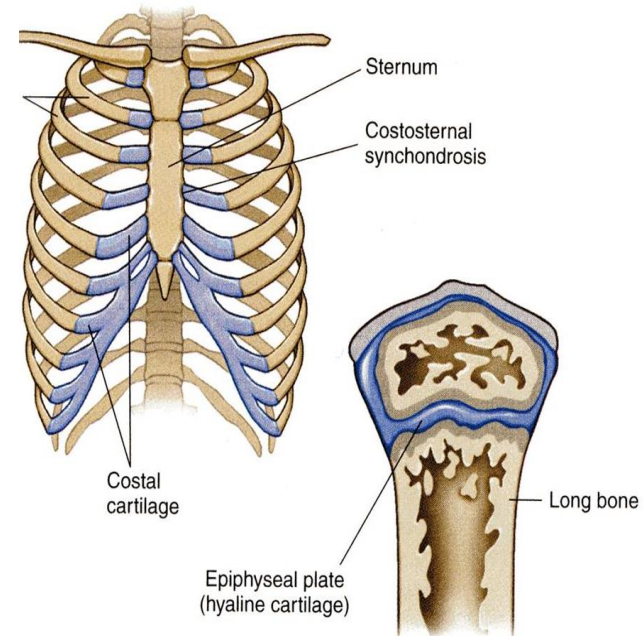
Cartilaginous joints.

Union between bones is by **cartilage**.

Two varieties:

1. Primary (Synchondrosis)
2. Secondary (Symphysis)

Primary Cartilaginous



JOINTS- CLASSIFICATION - CARTILAGINOUS

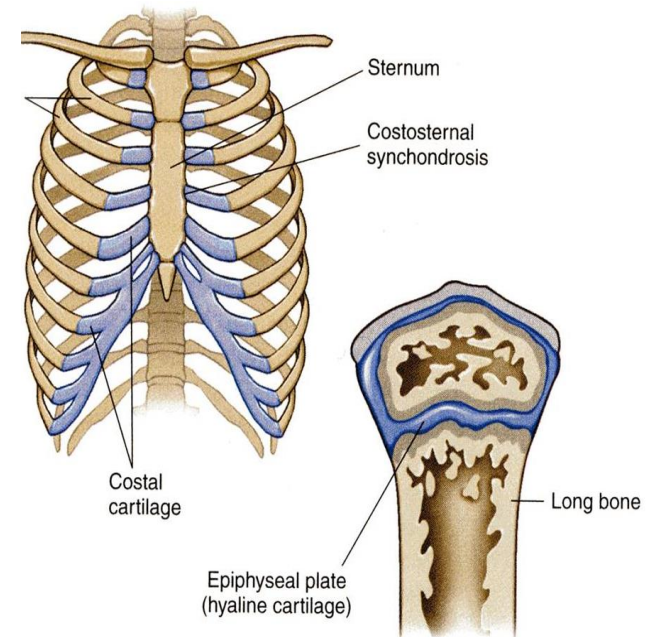
Primary Cartilaginous joints:

is one where bone and cartilage meet.

- Immobile ,very strong
- temporary joints, ossify later

Examples:

1. All epiphyses Between the Epiphysis and Diaphysis of a growing bone.
2. Junctions of ribs with their costal cartilage
3. Between the First Rib and the Sternum (1st sternocostal joint).



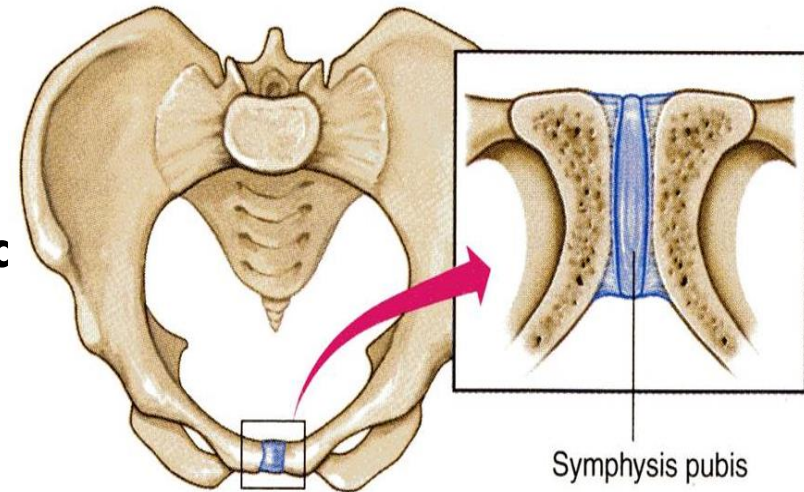
Primary Cartilaginous

JOINTS- CLASSIFICATION - CARTILAGINOUS

Secondary Cartilaginous Joint :

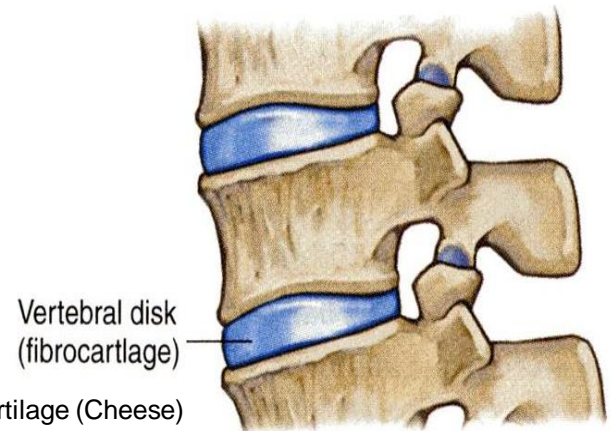
The bones are united by a plate of fibrocartilage.

- Their articulating surfaces are covered by a thin plate of hyaline cartilage.
- Little movement, permanent joints.
- They are called Midline joints.



Examples:

- Joints between the Vertebral Bodies (intervertebral discs).
- Symphysis Pubis.

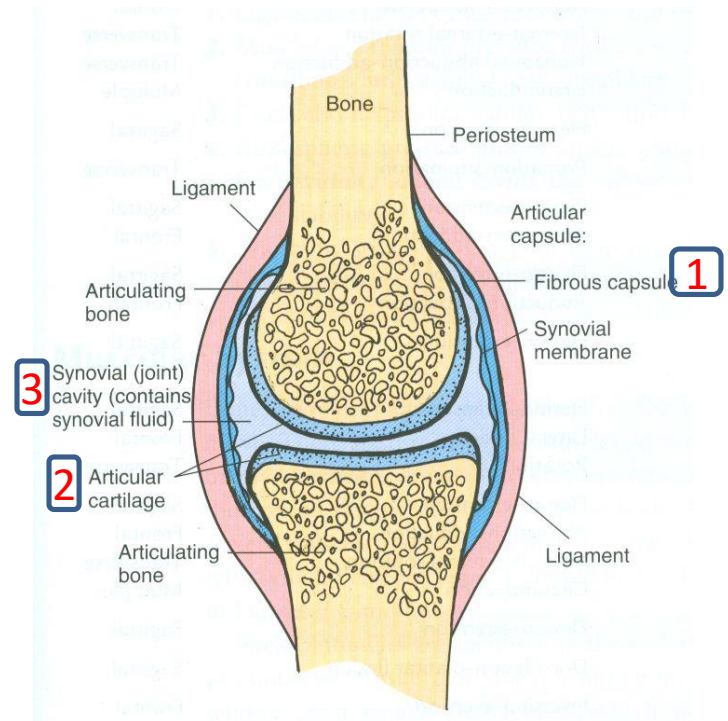


Joints

Synovial Joint

Characteristic features :

1. The articulating bones are joined by a **fibrous capsule**, which is attached to the margins of articular surfaces & enclosing the joint..
2. The articular surfaces are covered by a thin layer of **hyaline cartilage (articular cartilage)**.
3. A **joint cavity** enclosed within the capsule.
4. **Freely movable joints**



Synovial Joint

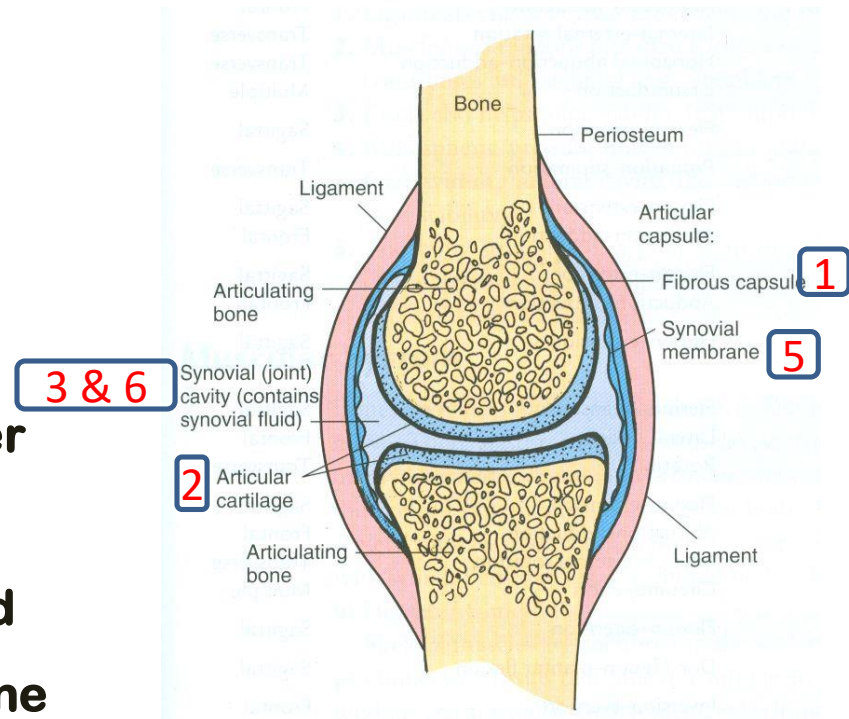
Characteristic features :

5. Synovial membrane : a thin vascular membrane lining the inner surface of the capsule.

6. Synovial fluid : a lubricating fluid produced by the synovial membrane in the joint cavity.

7. Ligaments Reinforce the capsule externally or internally or both

“The fluid minimizes the friction between the articular surfaces.”



Synovial joints.

Characteristic features:

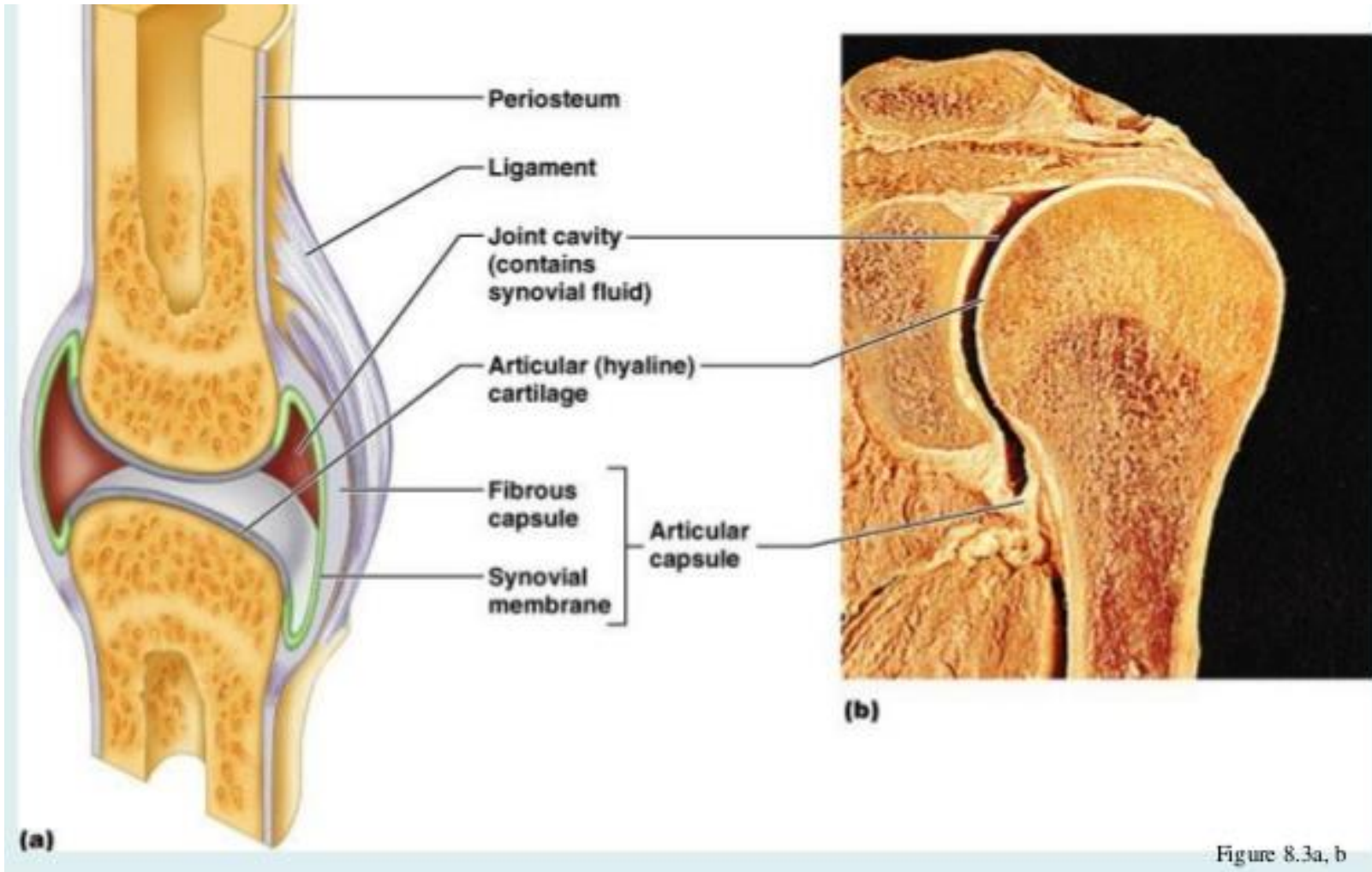
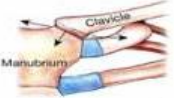


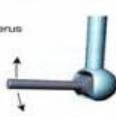


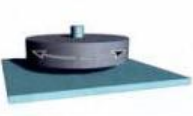










Figure 8.3a, b

Classification of Synovial joints.

Synovial joints can be classified according to:

- The arrangement of the articular surfaces.
- The types of movement that are possible

| | |
|---|-------------------------------|
|   | Slight nonaxial or multiaxial |
|    | Monaxial |
|   | Monaxial (rotation) |
|    | Biaxial |
|    | Biaxial |
|   | Triaxial |

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Plane Joint



Saddle Joint



Hinge Joint



Pivot Joint



Ball-and-Socket Joint

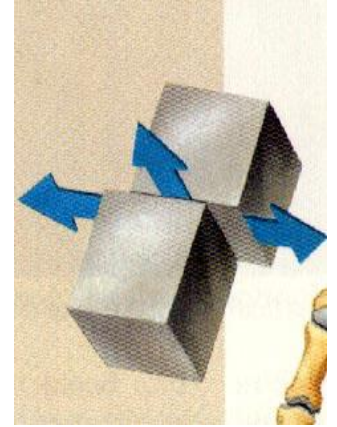


Ellipsoid Joint



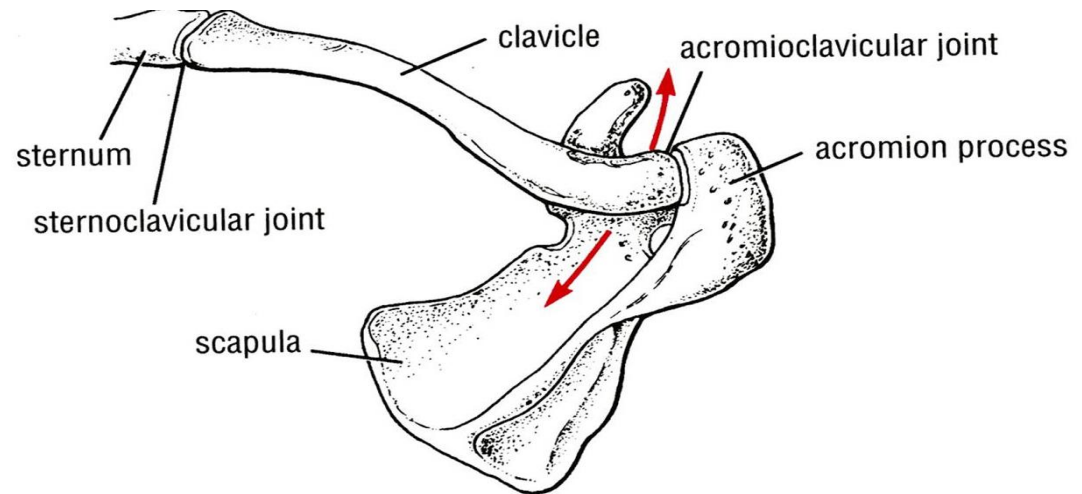
Plane synovial joints

- The articulating surfaces are flat.
- The bones slide on one another, producing a gliding movement.



Examples:

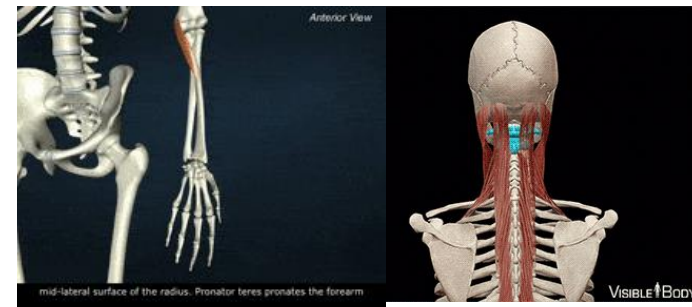
1. Sternoclavicular joint.
2. Acromioclavicular joint.
3. Intercarpal Joints.



Axial synovial joints

Movements along different axes:

- 1. Transverse axis allows flexion & extension.**
- 2. Longitudinal axis allows rotation.**
- 3. Antero-posterior axis: allows abduction & adduction.**



Axial joints are divided into:

- 1. Uniaxial.**
- 2. Biaxial.**
- 3. Multi-axial (polyaxial).**



Uniaxial Synovial Joint

- Hinge joints
- Pivot joints

Hinge joints:

Axis: Transverse

Movements: Flexion & extension.

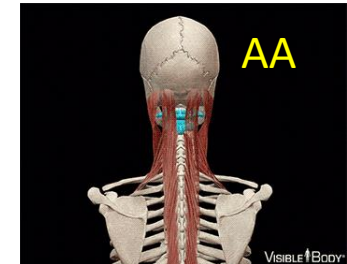
Example: Elbow and ankle joints.

Pivot:

Axis: longitudinal.

Movements: Rotation.

Example: Radio-ulnar joints
Atlantoaxial joint



Biaxial Synovial Joint

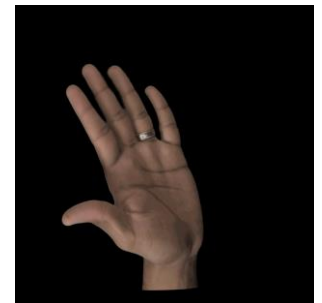
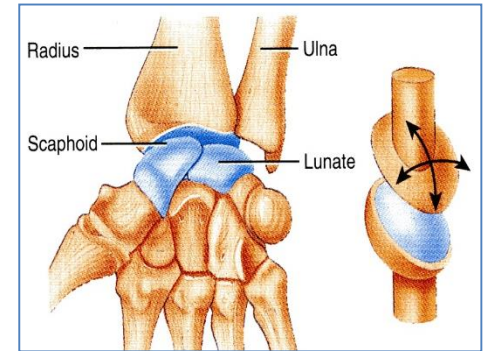
- Ellipsoid joints
- Saddle joints:

Ellipsoid joints:

Axis: Transverse & antero-posterior.

Movements: Flexion & extension + abduction & adduction **BUT** rotation is impossible.

Example: Wrist joints.



Biaxial Synovial Joint

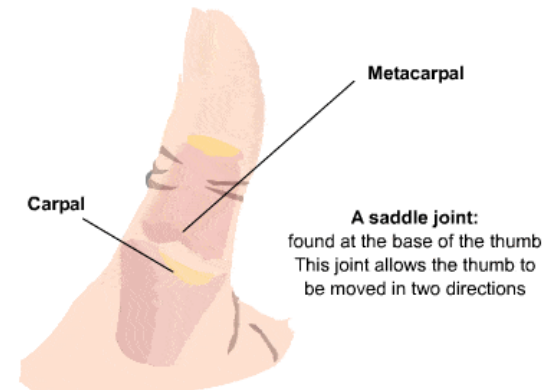
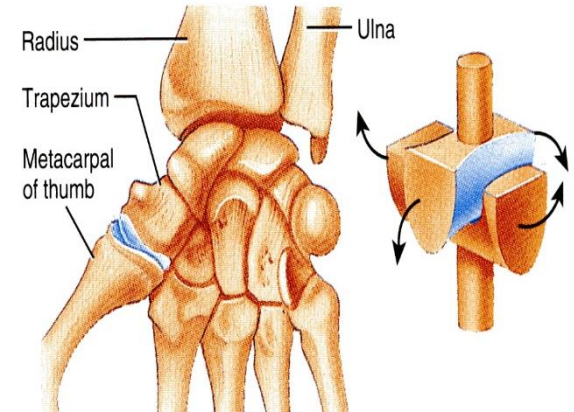
Saddle joints:

They resemble a **saddle** on a horse's back

Movements: Like ellipsoid joints
Flexion & extension +
Abduction & adduction)
& a **small range of rotation** .

Example:

Carpometacarpal joint of the thumb.



JOINTS- SYNOVIAL- CLASSIFICATION

Polyaxial Synovial Joint

Ball and socket joints:

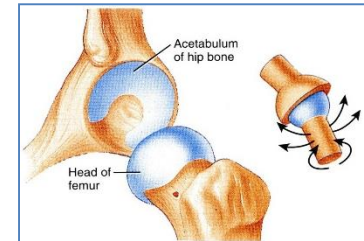
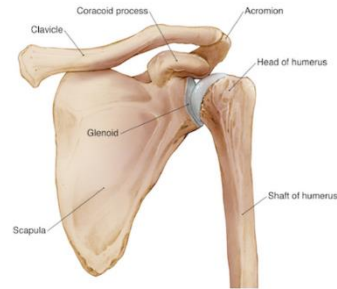
A ball-shaped head of a bone fits into a socket-like concavity of another.

Movements:

Flexion & extension +
Abduction & adduction)
& rotation along separate axis.

Example:

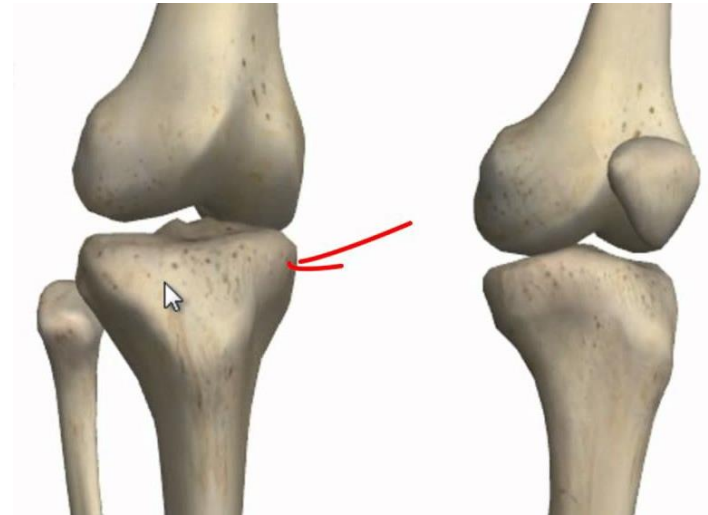
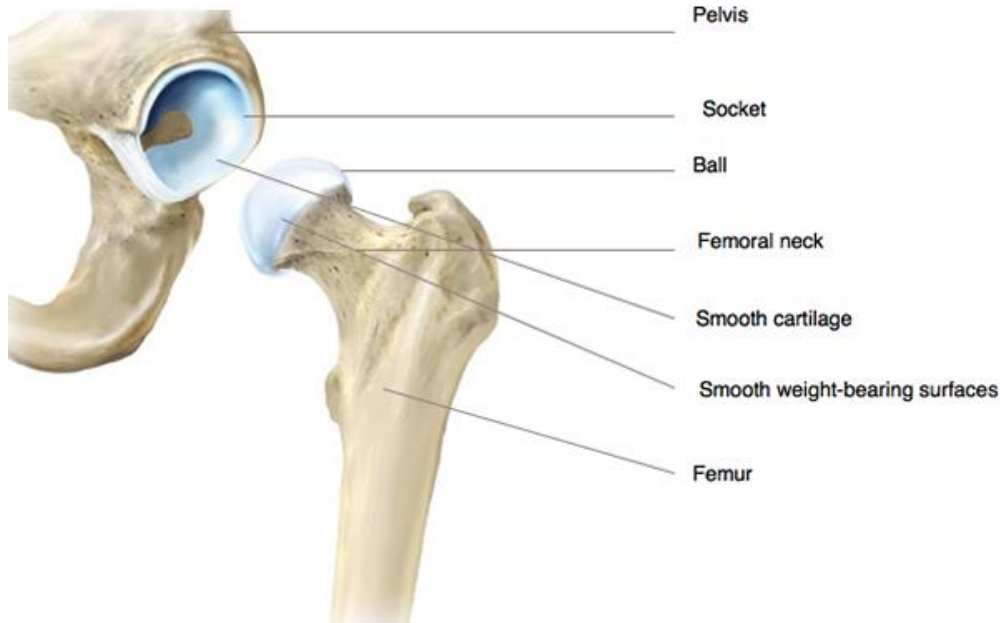
1. Shoulder joint
2. Hip joint.



Zkaimkhani

Factors Affecting Stability of Synovial Joints

1. The shape of articular surfaces
2. Ligaments
3. Tone of muscles around the joint.
4. Atmospheric pressure

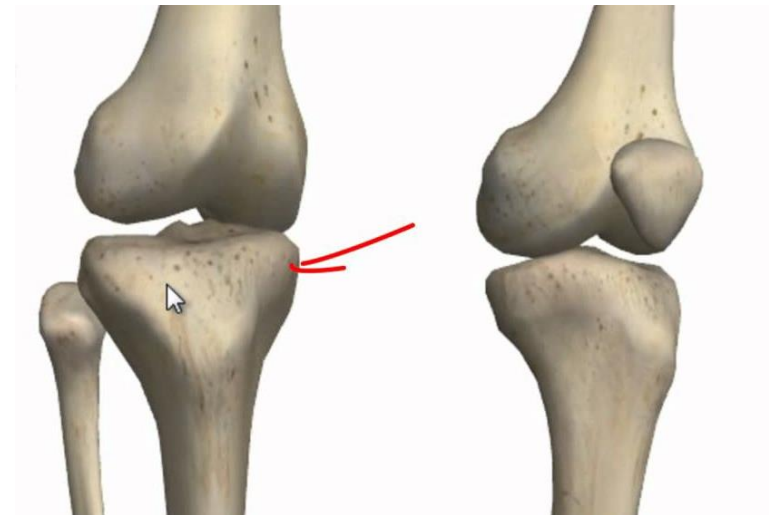
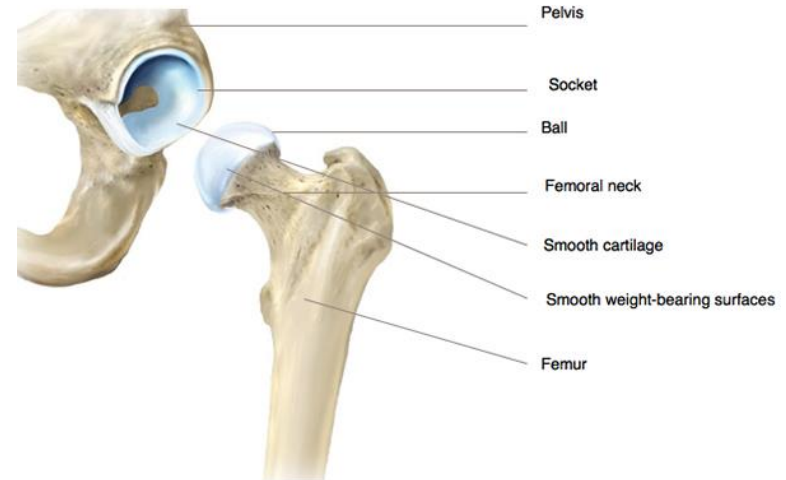


JOINTS - STABILITY

1. The shape of articular surfaces

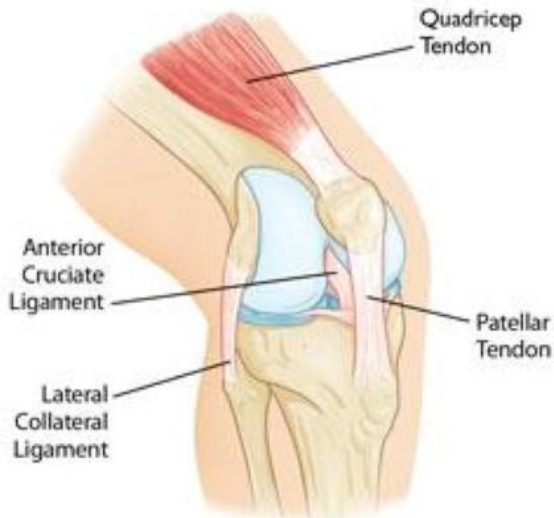
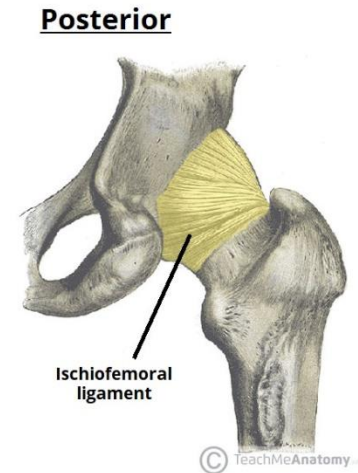
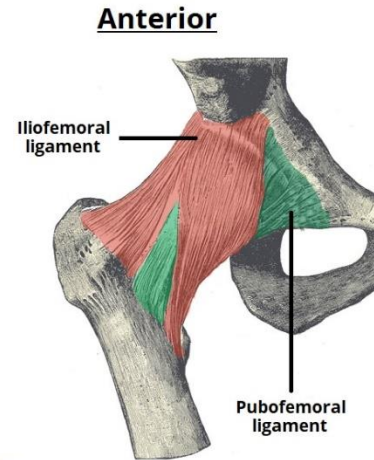
- **The ball and socket shape of the Hip joint is a good examples of the importance of the shape of the bone, to maintain joint stability.**

- **The shape of the bones forming the Knee joint has nothing to do for stability.**



2. Strength of the ligaments:

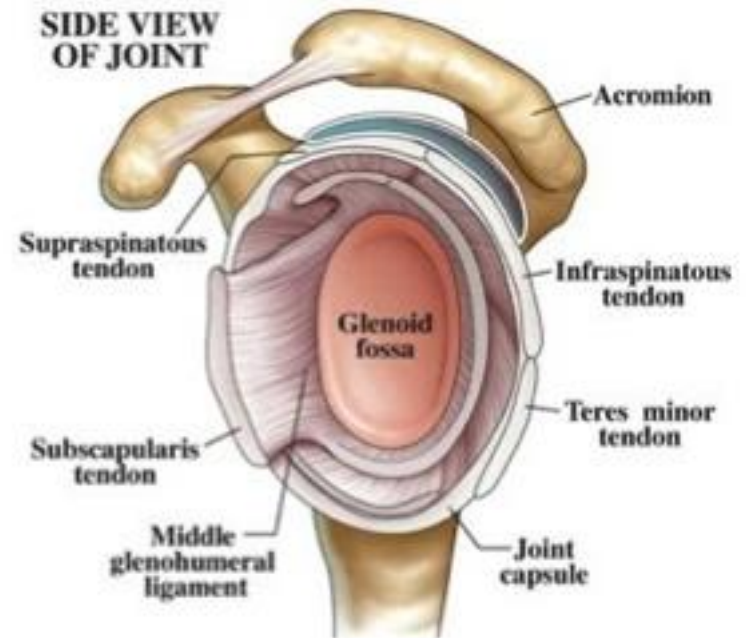
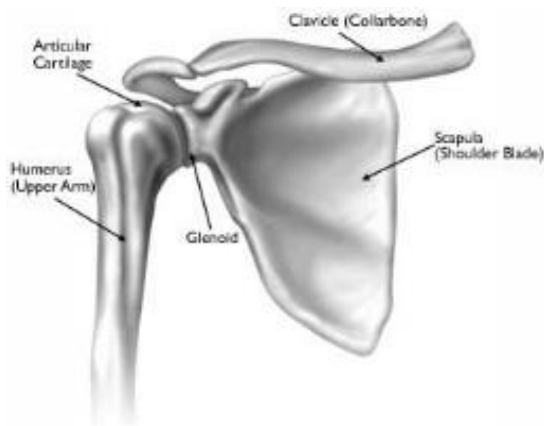
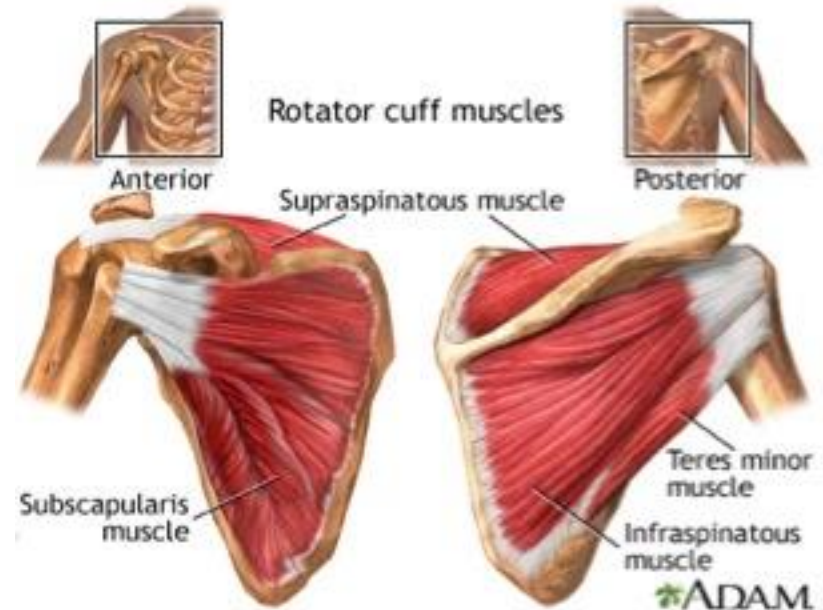
- They prevent excessive movement in a joint.



JOINTS - STABILITY

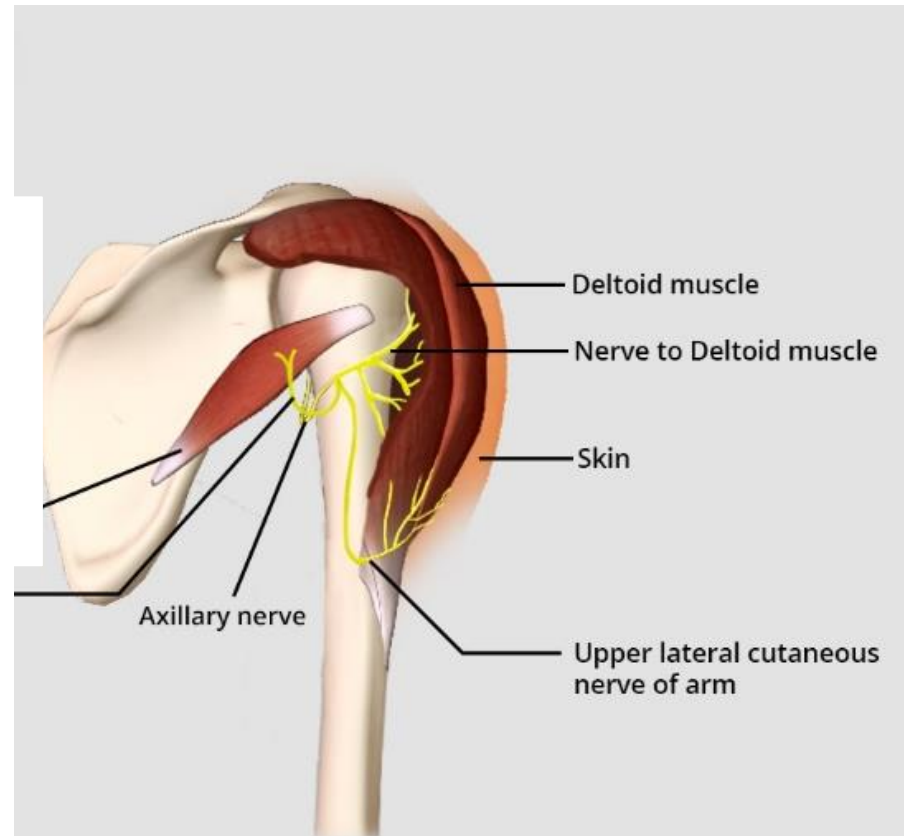
2. Tone of the surrounding muscles.

- In most joints, it is the major factor controlling stability.
- The short muscles around the shoulder joint (**rotator cuff**) keeps the head of the humerus in the shallow glenoid cavity.



NERVE SUPPLY OF JOINTS

The **CAPSULE** and **LIGAMENTS** receive an abundant sensory nerve supply.



- **Hilton's Law**

“A sensory nerve supplying a **joint** also supplies the **muscles moving** that joint and **the skin overlying** the insertions of these muscles.”

JOINTS - SUMMARY

JOINT is the site where two or more bones come together, whether movement occurs (or not) between them.

JOINTS are classified according to the tissues that lie between the bones into 3 types: fibrous, cartilaginous & synovial.

SYNOVIAL JOINTS are freely movable & characterized by the presence of:

- 1. Fibrous capsule,**
- 2. Articular cartilage,**
- 3. Ligaments**
- 4. Synovial membrane &**
- 5. Joint cavity containing synovial fluid.**
 - Synovial joints are classified according to the range of movement into: plane and axial.
 - Axial are divided according to the number of axes of movements into: uniaxial, biaxial & polyaxial or multiaxial.
 - Stability of synovial joints depends on: shape of articular surfaces, ligaments & muscle tone.
 - Joints have same nerve supply as muscles moving them (Hilton's law).

Self Assessment

QUESTION

Which of the following is a plane synovial joint?

1. Shoulder.
2. Elbow.
3. Sternoclavicular.
4. Symphysis pubis.

QUESTION

Which of the following is a cartilaginous joint?

1. Hip.
2. Elbow.
3. Sternoclavicular.
4. Symphysis pubis.

QUESTION

Which of the following is A-typical synovial joint?

1. Elbow.
2. Ankle
3. Acromioclavicular
4. Inferior radioulnar.

QUESTION

Gomphosis is an example of _____?

QUESTION

Inferior radioulnar is an example of _____?

QUESTION

Joint cavity is characteristic of _____?

QUESTION

Hilton's law explain the _____ of a joint?

QUESTION

The shape of articular surfaces is very important stabilizing factor in _____ joint.

QUESTION

The muscle tone is very important stabilizing factor in _____ joint.



THANK YOU