

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

DR. ZAHID ALI KAIMKHANI
M.D;M.Phil;Ph.D

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

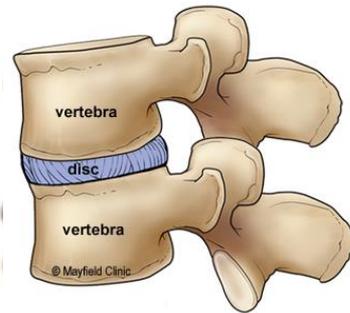
JOINTS are classified into:

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

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



Fibrous
(Immoveable)



Cartilagenous
(Semi moveable)



Synovial
(freely moveable)

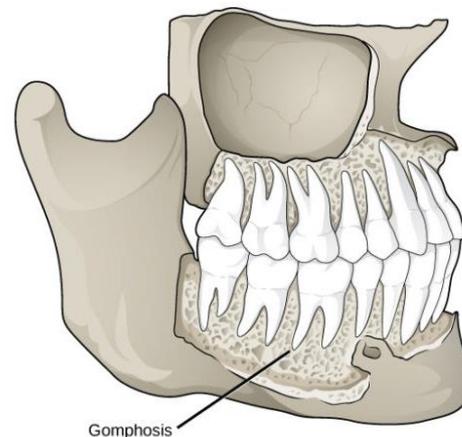
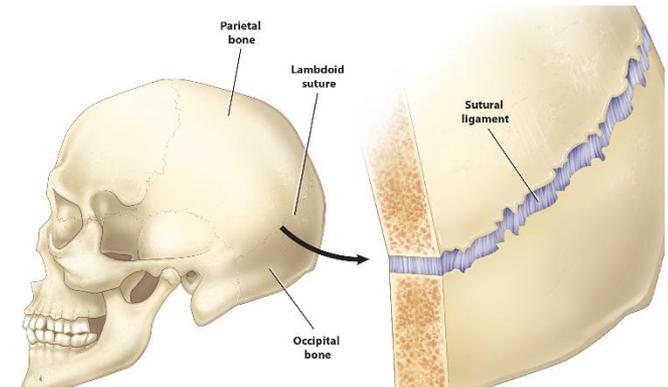
JOINTS- CLASSIFICATION - FIBROUS

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:

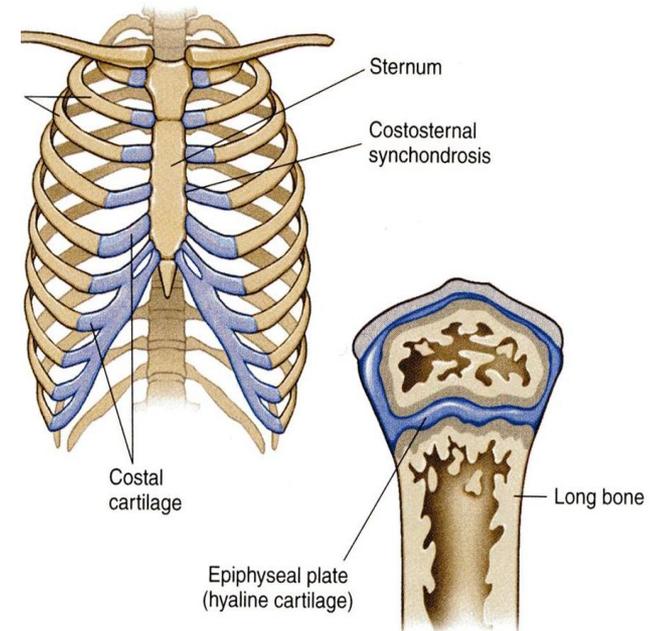
1. Primary (Synchondrosis)
2. Secondary (Symphysis)

1. **Primary Cartilaginous Joint** : is one where **bone and cartilage meet**.

- **Immobile ,very strong**
- **temporary joints, ossify later**

• **Example**

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).

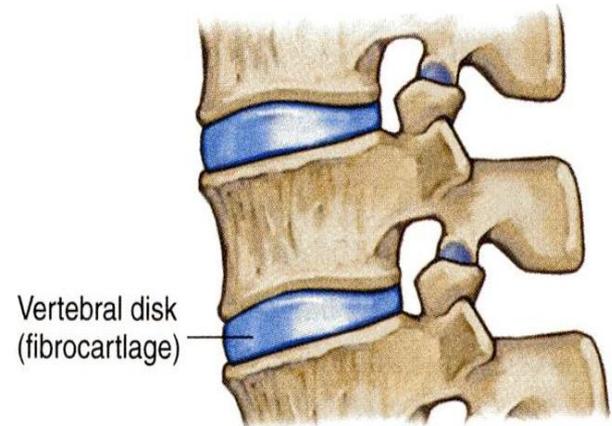
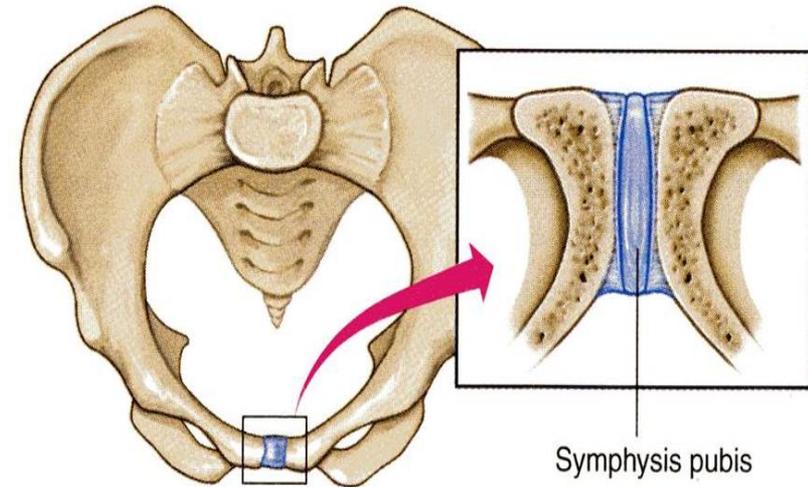


Primary Cartilaginous

JOINTS- CLASSIFICATION - CARTILAGINOUS

Cartilaginous joints.

1. **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- CLASSIFICATION – SYNOVIAL- CHARACTERISTIC

Synovial joints.

Characteristic features:

- Fibrous capsule
- Articular cartilage (Hyaline)
- Joint cavity
- Synovial membrane
- Synovial fluid
- Movements
- Ligaments

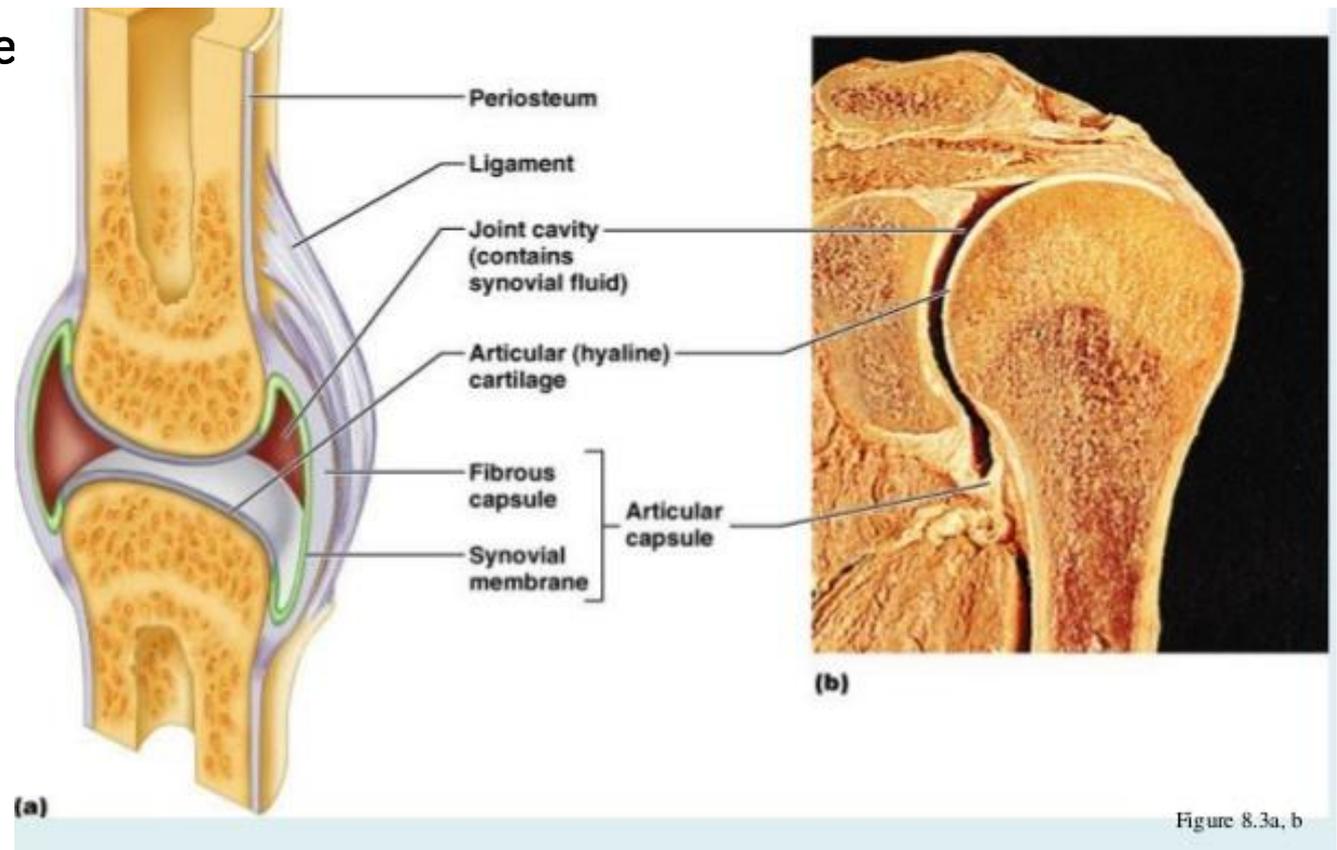


Figure 8.3a, b

JOINTS- CLASSIFICATION – SYNOVIAL- CHARACTERISTIC

Synovial joints.

Characteristic features:

- The bones are joined by a **fibrous capsule**, which is attached to the margins of articular surfaces & enclosing the joint.
- The **articular surfaces are covered by a thin layer of hyaline cartilage** (articular cartilage).
- A joint **cavity** enclosed within the capsule.
- A thin vascular **synovial membrane** lining the inner surface of the capsule.
- A lubricating **synovial fluid** produced by synovial membrane in the joint cavity.

The fluid minimizes the friction between the articular surfaces.

- **Movements.** freely movable joints.
- **Ligaments .** Reinforce the capsule externally or internally or both

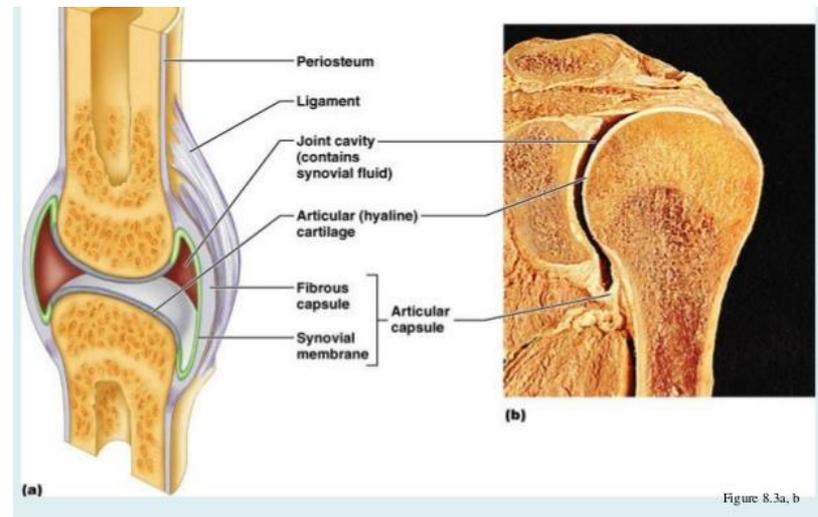


Figure 8.3a, b

JOINTS- CLASSIFICATION – SYNOVIAL- CLASSIFICATION

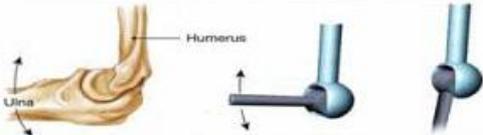
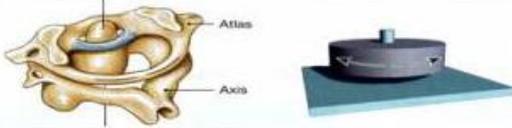
Synovial joints.

Classification

Synovial joints can be classified according to:

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

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	Monaxial
	Monaxial (rotation)
	Biaxial
	Biaxial
	Triaxial



Plane Joint



Saddle Joint



Hinge Joint



Pivot Joint



Ball-and-Socket Joint



Ellipsoid Joint



JOINTS- CLASSIFICATION – SYNOVIAL- CLASSIFICATION

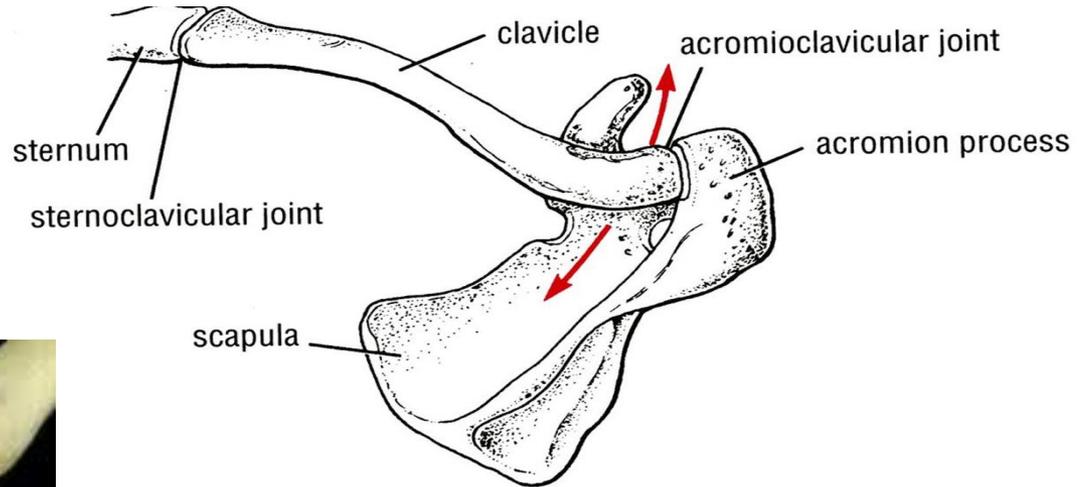
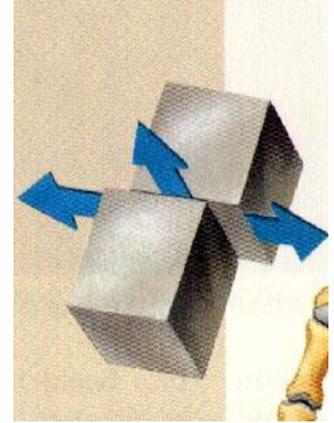
Synovial joints.

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.



JOINTS- CLASSIFICATION – SYNOVIAL- CLASSIFICATION

Synovial joints.

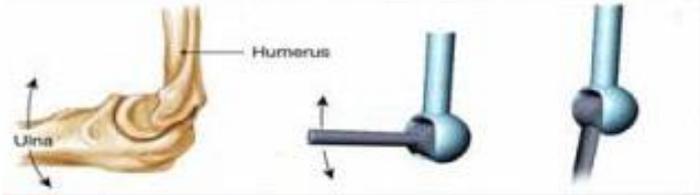
Axial synovial joints

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).

	Monaxial
	Monaxial (rotation)
	Biaxial
	Biaxial
	Triaxial

JOINTS- CLASSIFICATION – SYNOVIAL- Axial synovial joints

Uniaxial.

1. Hinge joints:

- Axis: Transverse.
- Movements: Flexion & extension.

Examples:

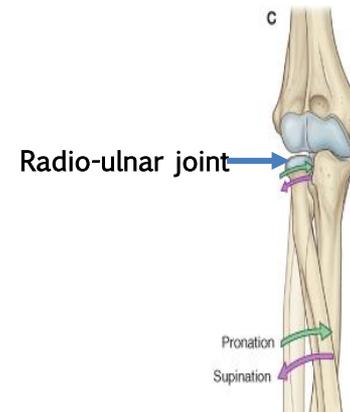
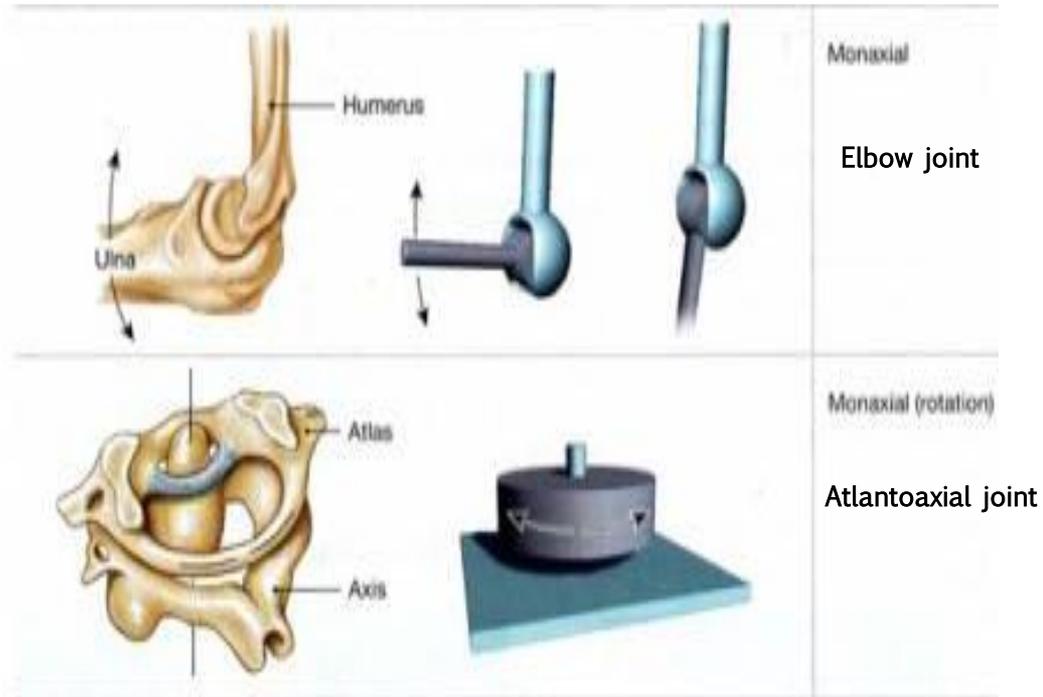
- Elbow joint
- Ankle joint.

2. Pivot joints :

- Axis: longitudinal.
- Movements: rotation.

Examples:

- Radio-ulnar
- Atlantoaxial joint.



JOINTS- CLASSIFICATION – SYNOVIAL- Axial synovial joints

Biaxial joints

1. **Ellipsoid joints:**
2. **Saddle joints :**

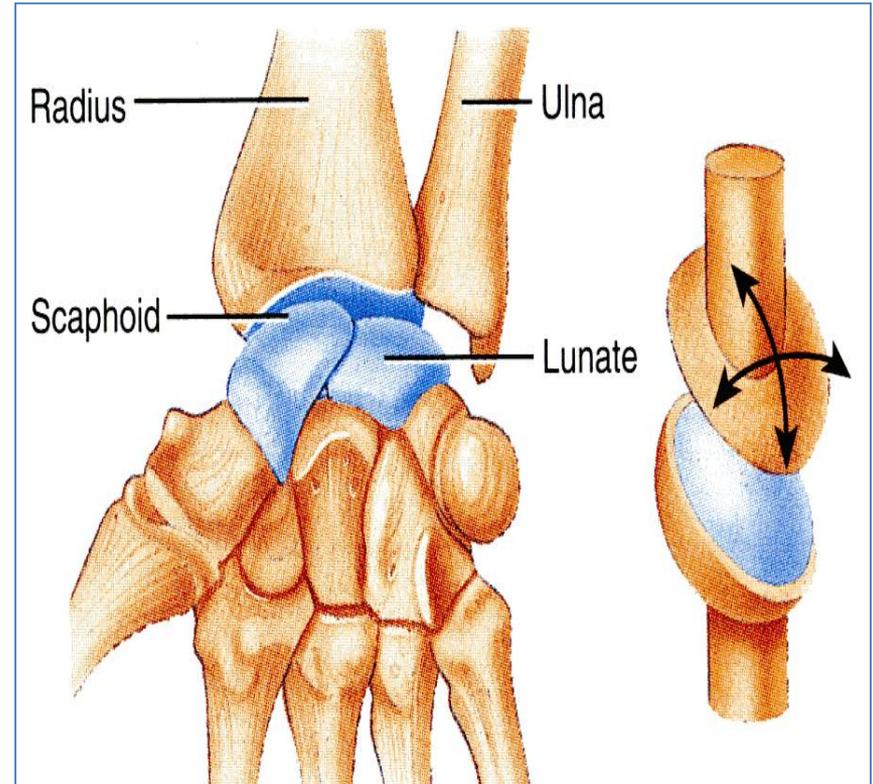
1. **Ellipsoid joints:**

An elliptical convex fits into an elliptical concave articular surfaces.

- Axis: Transverse & antero-posterior.
- Movements: Flexion & extension, abduction & adduction
BUT
ROTATION IS IMPOSSIBLE.

Example:

- Wrist joint.



JOINTS- CLASSIFICATION – SYNOVIAL- Axial synovial joints

Biaxial joints (Conti)

1. **Ellipsoid joints:**
2. **Saddle joints :**

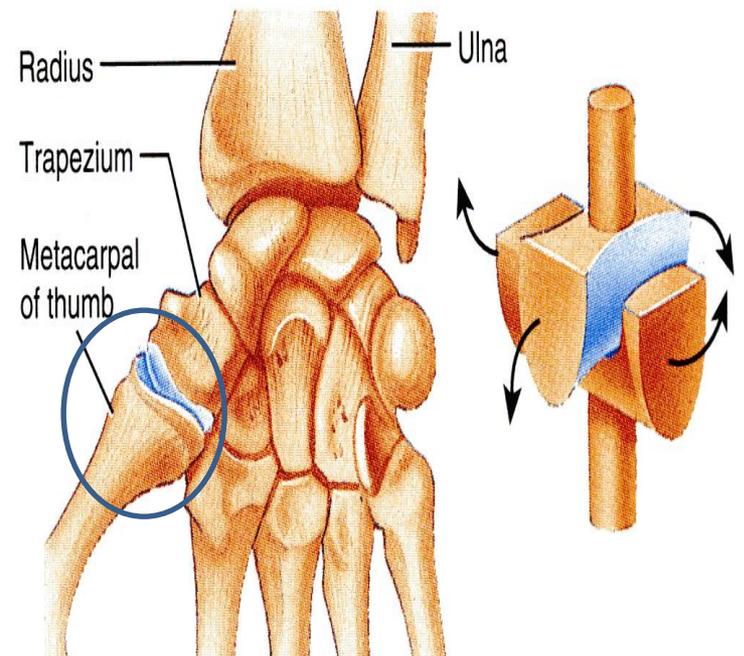
2. **Saddle joints :**

They resemble a saddle on a horse's back.
The articular surfaces are reciprocally **concavoconvex**.

- Axis: longitudinal.
- Movements: Flexion & extension, abduction & adduction and small range of **ROTATION**.

Examples:

- Carpometacarpal joint of the thumb.

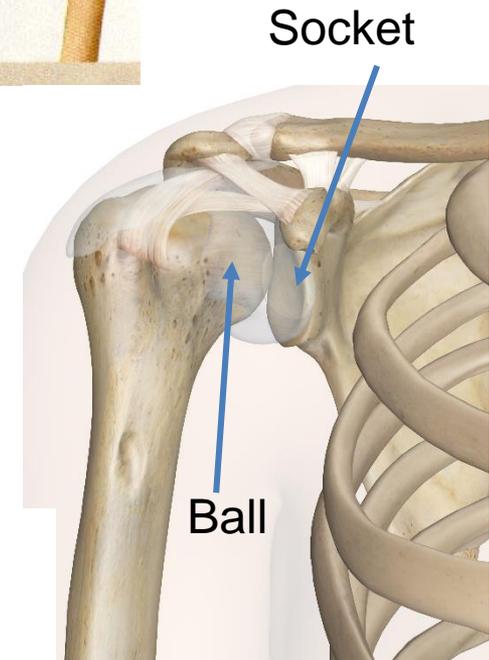


JOINTS- CLASSIFICATION – SYNOVIAL- Axial synovial joints

Multi-axial Synovial joints

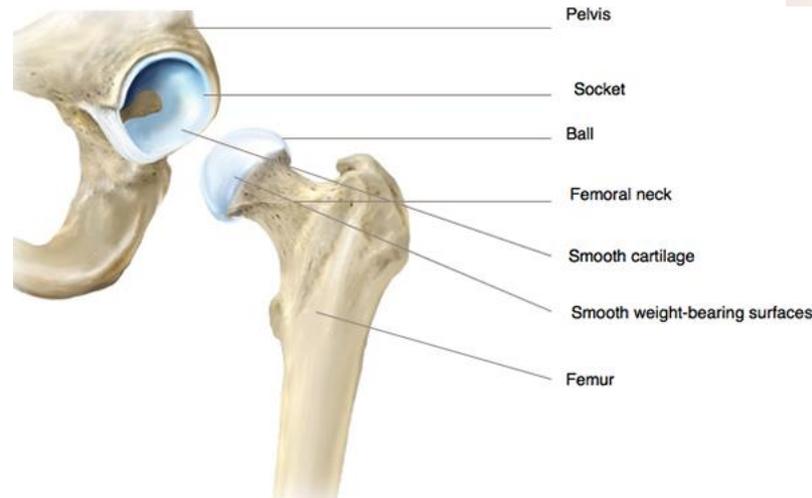
Ball-and-Socket joints:

- A **ball-shaped head** of a bone fits into a **socket-like concavity** of another.
- Allows free movements
- Movements: Flexion & extension, Abduction & adduction and Medial and lateral rotation.



Examples:

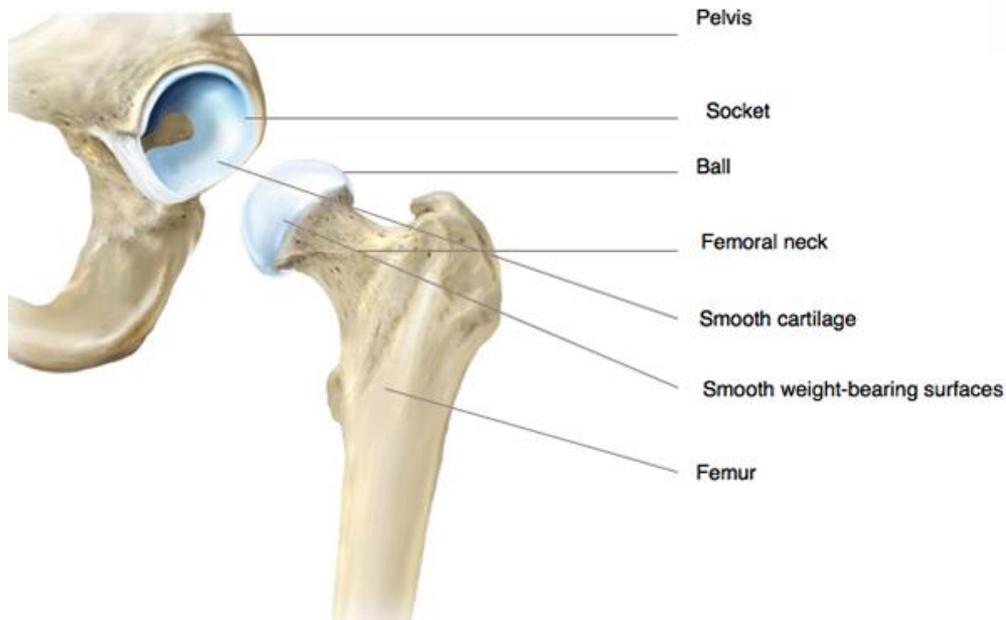
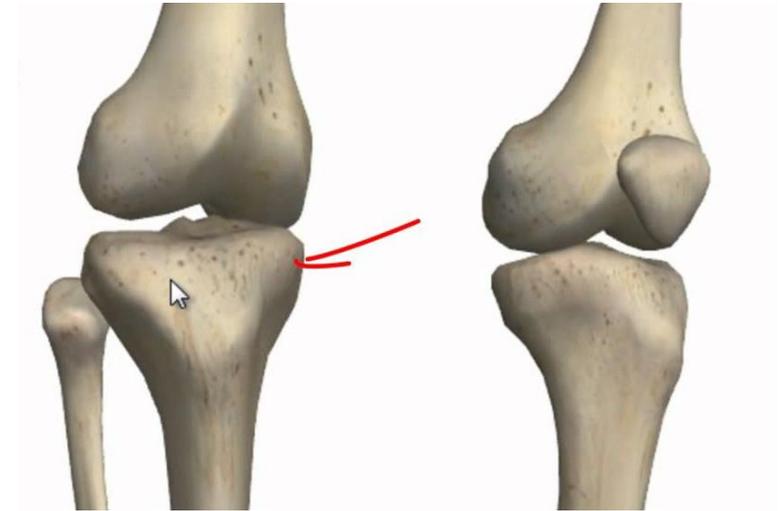
- Shoulder joint.
- Hip Joint.



JOINTS - STABILITY

Factors Affecting Stability of Synovial Joints

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

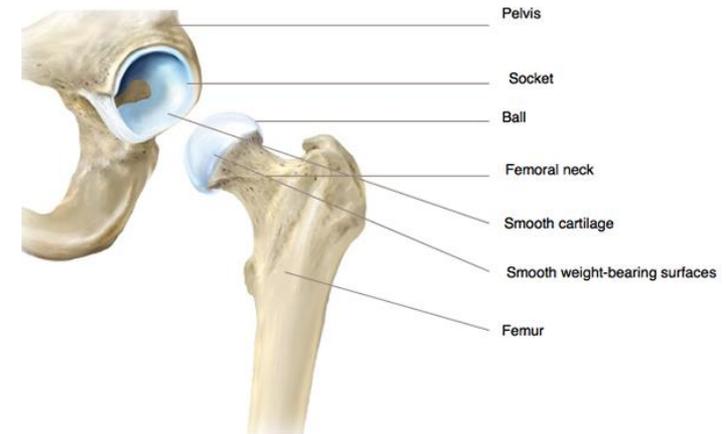


JOINTS - STABILITY

Factors Affecting Stability of Synovial Joints

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.

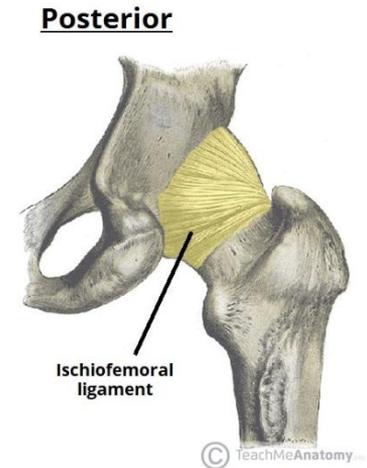
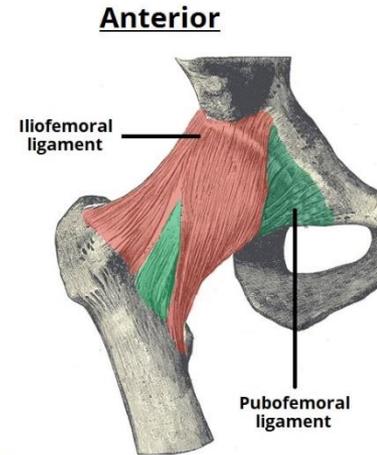


JOINTS - STABILITY

Factors Affecting Stability of Synovial Joints

2. Strength of the ligaments:

- They prevent excessive movement in a joint.

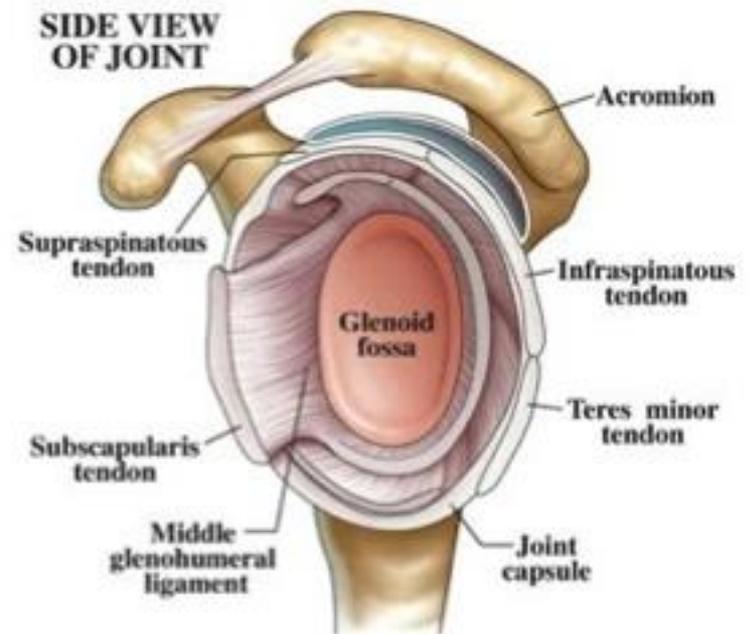
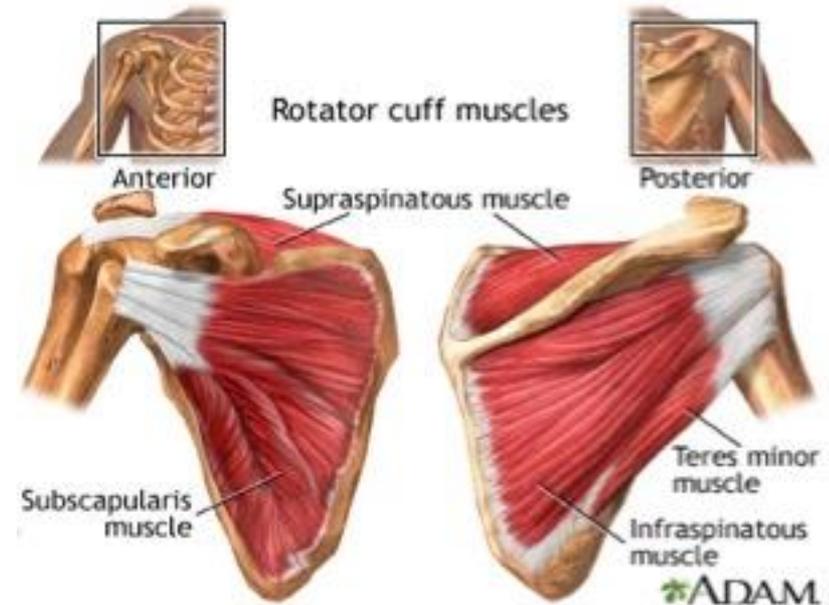
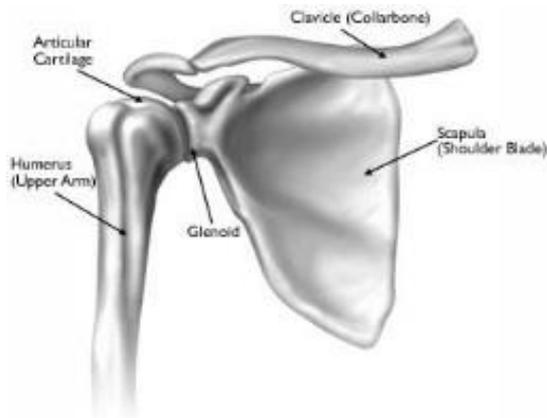


JOINTS - STABILITY

Factors Affecting Stability of Synovial Joints

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.



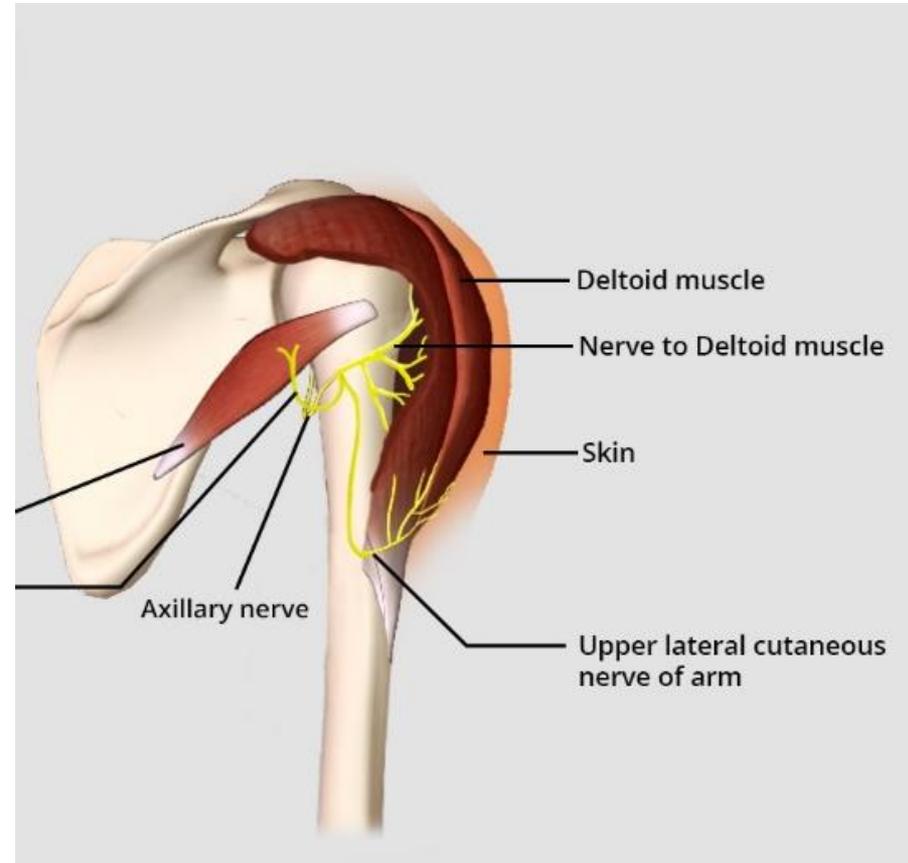
JOINTS - NERVE SUPPLY

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).**

JOINTS - SELF ASSESSMENT

QUESTION "1"

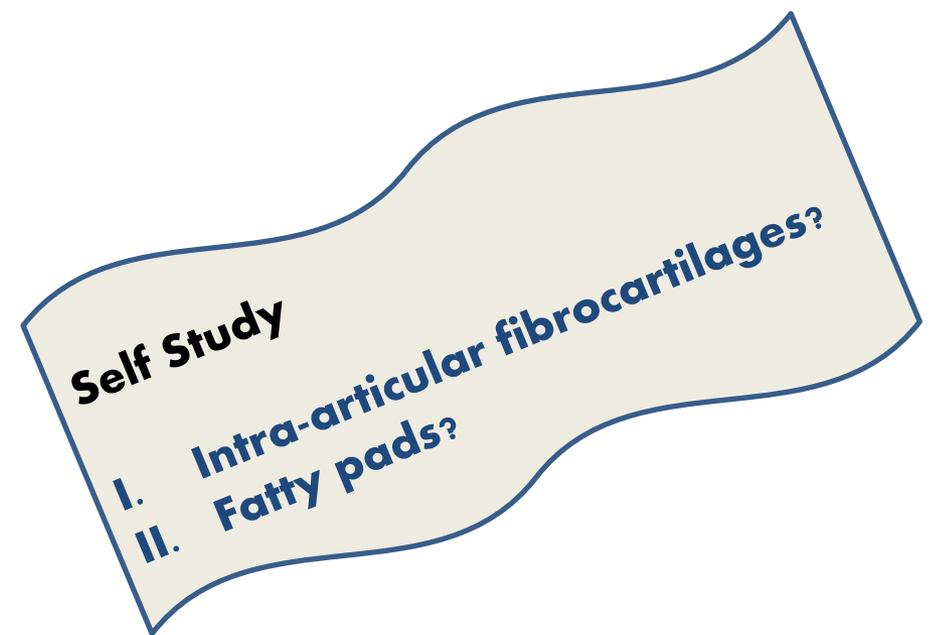
Which of the following is a pivot synovial joint?

1. Shoulder.
2. Ankle.
3. Sternoclavicular.
4. Atlantoaxial joint

QUESTION "2"

Which of the following is a Primary cartilaginous joint?

1. Hip.
2. Elbow.
3. Inferior radioulnar.
4. Symphysis pubis.



QUESTION "3"

Which of the following stabilizing factor is the most important in shoulder joint?

1. Articular surface.
2. Capsule
3. Muscles
4. Ligaments.

QUESTION "4"

The normal level synovial fluid in KNEE joint is?

1. 0.5 ml.
2. 5.0 ml.
3. 10 ml
4. 50 ml

