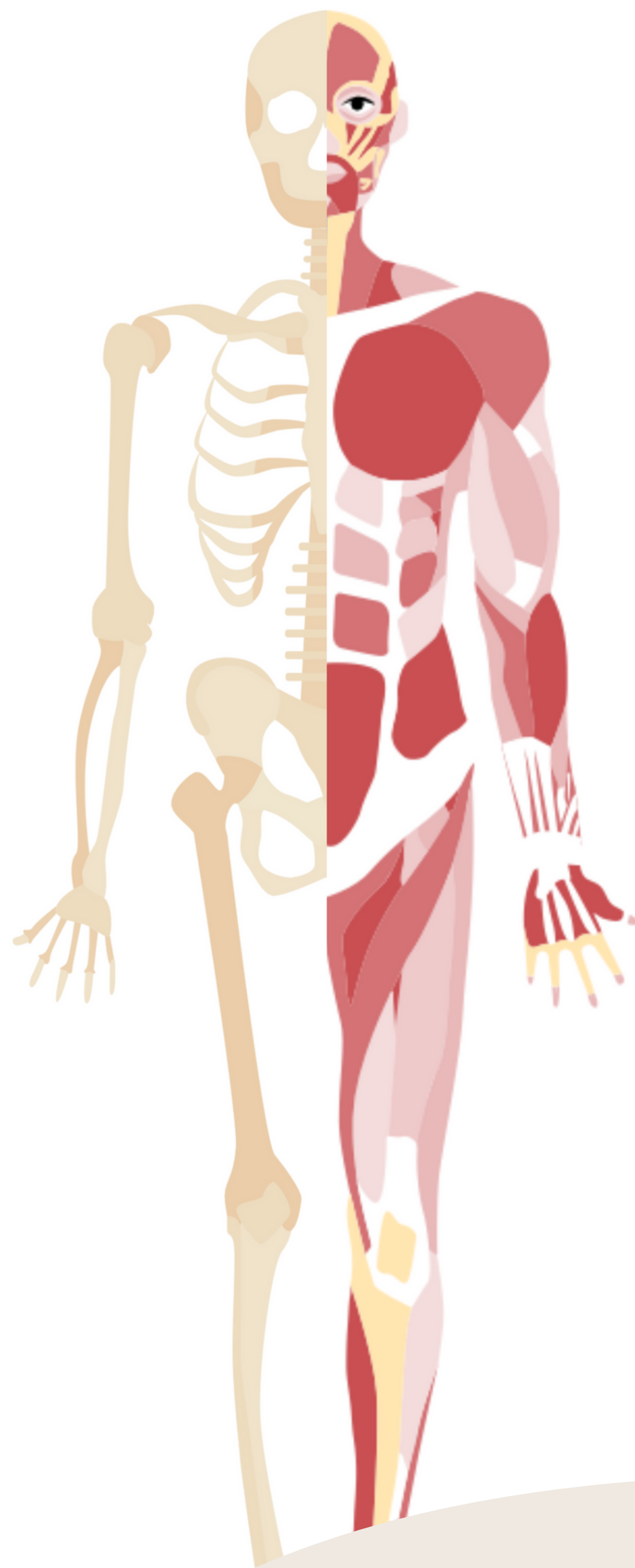


# Lecture 2

# JOINTS

## OBJECTIVES

- Define the term “Joint “
- Describe the classification of the 3 types of joints & give an example of each.
- Describe the characteristics of synovial joints.
- Describe the classification of synovial joints & give an example of each.
- List factors maintaining stability of joints.
- Recite “Hilton’s law” for nerve supply of joints.



### Color Index:

- Main text
- Boys' Slides
- Girls' Slides
- Important
- Dr's Notes
- Extra



[Helpful Video](#)

[Helpful Video](#)

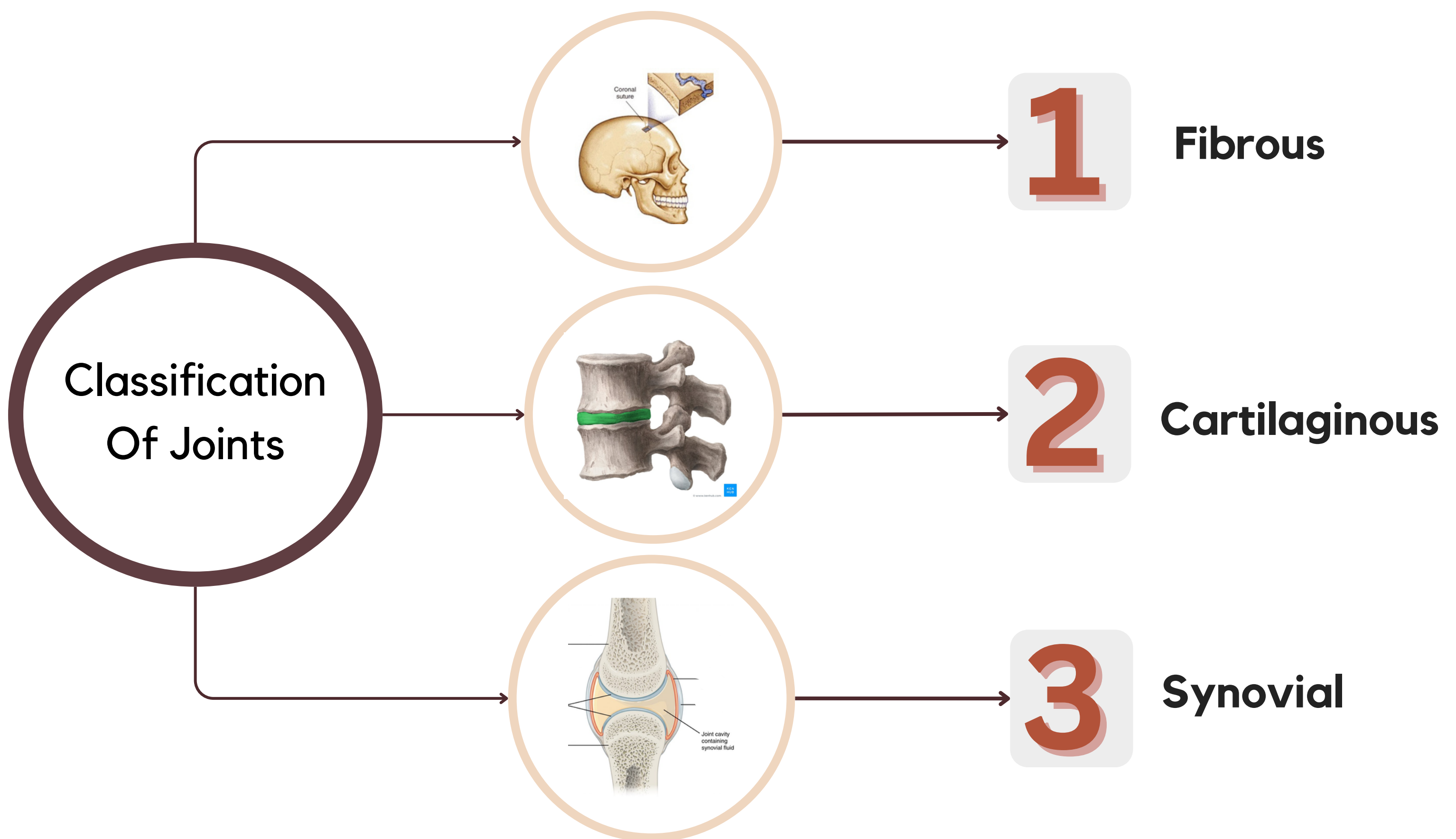


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# Joint

## Definition

-It is the site where two or more bones meet together or **union of two or more bones of the body**



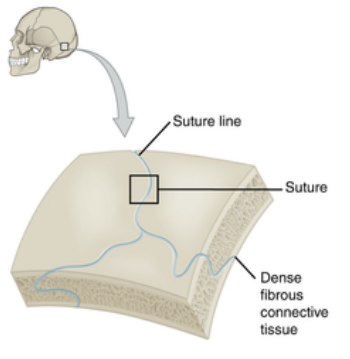
They are classified according to :  
**Tissues that lie between the articulating bones**

# 1) Fibrous Joints: IMPORTANT!

The articulating surfaces are joined by fibrous connective tissue, where **No** or **very mild movement (Negligible)**.

For example:


**1** **Skull sutures:**



- No movement
- Temporary (as it ossify later)

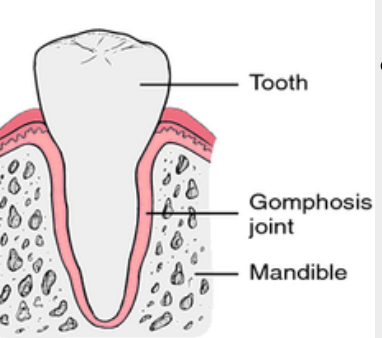
Ossify: They will become bones

**2** **Inferior tibiofibular joints (Syndesmosis)**



- Minimal movement
- Permanent joints.

**3** **Gomphosis**



- dental alveolar joints.

Articulation between root of the tooth with the mandible (between the teeth & their socket)

# 2) Cartilaginous Joints : IMPORTANT!

Happens when two bones are joined by cartilage.

They are classified into **2 types** :

## Primary Cartilaginous (Synchondrosis)

## Secondary Cartilaginous (Midline or symphysis)

### Structure:

The bones are united by a **plate** or a bar of **hyaline cartilage**.

439 Note: it's one where bone and cartilage meet. It's a very strong joint and immobile.

### Structure:

The bones are united by a **plate** of **fibrocartilage**. Their articulating surfaces are covered by a **thin plate of hyaline cartilage**. Also called Midline joints.

### Movement:

**No** movement, **temporary** joints (ossify later).

### Movement:

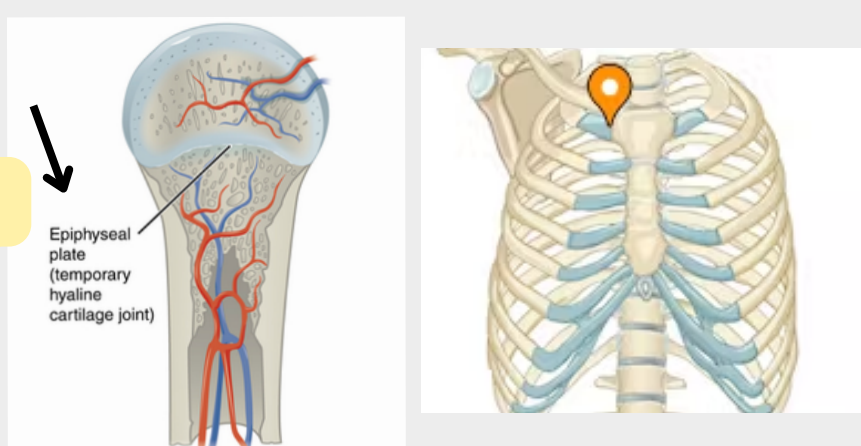
**Little** movement, **permanent** joints.

### -Examples :

-Between the **Epiphysis** and the Diaphysis of a growing bone (**Epiphysial Plate**)

-Between the **First Rib** and the **Sternum** (1st sternocostal joint)

- (The rest of the sternocostal joints are synovial plane joints)

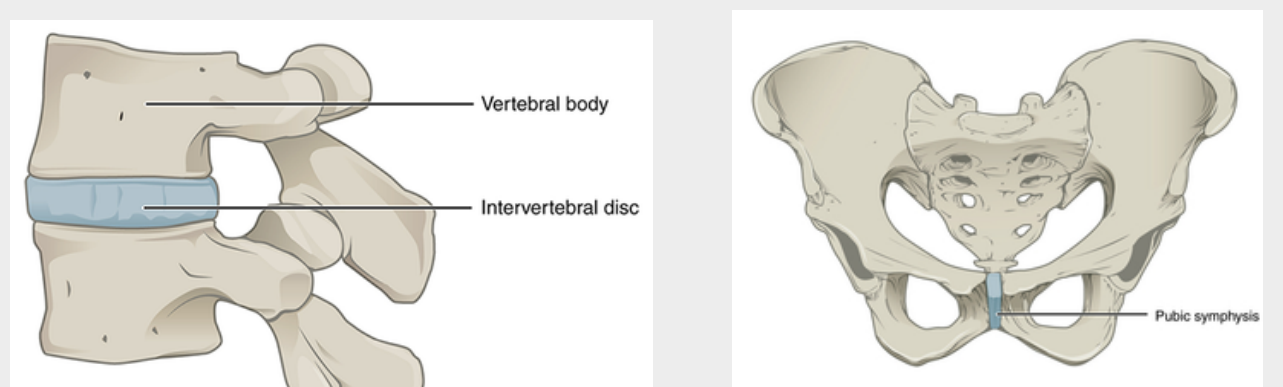


### -Examples :

-Joints between the Vertebral Bodies (**intervertebral discs**).

-Symphysis Pubis. (between the two hip bones .)

- **Between parts of the sternum**



### 3) Synovial Joints: IMPORTANT!

#### Characteristic features

Freely movable Joints. Because of the Synovial Cavity and fluid

The 2 bones (Articulating 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**).

Note444: يتآكل مع التقدم في العمر خصوصا عند النساء

A joint cavity enclosed within the capsule.

#### **Synovial membrane:**

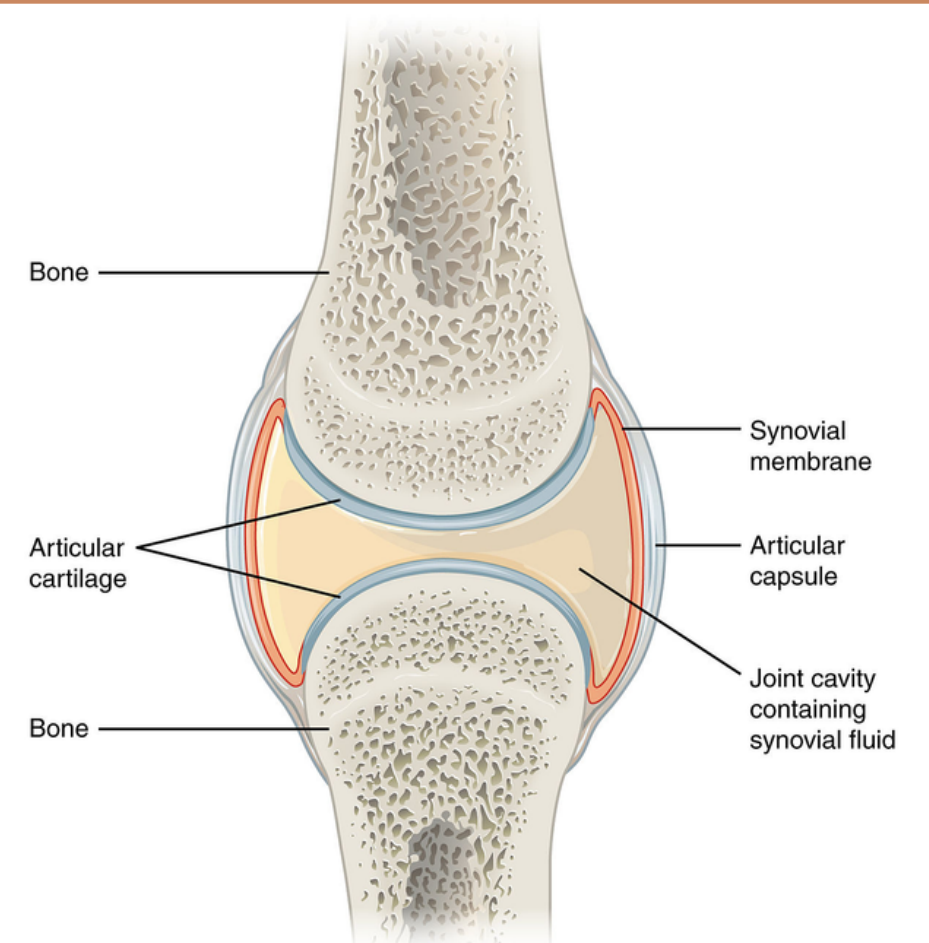
a thin vascular membrane lining the inner surface of the capsule.

#### **Synovial fluid :**

- a lubricating fluid produced by the synovial membrane in the joint cavity.
- The fluid minimizes the friction between the articular surfaces.



All joints in appendicular (Upper and lower limbs) skeleton are synovial joints



# Classification of Synovial joints:

Synovial joints can be classified according to:

- The **arrangement** (shape) of the articular surfaces.
- The **range of movement** that are possible

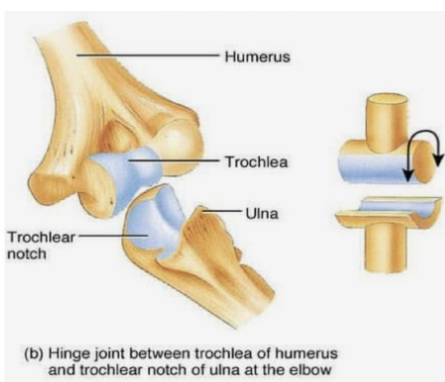
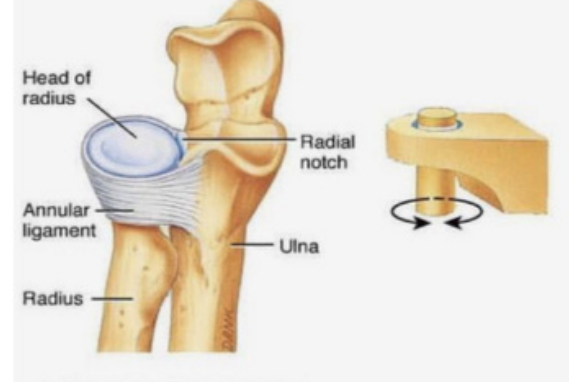
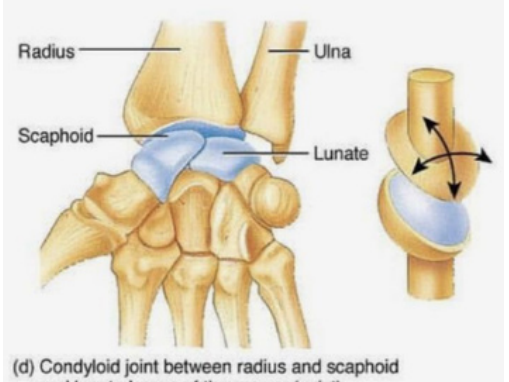
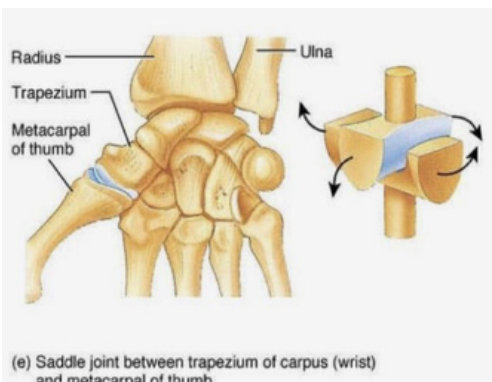
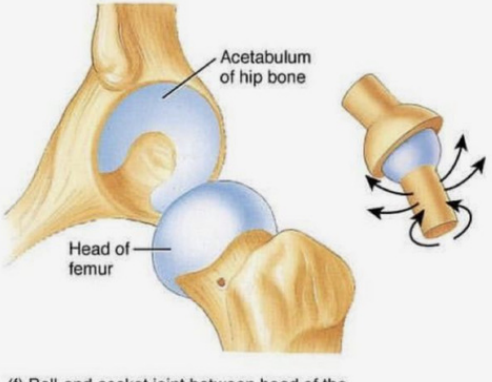
	Plane Synovial Joints	Axial synovial joint
Movement	-Gliding movement(Minimal)	<p>-<b>Transverse (x-axis)</b>: flexion and extension</p> <p>-<b>Longitudinal (y-axis)</b>: rotation</p> <p>-<b>Antero-posterior (z-axis)</b>: abduction and adduction</p>
Arrangement	-The articulating surfaces are flat and the bones slide on one another producing a gliding movement.	The articulating surfaces occur along axis.
Examples	<ul style="list-style-type: none"> <li>• Intercarpal &amp; intertarsal joints</li> <li>• Sternoclavicular joint</li> <li>• Acromioclavicular joint</li> <li>• <b>Between the 2nd-7th sternocostals</b></li> </ul>	<ul style="list-style-type: none"> <li>- Elbow joint</li> <li>- Shoulder joint</li> <li>- Radio-ulnar joint</li> </ul>

**Axial joint are divided to:**

Uniaxial

Biaxial

Multi-axial  
(polyaxial)

	Uniaxial		Biaxial		Multiaxial
<b>Type</b>	<b>Hinge</b>	<b>Pivot</b>	<b>Ellipsoid</b> an elliptical convex fits in an elliptical (oval) concave articular surface)	<b>Saddle</b> the articular surfaces are reciprocally concavoconvex.	<b>Ball &amp; socket</b>
<b>Axis</b>	Transverse	longitudinal	Transverse & antero-posterior	They resemble a saddle on a horse's back	A ball-shaped head of a bone fits into a socket-like concavity of another
<b>Movement</b>	Flexion & extension	Rotation	1.Flexion & extension. 2.Abduction & adduction. BUT rotation is impossible.	1.Flexion & extension. 2.Abduction & adduction. Small range of rotation	1.Flexion & extension. 2.Abduction & adduction. rotation along separate axis
<b>Examples</b>	1.Elbow joint 2.Ankle joint	1.Radio-ulnar joint(supination & pronation) 2.Atlantoaxial joint	Wrist joints	Carpometacarpal joint of the thumb	1.Shoulder joint 2.Hip joint
<b>Pictures</b>					



**Helpful Video**



**Helpful Video**

## 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:

Ligaments prevent excessive movement in a joint.

e.g. **Cruciate ligaments** of the knee joint.

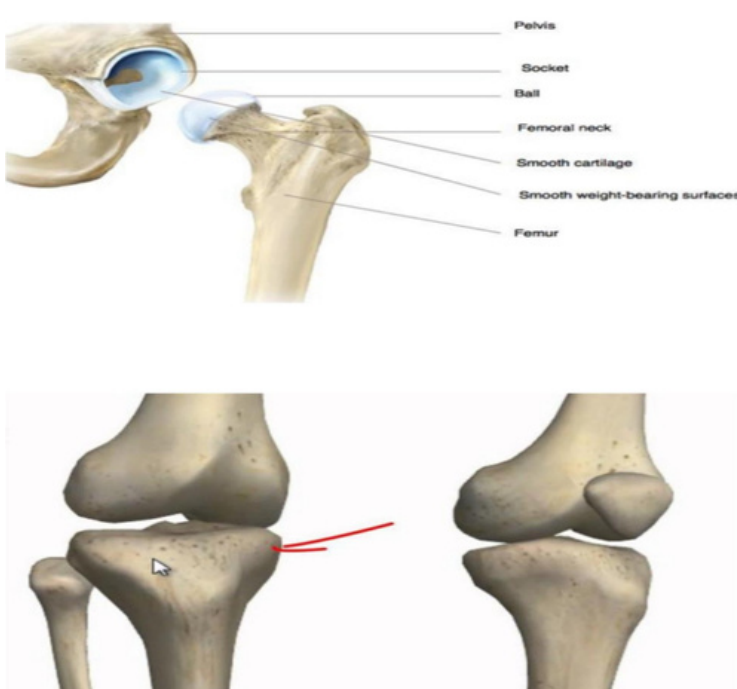
# Factors Affecting Stability of Synovial Joints

## 3. Tone of the surrounding muscles:

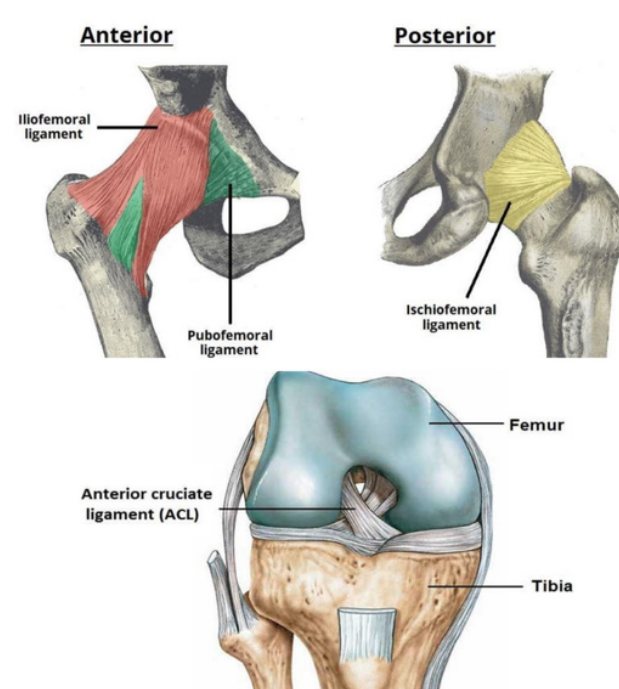
In most joints, it is the major factor controlling stability.

e.g. The short muscles around the shoulder joint (**Rotator cuff muscles**) keeps the head of the humerus in the shallow glenoid cavity.

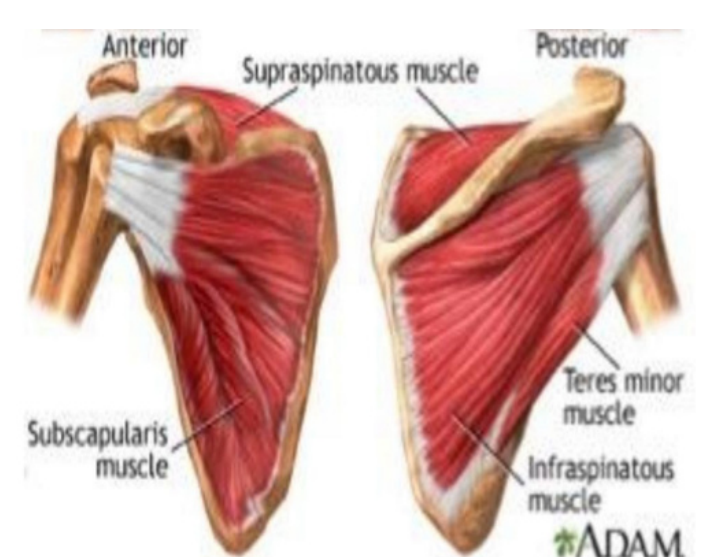
### 1. The shape of articular surfaces:



### 2. Strength of the ligaments:



### 3. Tone of the surrounding muscles:



## 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."



## Applied Anatomy

-Many of these functional aspects of joints may be assessed by radiology.

-Displacement of the articulating surfaces of a joint is known as dislocation.

-Partial displacement of the articulating surfaces is known as subluxation.

-Dislocation of a joint may follow severe injury and is always associated with damage to the capsular and accessory ligaments. There may also be fractures of the bony structures of the joint, and occasionally damage to closely related nerves and vessels.

-Chronic inflammatory processes are prone to affect the bone ends (osteoarthritis) and synovial membrane (rheumatoid arthritis), and joints thus affected may be deformed and painful, with marked limitation of movement.





# MCQs

## 1

Which one of the following joints is a hinge synovial ?

A) Shoulder joint	B) Elbow Joint	C) Wrist Joint	D) Intercarpal
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## 2

Which one of the following joints represents the primary cartilaginous ?

A) Gomphosis	B) 7th sternocostal	C) Intervertebral disc	D) Epiphyseal plate
--------------	---------------------	------------------------	---------------------

## 3

Which one of the following joints is pivot synovial ?

A) Radioulnar Joint	B) Shoulder joint	C) Elbow Joint	D) Wrist Joint
---------------------	-------------------	----------------	----------------

## 4

Gomphosis is an example of which one of the following joints ?

A) Cartilaginous	B) Fibrous	C) Plane synovial	D) Pivot synovial
------------------	------------	-------------------	-------------------

## 5

in most joints, it's the major factor controlling stability

A) The shape of the articular surfaces	B) Tone of the surrounding muscles	C) Strength of the ligaments	D) Atmospheric pressure
--	------------------------------------	------------------------------	-------------------------



1-B 2-D 3-A 4-B 5-B

# MCQs

6

According to Hilton's law "A sensory nerve supplying a joint also supplies..." relating to that joint ?

- |                   |                |                   |                         |
|-------------------|----------------|-------------------|-------------------------|
| A) Bone & muscles | B) Bone & skin | C) Muscles & skin | D) All of the following |
|-------------------|----------------|-------------------|-------------------------|

7

Which type of uniaxial synovial joints can do supination & pronation of the forearm ?

- |          |          |              |           |
|----------|----------|--------------|-----------|
| A) Hinge | B) Pivot | D) Ellipsoid | C) Saddle |
|----------|----------|--------------|-----------|

8

Secondary cartilaginous joints are united by ?

- |                      |                   |                   |                      |
|----------------------|-------------------|-------------------|----------------------|
| A) Elastic cartilage | B) fibrous tissue | C) fibrocartilage | D) Hyaline cartilage |
|----------------------|-------------------|-------------------|----------------------|

9

the site where two or more bones meet together ?

- |              |          |           |                          |
|--------------|----------|-----------|--------------------------|
| A) Cartilage | B) Joint | D) Tendon | D) None of the following |
|--------------|----------|-----------|--------------------------|

10

Sternoclavicular joint is a plane synovial joint take place between the ?

- |                             |                        |                         |                        |
|-----------------------------|------------------------|-------------------------|------------------------|
| A) Sternum and the clavicle | B) 2nd rib and 3rd rib | C) Ulna and the humerus | D) Ulna and the radius |
|-----------------------------|------------------------|-------------------------|------------------------|



6-C 7-B 8-C 9-B 10-A

# SAQs


List the 3 type of joint

1

 1-Cartilaginous 2-Fibrous 3- Synovial:

The joint cavity contain the \_\_\_\_\_ which is secreted from the \_\_\_\_\_.

2

 Synovial fluid - synovial membrane.

List the 5 types of the axial synovial joints with an example for each one

3

 1-Hinge e.g. Elbow joint. 2-Pivot e.g. Radio-ulnar joint. 3- Ellipsoid e.g. Wrist joint. 4-Ball & socket e.g. hip joint. 5- Saddle e.g. carpometacarpal joint of the thumb.



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