

ANATOMY

Vertebral column

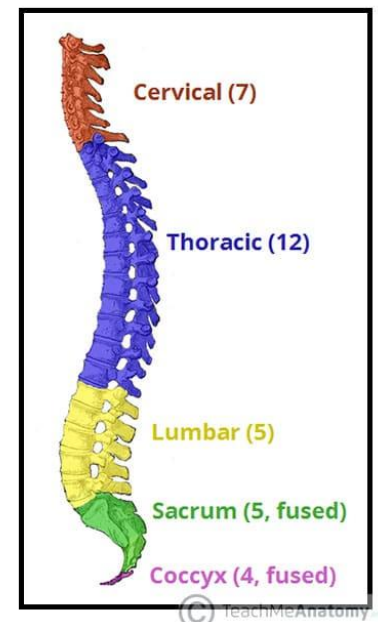
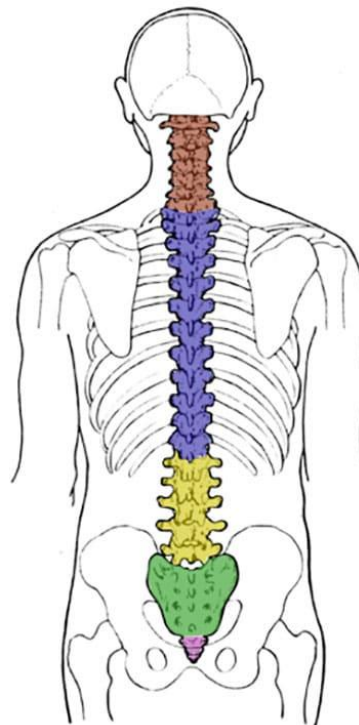
- ❖ The vertebral column (backbone or spine) is a midline column formed of 33 vertebrae separated by intervertebral cartilaginous discs.
- ❖ It contains and protects the spinal cord in its spinal canal.
- ❖ In side view, the vertebral column presents several curves, which correspond to the different regions of the column.

Parts of the Vertebral Column:

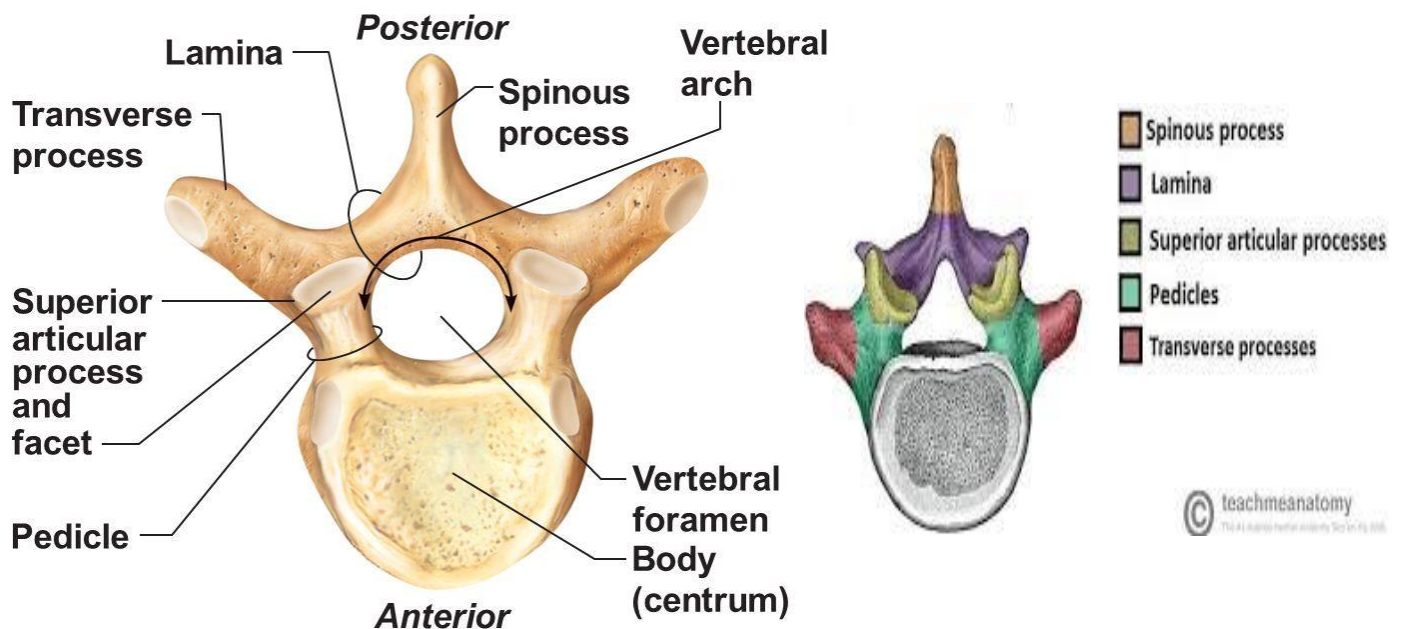
1. Cervical vertebrae (7)
2. Thoracic vertebrae (12)
3. Lumbar vertebrae (5)
4. Sacral vertebrae (5 fused)
5. Coccygeal vertebrae (4)

Parts of Any Vertebra:

1. Body
2. Neural arch : Formed of pedicle and lamina on each side.
 - The "vertebral foramen" is formed between the body and the neural arch.
 - The "vertebral canal" is formed by the collection of all vertebral foramina (it contains the spinal cord).



3. At the point of junction of each pedicle and lamina there are three processes on each side:
 - a) Transverse process .
 - b) Superior articular process and facet .
 - c) Inferior articular process and facet .
4. At the point of junction of the two laminae, there is spine (directed posteriorly).
5. Each pedicle contains two notches which are:
 - a) Superior vertebral notch .
 - b) Inferior vertebral notch .
6. Between the superior & inferior vertebral notches of each two adjacent vertebrae, there is the inter-vertebral foramen which gives passage to the trunk of the corresponding spinal nerve.



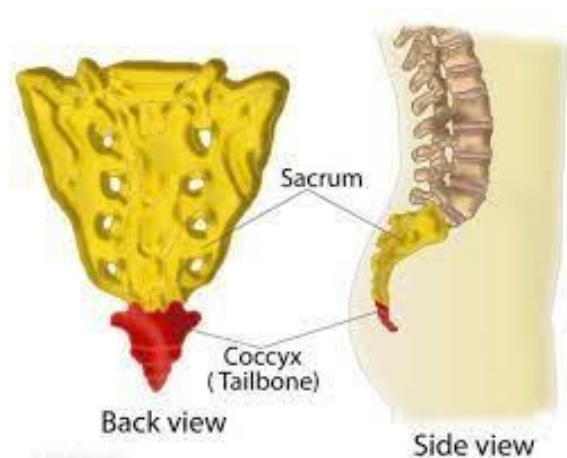
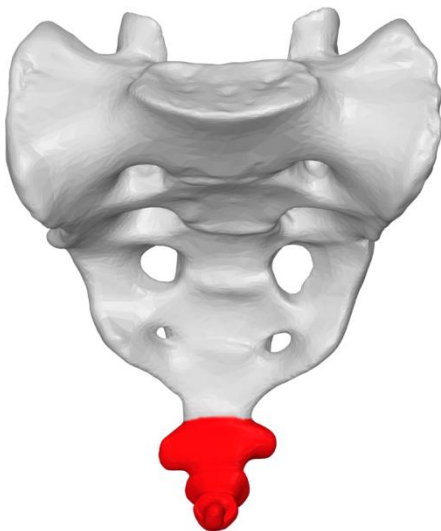
Sacrum

- ❖ It is described as an inverted triangle, with the apex pointing inferiorly.
- ❖ On the lateral walls of the sacrum are facets, for articulation with the hip bone at the sacro-iliac joints.



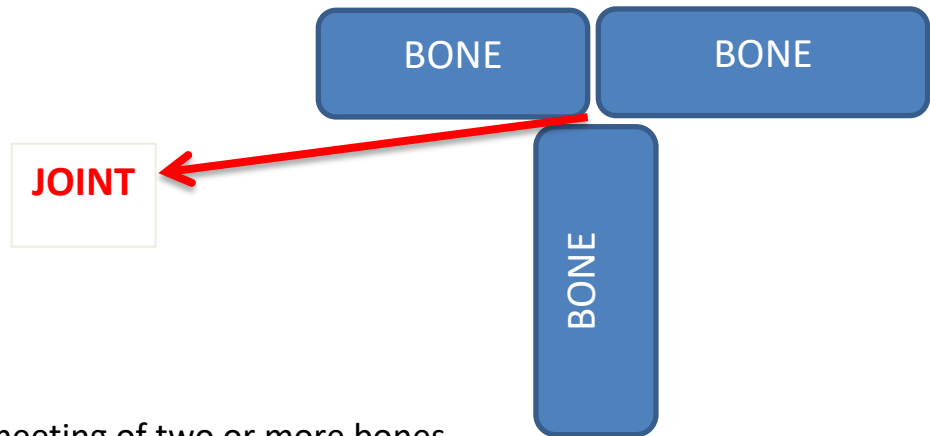
Coccyx

- ❖ It is recognized by its lack of vertebral arches.
- ❖ Due to the lack of vertebral arches, there is no vertebral canal, and so the coccyx does not transmit the spinal cord.
- ❖ It articulates with the apex of the sacrum.



Joints

Definition of a Joint:



- ❖ The joint is the point of meeting of two or more bones.

Classification:

- ❖ They are classified according to the substance between the ends of the bones into:
 - a) Fibrous: The substance between the bones is "fibrous tissue".
 - b) Cartilaginous: The substance between the bones is "cartilage".
 - c) Synovial joints: The substance between the bones is "synovial fluid".

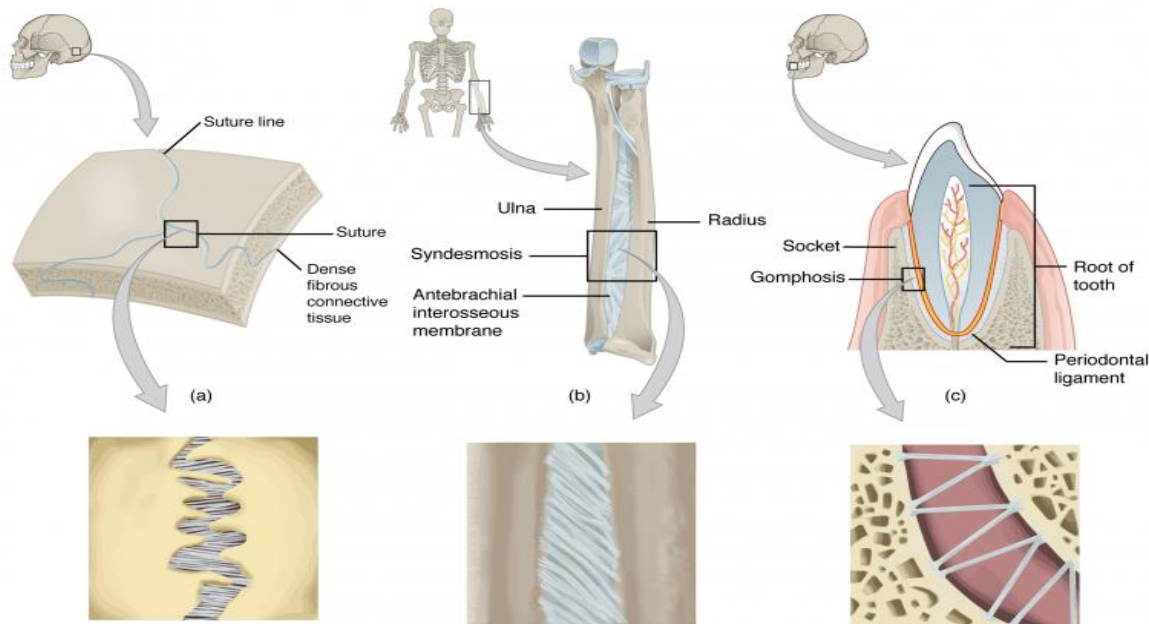
A- Fibrous Joints

- Definition : the two bones are separated by fibrous tissue .
- ❖ Characters : **No movement** is allowed.

Types :

1. Sutures
 - Example : Sutures present between the bones of the skull.
2. Gomphosis (peg and socket)
 - Example : Teeth and its socket.
3. Syndesmosis

➤ Example : Inferior tibiofibular joint



B- Cartilaginous Joints

○ Definition: The two bones are separated by "cartilage".

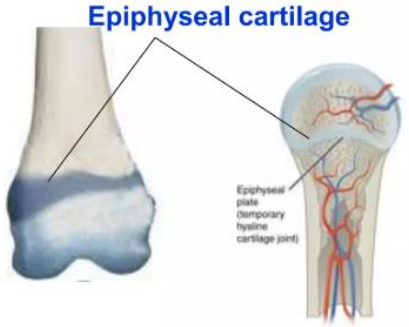
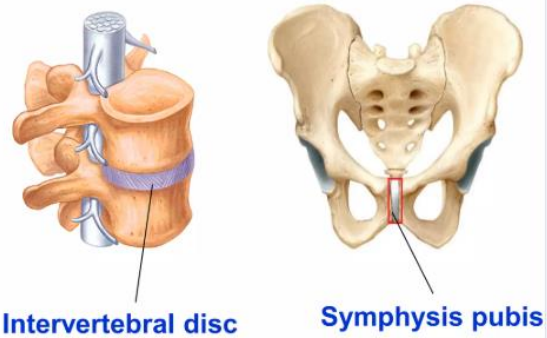
Types : According to the persistence of the cartilage, they are classified into:

I. Primary cartilaginous joints :

- A hyaline cartilage is present at the ends of long bones
- This cartilage is transformed into bone (ossifies with growth).
- No movement is allowed.
- Example: Epiphyseal plates of long bones

II. Secondary cartilaginous joints :

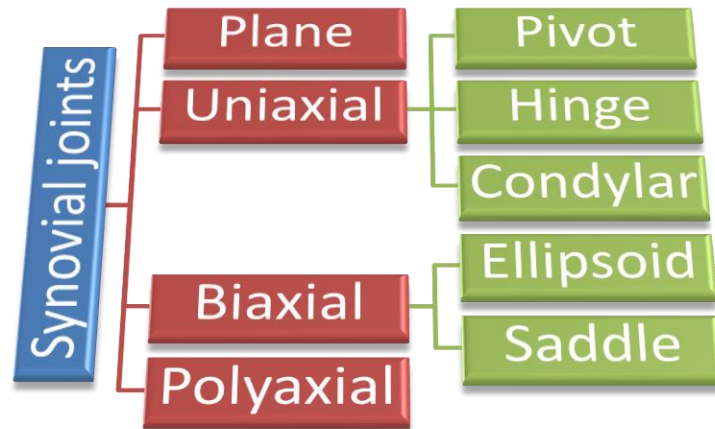
- A fibro-cartilage is present at the ends of bones
- This cartilage persists (it is not transformed into bone with growth).
- Very limited movement is allowed.
- Example: Joints between bodies of vertebrae (intervertebral discs).

Cartilaginous Joints	
Primary cartilaginous (Synchondrosis) Joint	Secondary cartilaginous (Symphysis) joint
bones are connected by hyaline cartilage	bones are connected by white fibrocartilage
no movement	limited movement
epiphyseal cartilage of growing bone	joints in the middle line
 <p style="text-align: center;">Epiphyseal cartilage</p>	 <p style="text-align: center;">Intervertebral disc Symphysis pubis</p>

C- Synovial Joints :

- Definition :The two bones are separated by "Synovial fluid".
- ❖ Characters:
 - 1) The articular surfaces of the bones are covered by
 - 2) They are covered by fibrous capsule which is thickened in some places to for ligaments.
 - 3) The capsule is lined by synovial membrane which secretes "synovial fluid"
 - 4) The synovial joints have free movements such as joints of the upper and lower limbs.
 - 5) There are intra-articular structures such as ligaments or cartilage.

Classifications :



1. Plane (None axial) (just gliding movements) :

- Example: Joints between the small bones of the hand and foot.

2. Uni-axial (one axis of movement):

a) Horizontal axis (hinge) :

- Example: Elbow joint

b) Vertical axis (pivot):

- Example: Radio ulnar joint

c) Condylar : Two knuckles articulate with two shallow concavities.

- Example: Knee joint

3. Bi-axial (two axes of movements) :

a) Ellipsoid:

- Oval convex articular surface articulates with elliptical concavity.
- Movements: flexion, extension, abduction & adduction.
- Example: wrist joint.

b) Saddle joint:

- Concavo-convex articulates with convexo-concave.
- Movements: as the ellipsoid plus slight rotation.
- Example: carpometacarpal joint of the thumb.

4. Poly-axial (multiple axes of movements) :

➤ Example: Hip and shoulder joints.

❖ Factors Affecting Stability of Joints

1. Bony factor .
2. Ligamentary factor .
3. Muscular factor .

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Plane Joint



Saddle Joint



Hinge Joint



Pivot Joint



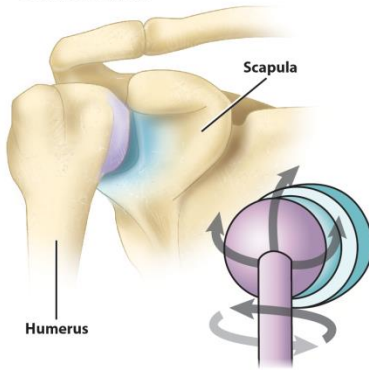
Ball-and-Socket Joint



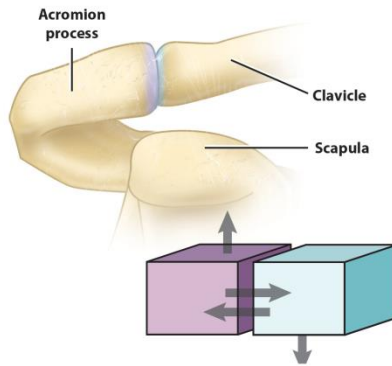
Ellipsoid Joint



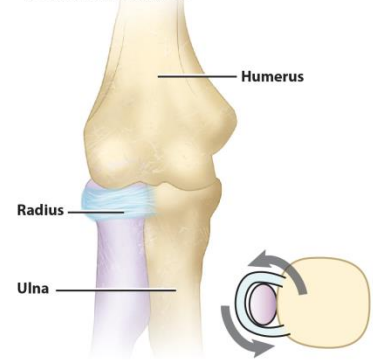
Ball and Socket
Glenohumeral joint



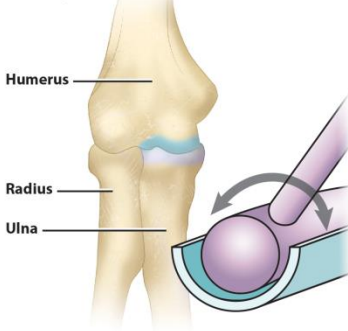
Plane
Acromioclavicular joint



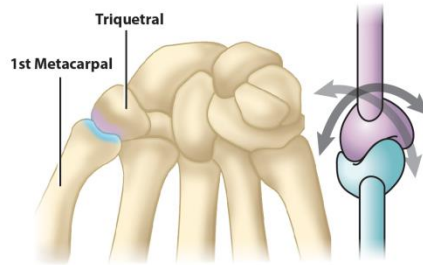
Pivot
Proximal radioulnar joint



Hinge
Elbow joint



Saddle
Carpometacarpal joint



Condylar
Metacarpophalangeal joint

