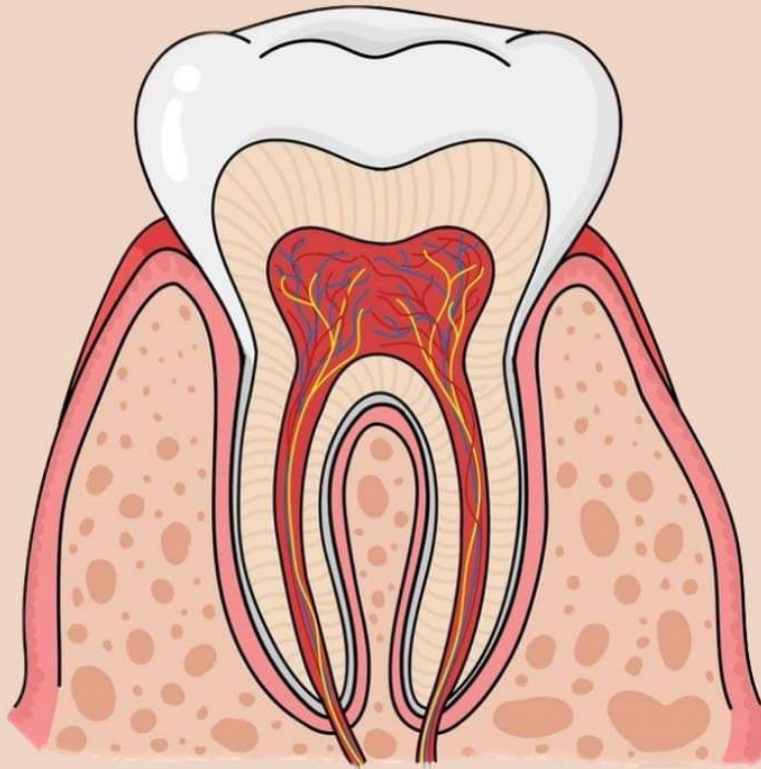




# ANATOMY



LEC NO. : 5

DONE BY : Saba Al-rawadieh

وَقُلْ رَبِّ زِدْنِي عِلْمًا



# Appendicular system part 2

General Anatomy lecture # 4

**Bones of lower limb**

By Heba Ali  
DDS, MSc, PhD (UK)

BONE MARKING	EXAMPLE
<b>Linear elevation</b>	
Line	Superior nuchal line of the occipital bone
Ridge	The medial and lateral supracondylar ridges of the humerus
Crest	The iliac crest of the hip bone
<b>Rounded elevation</b>	
Tubercle	Pubic tubercle
Protuberance	External occipital protuberance
Tuberosity	Greater and lesser tuberosities of the humerus
Malleolus	Medial malleolus of the tibia, lateral malleolus of the fibula
Trochanter	Greater and lesser tuberosities of the humerus
<b>Sharp elevation</b>	
Spine or spinous process	Ischial spine, spine of the vertebra
Styloid process	Styloid process of temporal bone

### Expanded ends for articulation

Head	Head of humerus, head of femur
Condyle	Medial and lateral condyles of femur (knuckle-like process)
Epicondyle (a prominence situated just above condyle)	Medial and lateral epicondyles of femur

### Small flat area for articulation

Facet	Facet on head of rib for articulation with vertebral body
-------	---

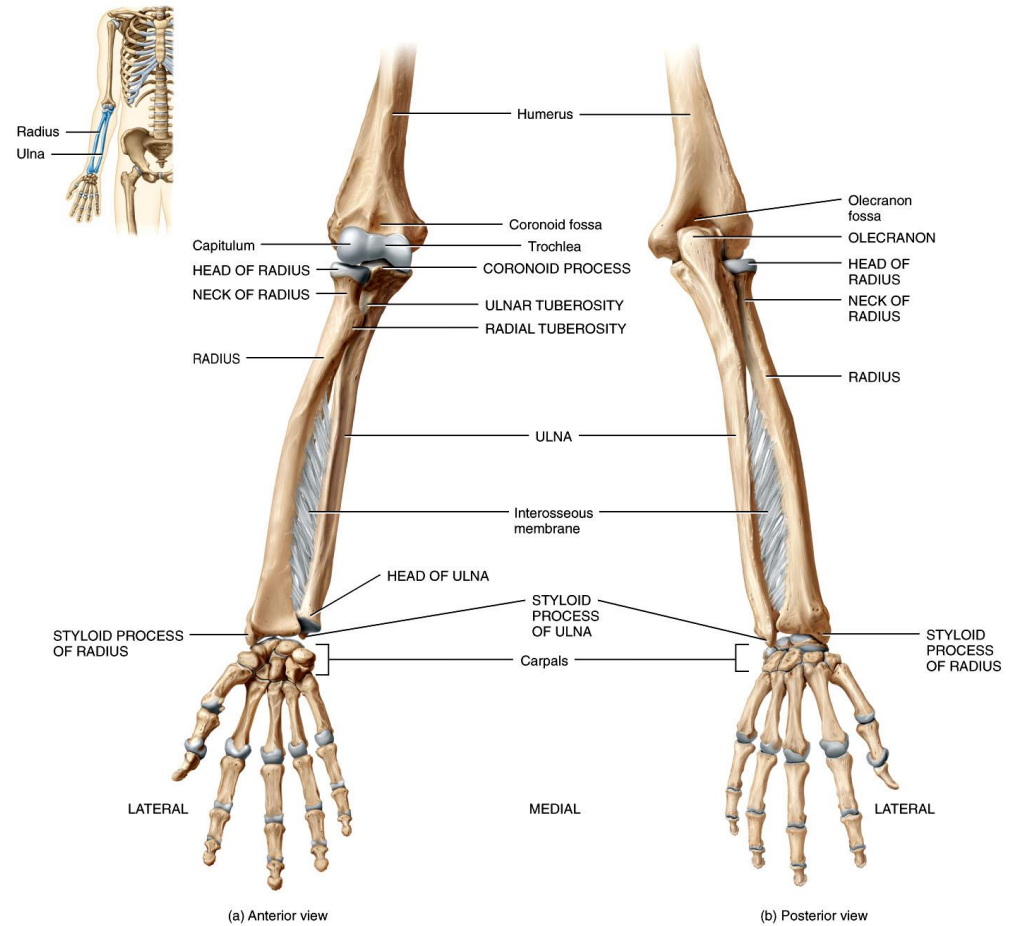
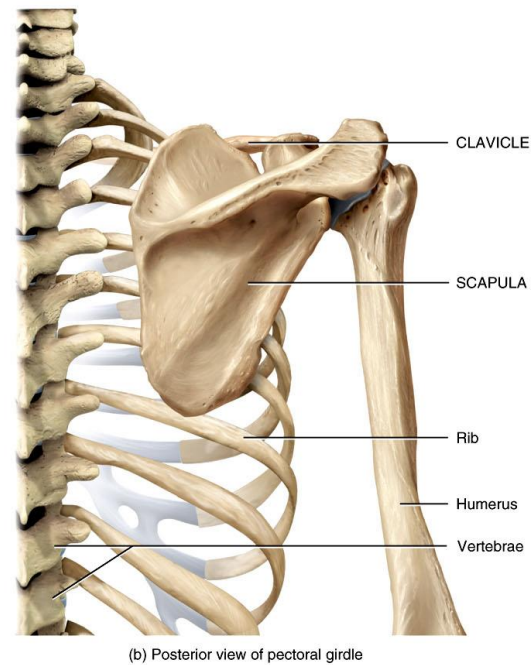
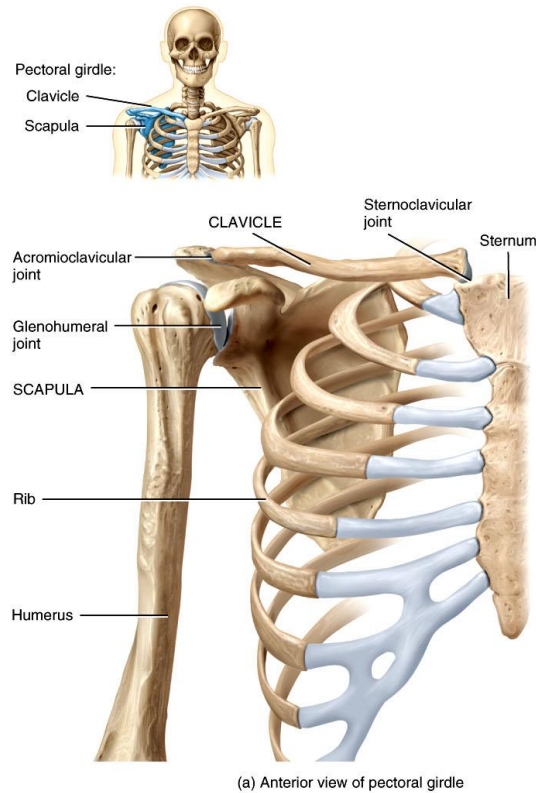
### Depressions

Notch	Greater sciatic notch of hip bone
Groove or sulcus	Bicipital groove of humerus
Fossa	Olecranon fossa of humerus, acetabular fossa of hip bone

### Openings

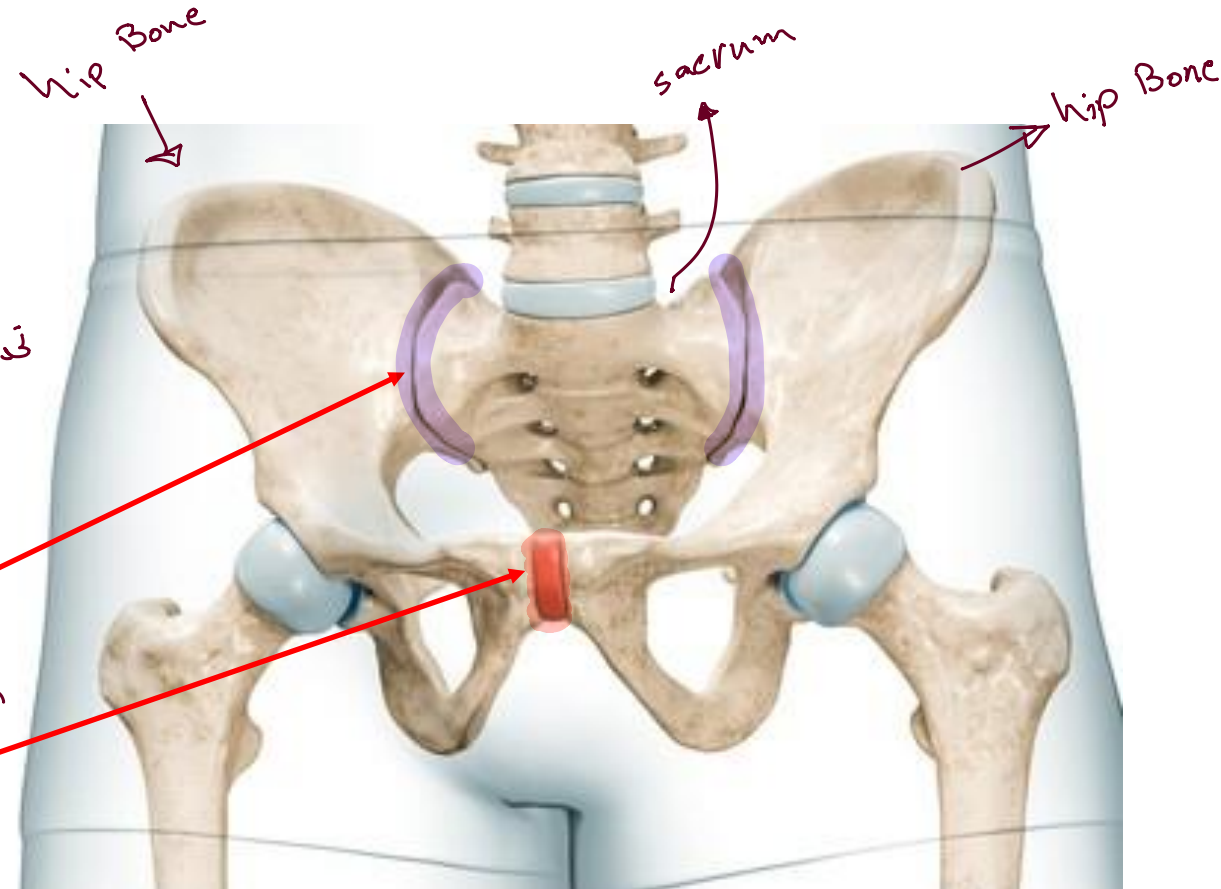
Fissure	Superior orbital fissure
Foramen	Infraorbital foramen of the maxilla
Canal	Carotid canal of temporal bone
Meatus	External acoustic meatus of temporal bone

- A quick recap of the previous lecture.....



# Pelvic girdle (os coxae)

- Equivalent of the upper limb **clavicle and scapula**. *بتبادل*
- The pelvic girdle **connects** bones of **lower limb to axial skeleton**. *صلة العظام*
- The pelvic girdle consists of the two hip bones. *كردية*
- The hip bones articulate **posteriorly** with the **sacrum** to form **sacroiliac joints**, and **anteriorly** with each other to form **symphysis pubis**. *hip with sacrum*



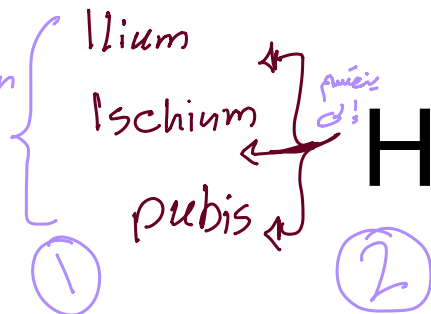
↳ hip with hip  
Right pubis with left pubis

↳ very strong joint → functions: support → fibro cartilage intervertebral column

# Hip Bone

In infants there is cartilage between these parts

In adult the three parts become one bone



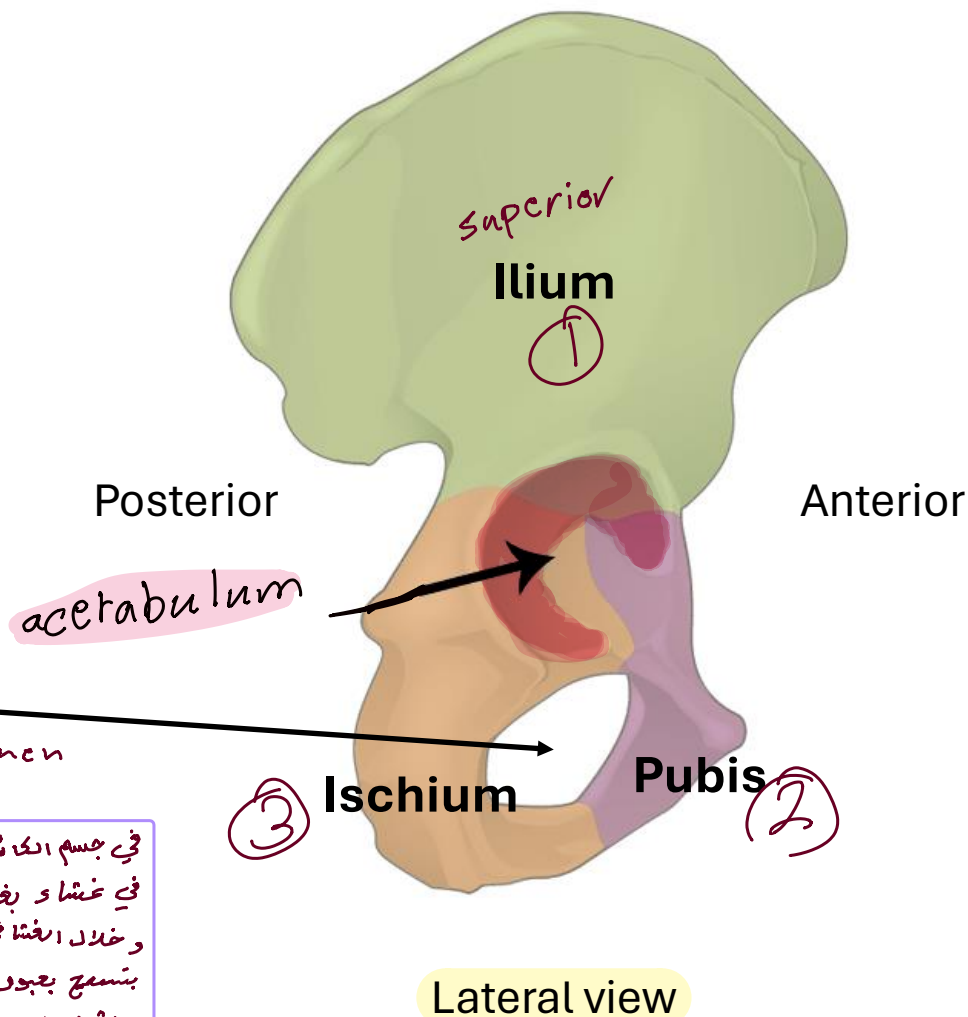
- Each hip bone is large & irregularly-shaped.
- Its lateral surface has near its centre a deep cup-shaped cavity named the **acetabulum**, which articulates with head of femur to form hip joint.
- Below the acetabulum the bone presents a large oval or triangular gap, the **obturator foramen**.
- The hip bone has three parts: **ilium**, **pubis** and **ischium**

①

②

③

في جسم الكائن الحي يكون في عظامه بخلقة التمايز وخلال العظام في فجوات يتسبب بعبور الدم عظام وأشرايين والقدرة.

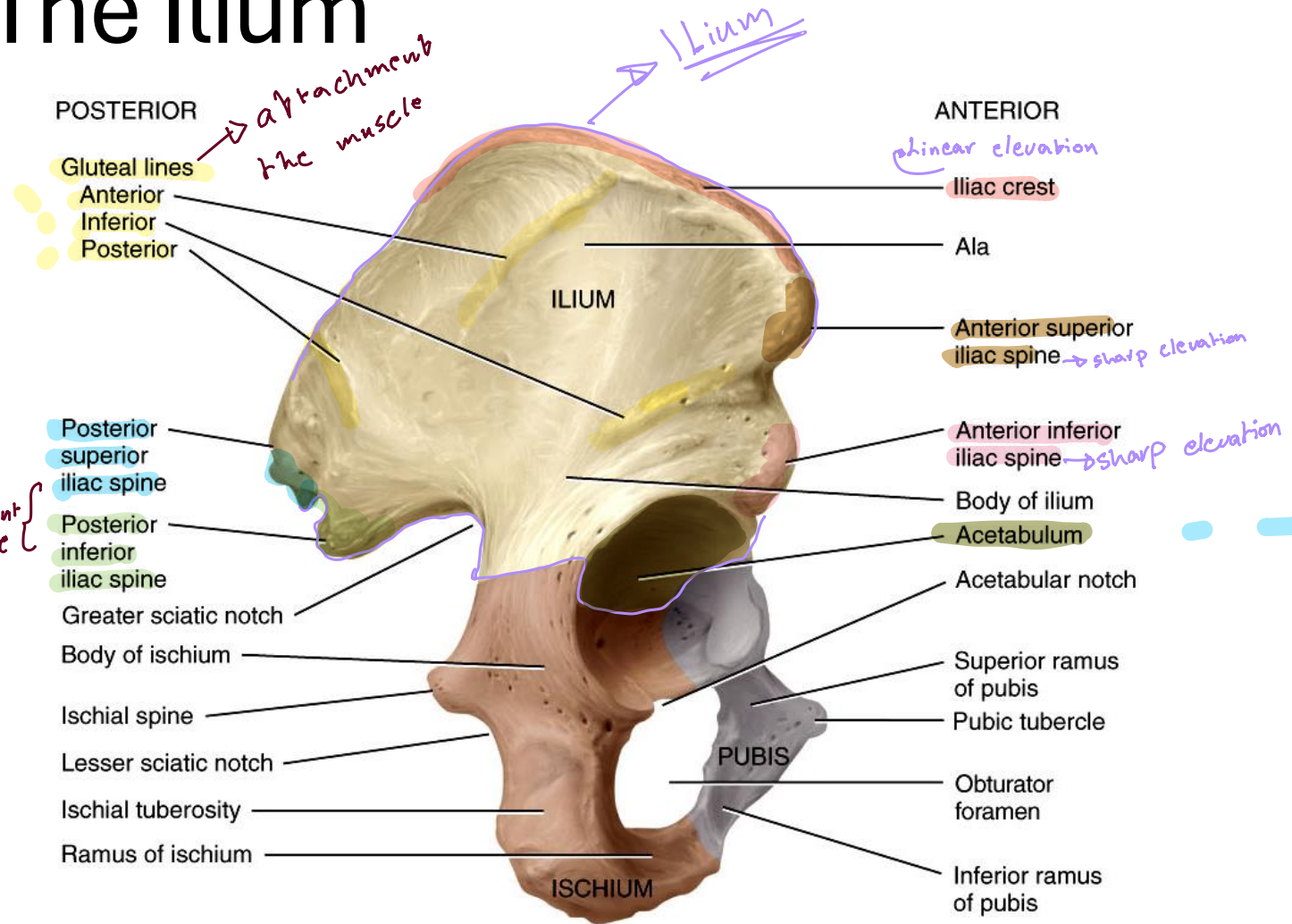


Lateral view

# The Ilium

- Includes the upper part of acetabulum & the expanded, flattened area of bone above it.
- Its upper margin is curved and is termed **iliac crest**.
- Its anterior border presents **anterior superior iliac spine (ASIS)** & **anterior inferior iliac spine (AIIS)**.
- Its posterior border presents **posterior superior iliac spine (PSIS)** & **posterior inferior iliac spine (PIIS)**. The lateral surface of the ilium is called the **gluteal surface**.
- Iliac fossa** is a concavity on anteromedial surface

↳ Anterior



(b) Detailed lateral view

# The Pubis

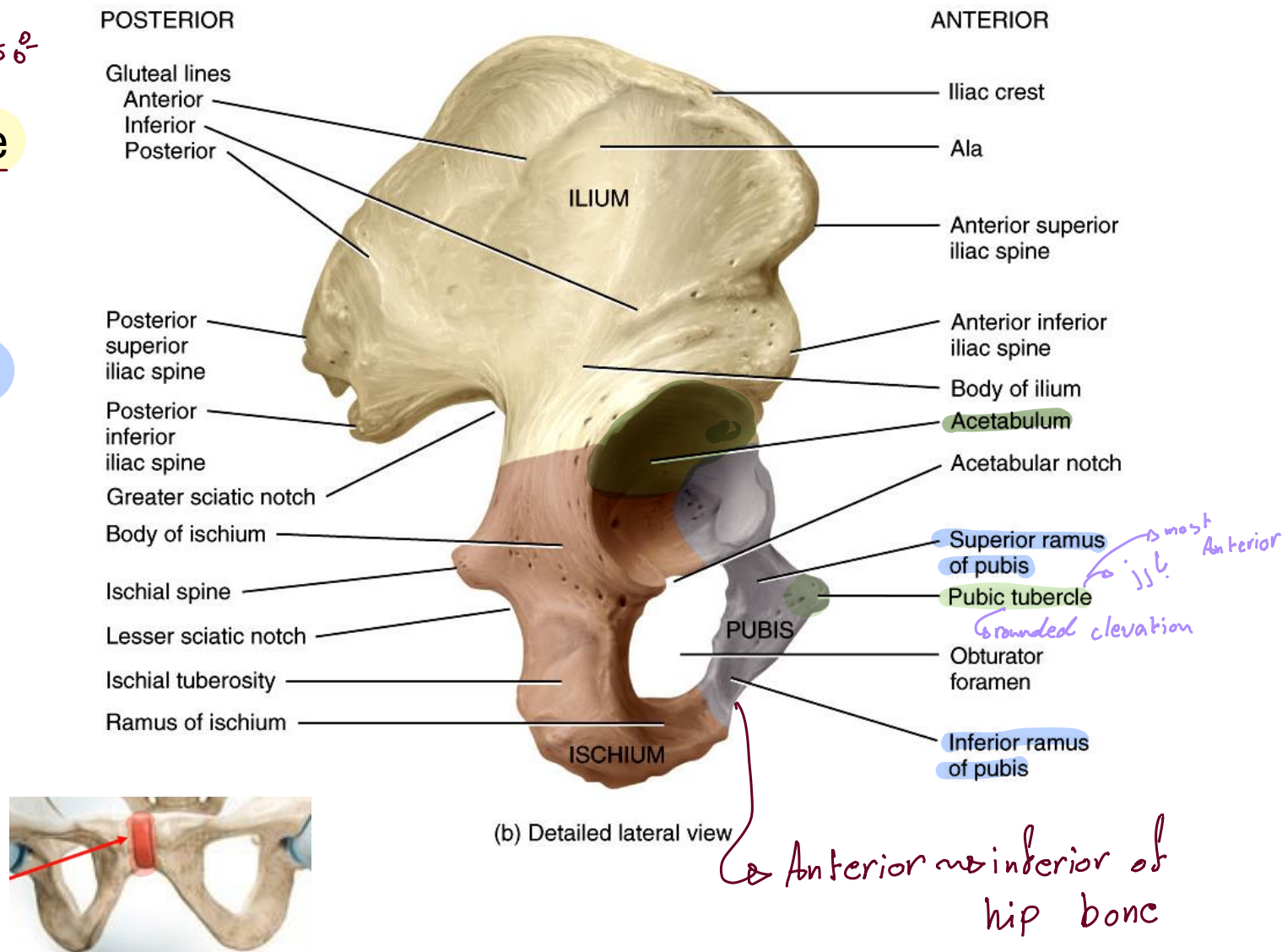
*we can explain the place of pubis*

- ① Forms the anterior portion of the lower expanded part of the hip, and the **lower anterior** part of the acetabulum.

- ② It consists of a **body**, a **superior ramus**, and an **inferior ramus**.

- ③ **Pubic tubercle**

- ④ The body articulates with the body of the opposite pubis forming the **symphysis pubis**.



*Anterior = inferior of hip bone*

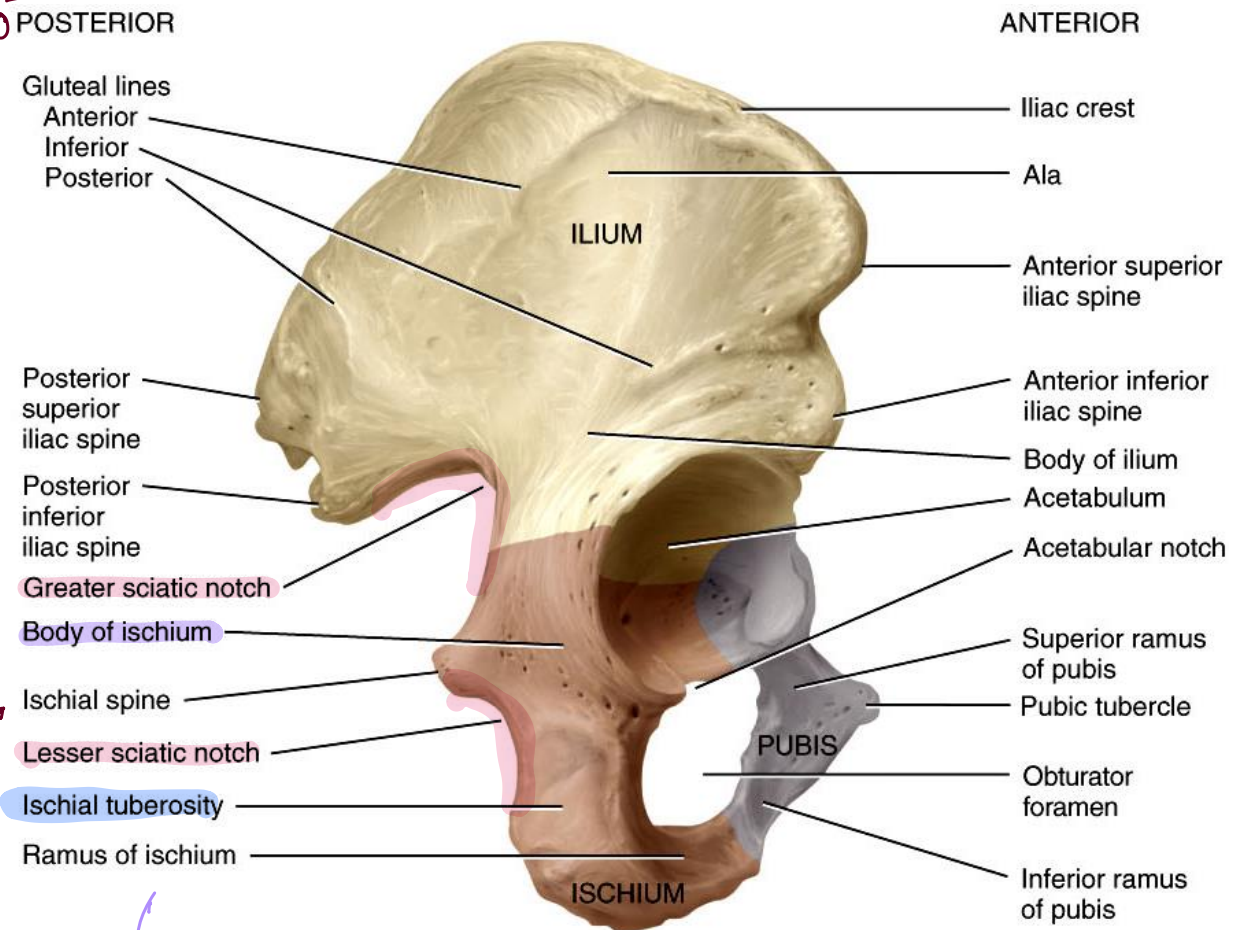


# The Ischium

we can explain the place of Ischium

- ① Forms the posterior portion of the lower expanded part of hip and the lower posterior part of acetabulum. ②
- It consists of: a **body** and a **ramus**, which is continuous with the inferior ramus of the pubis.
- The **ischial tuberosity** is a large rough area situated on the lower part of the body.
- The posterior border of ischium is continuous with posterior border of ilium.
- Ischial spine** is a sharp projection, which intervenes between the greater and lesser sciatic notches.

الحك اسم الوصل وان يعني lower limb



(b) Detailed lateral view

one bone

Greater sciatic notch (above)  
Lesser sciatic notches (below)

# Comparing Male and Female Pelvis

## POINT OF COMPARISON

## FEMALE

**General structure**

Light and thin.

**False (greater) pelvis**

Shallow.

**Pelvic brim (inlet)**

Larger and more oval.

**Acetabulum**

Small and faces anteriorly.

**Obturator foramen**

Oval.

**Pubic arch**

Greater than 90° angle.

## MALE

Heavy and thick.

Deep.

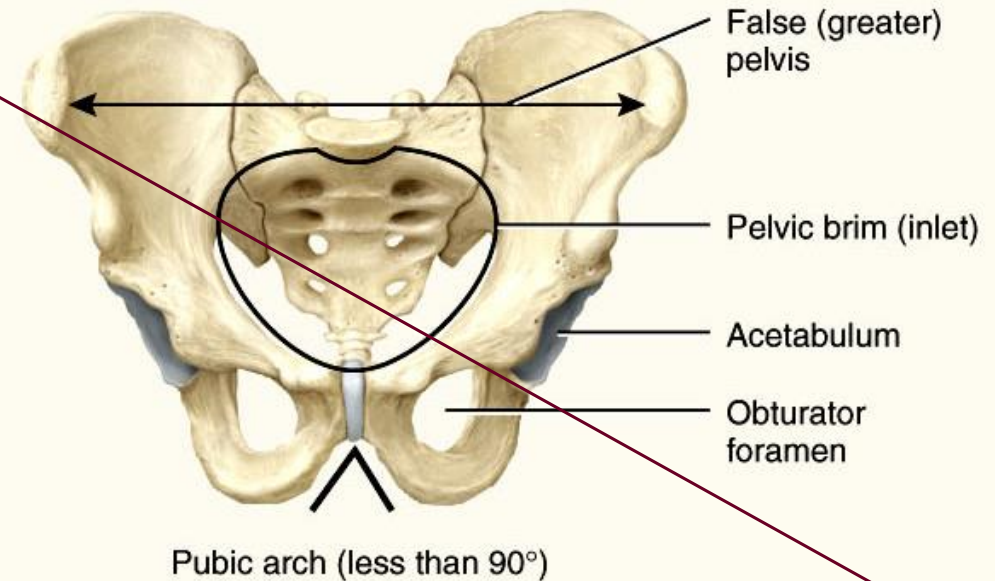
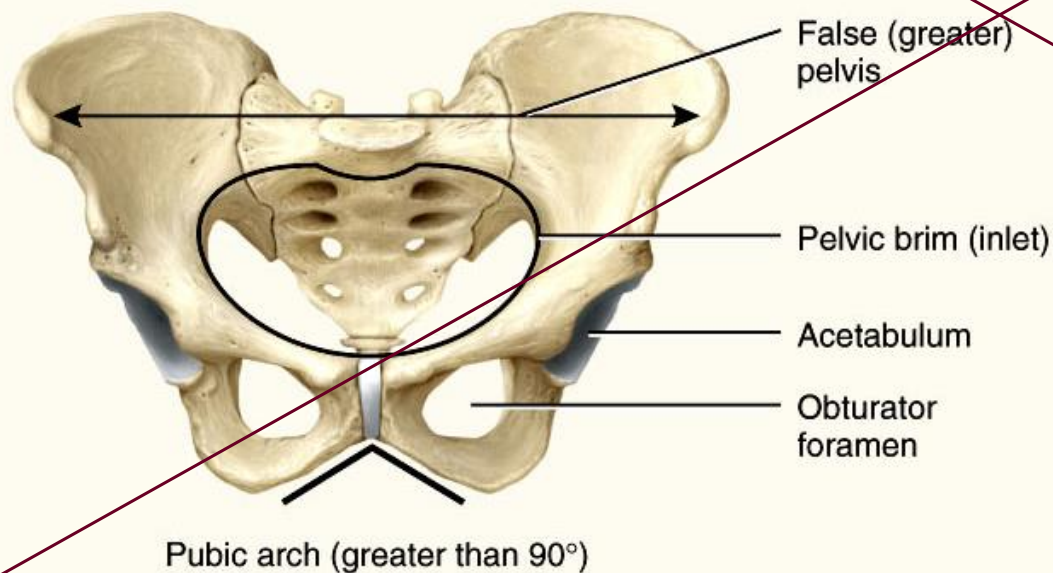
Smaller and heart-shaped.

Large and faces laterally.

Round.

Less than 90° angle.

*not important?*



Anterior views

strongest bone ↙ ↘ longest bone in the body

# The Femur

↳ not straight line slanted to the right  
Greater trochanter  
↳ lateral

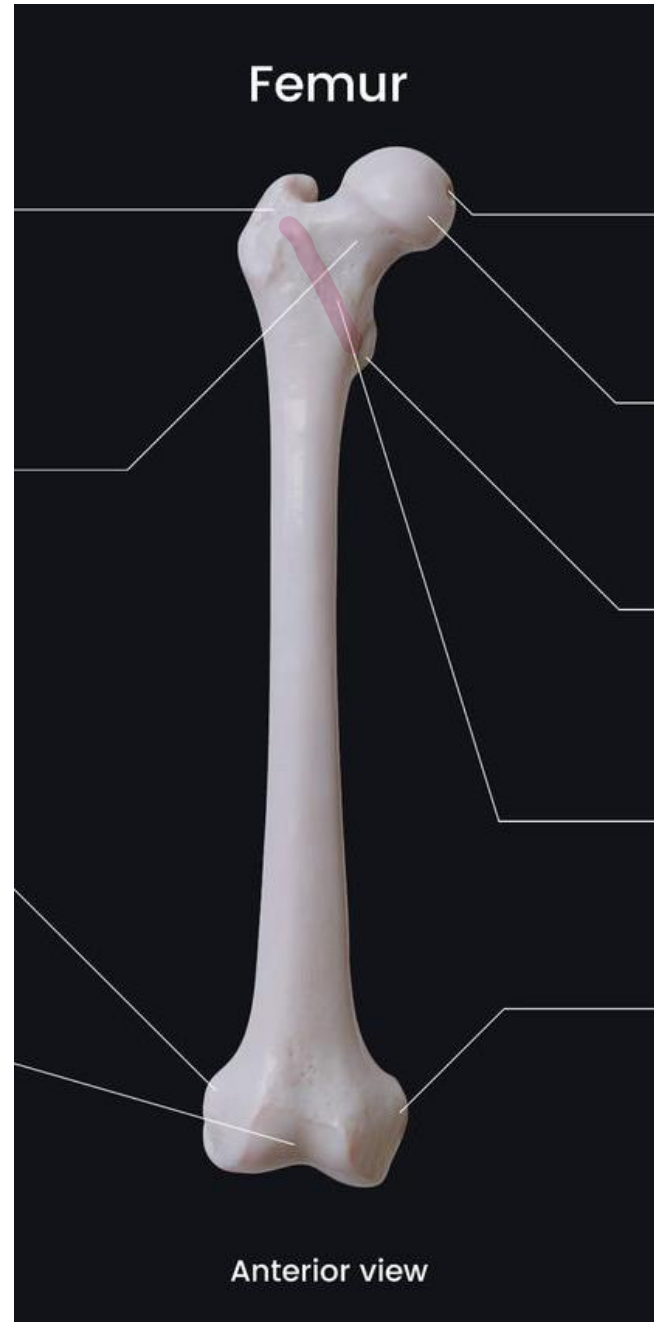
- Proximal end: <sup>①</sup> head, <sup>②</sup> neck, and <sup>③</sup> greater and lesser trochanters.

- **The head:** more than half of a sphere, articulates with acetabulum of the hip, to form the hip joint.

التي في كبر بعباية السلا يداج

- **The neck** is about 5 cm long & connects the head to shaft.

- **The intertrochanteric line** is a rough ridge, which runs downwards and medially on anterior aspect of the bone from greater trochanter to lesser trochanter.



Head

Lesser trochanter  
↳ medial

Intertrochanteric line  
↳ بين  
↳ rough  
↳ Make intertrochanteric crest in posteriorly view.

منه الى هنا

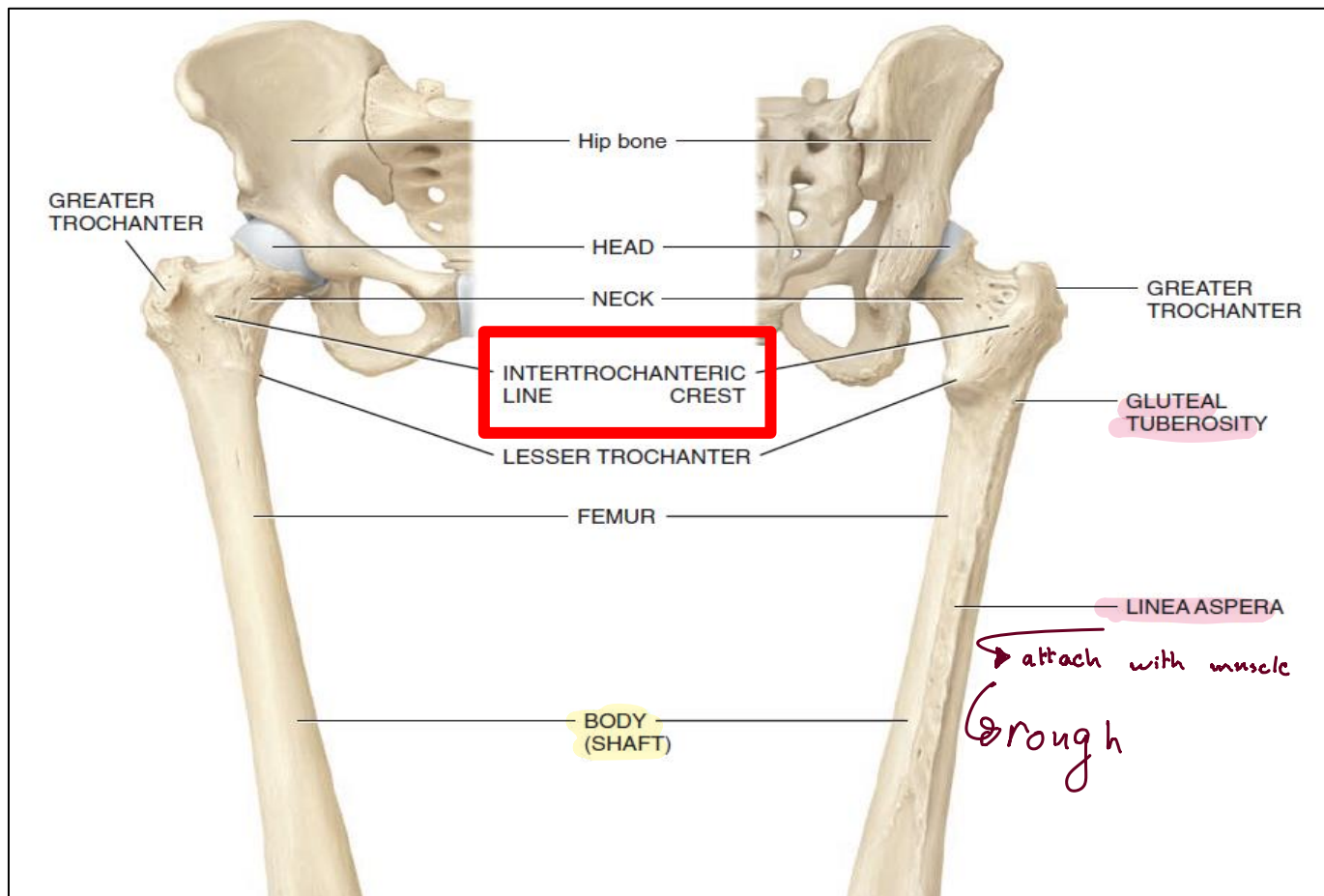
In anterior view we have a intertrochanteric line → rough ridge  
but

In posterior view we have a intertrochanteric crest → smooth elevation.

(posterior crest)

- **The intertrochanteric crest** is a smooth elevation on posterior aspect of the bone between greater and lesser trochanters.
- **Shaft:** The middle third of the posterior aspect of femur presents a broad, rough vertical ridge termed **linea aspera** continuous superiorly with another vertical ridge, called **gluteal tuberosity**.

posterior ↙

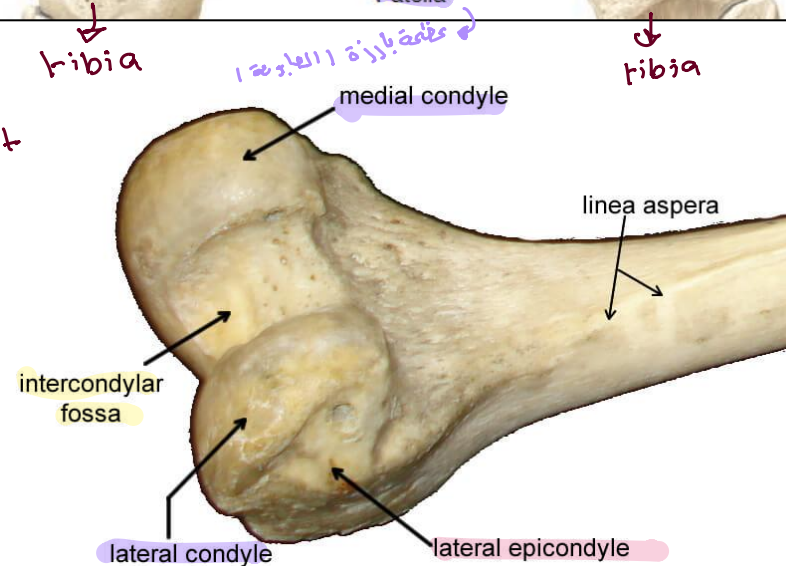
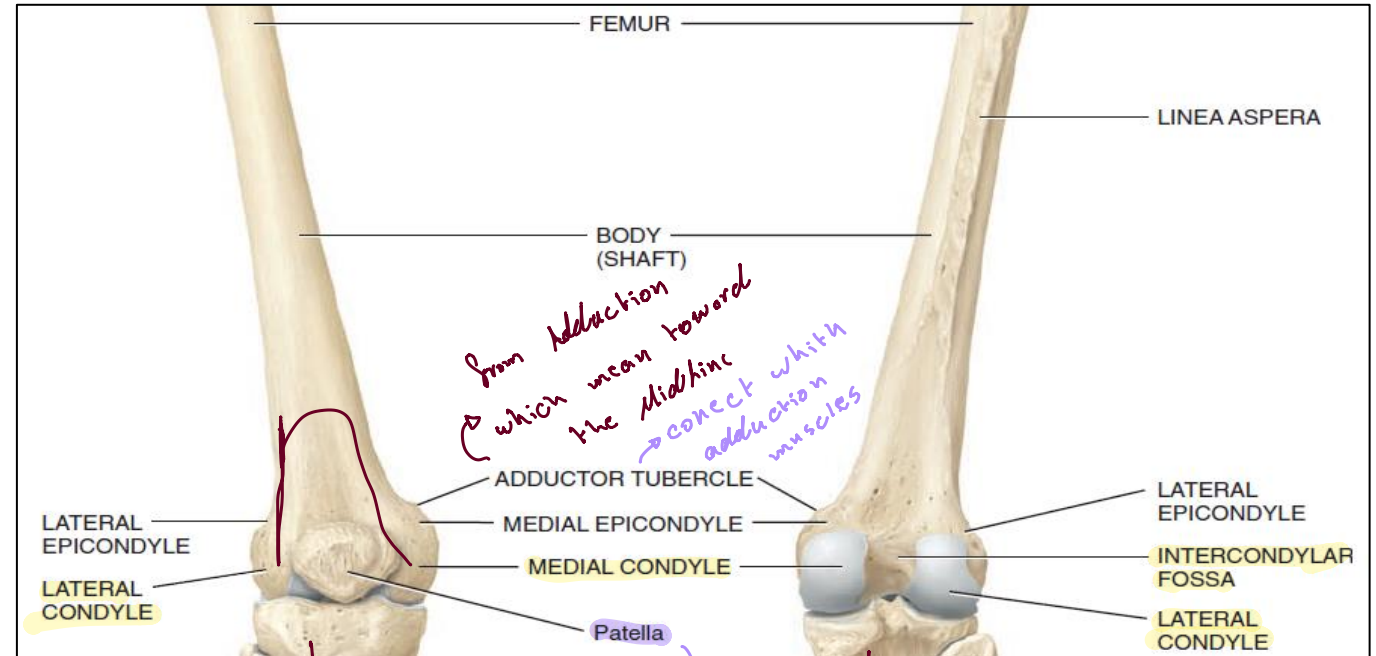


- **Distal end:** The expanded lower end consists of two large masses, the **medial and lateral condyles**, which unite anteriorly, but separated posteriorly by the deep **intercondylar fossa**.
- Anteriorly, the condyles form a broad n-shaped articular surface for articulation with the patella anteriorly and the tibia below. → form knee joint
- Superior to the medial and lateral condyles, are the **medial, and lateral epicondyles**, respectively

lateral condyle ← medial condyle

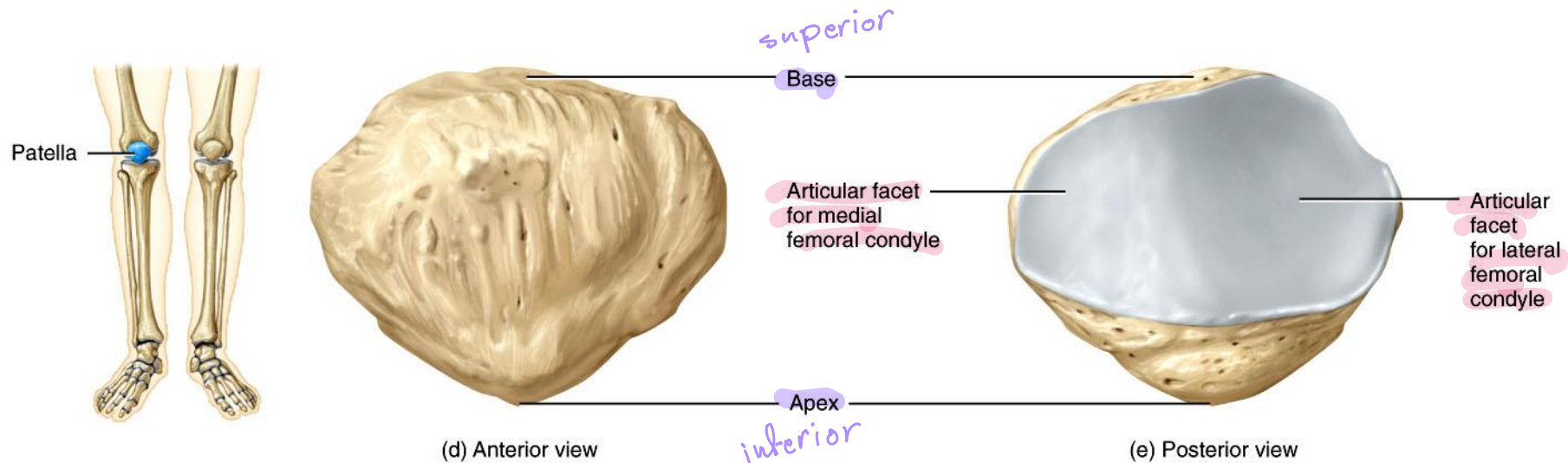
Anterior view

Posterior view



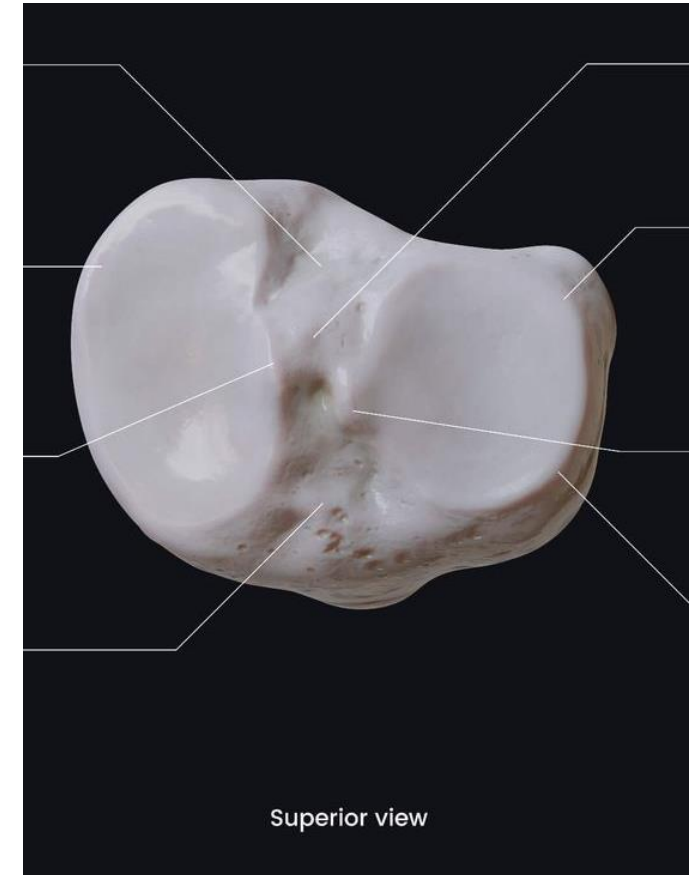
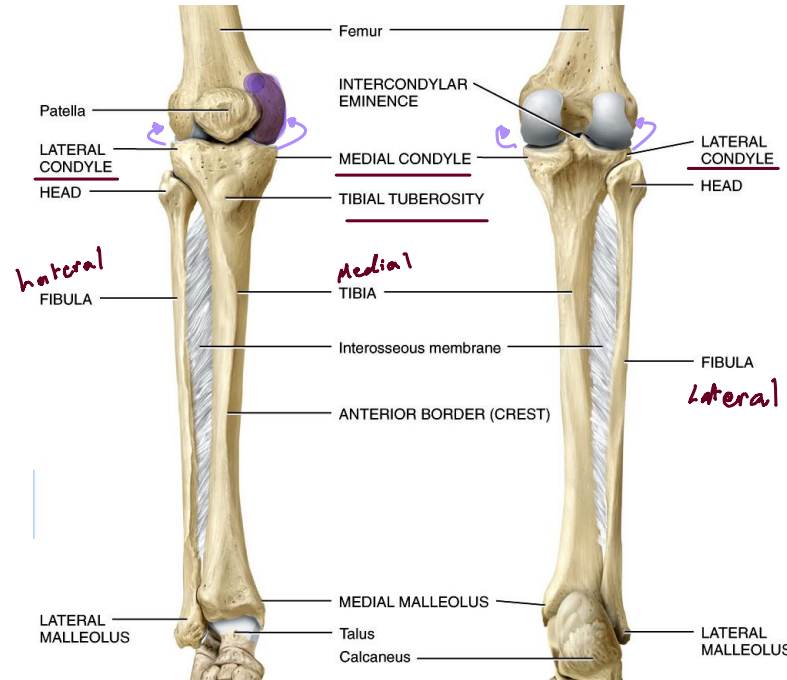
# The Patella

- **The patella** is a triangular sesamoid bone (bone inside tendon), located in front of the knee joint.
- Largest sesamoid bone in the body *(developed in tendon)*
- The **base** of the patella forms the *(superior)* upper border, whereas the **apex** is pointed inferiorly.
- The posterior surface contains two articular facets, for articulation with the medial and lateral condyles of the femur (in knee joint).



# Tibia

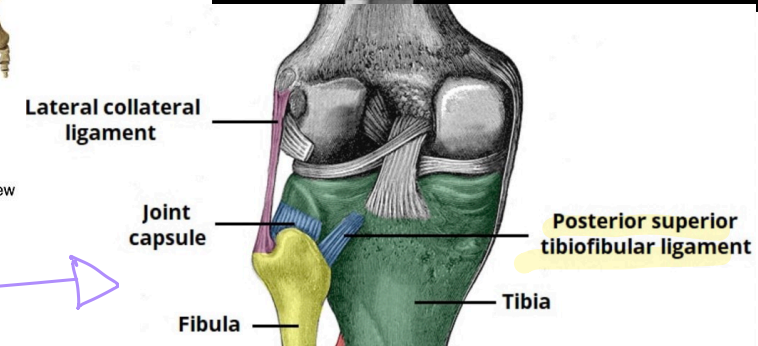
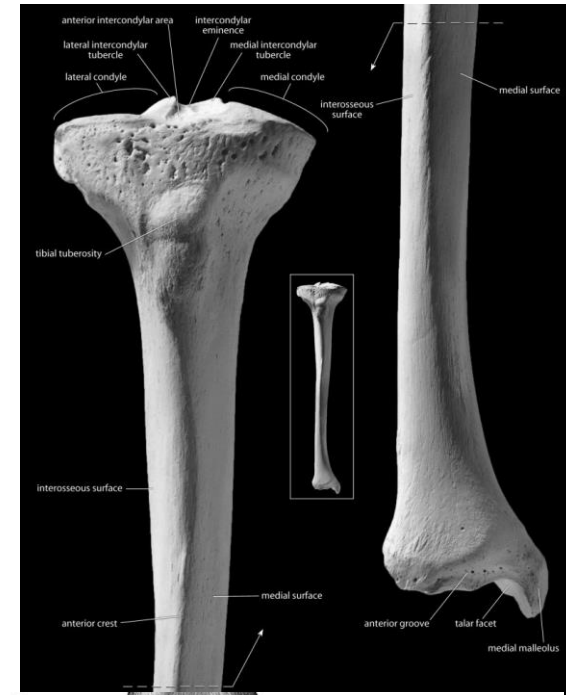
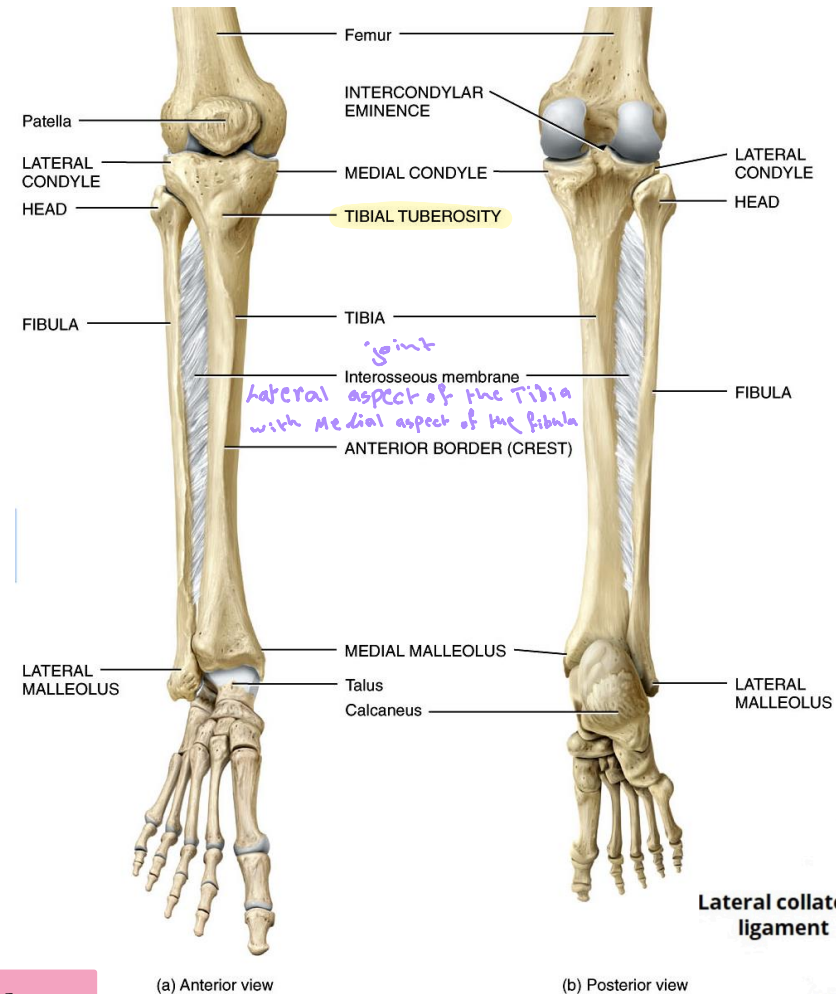
- ① The tibia is the medial, larger, and much stronger one of the two bones of the leg. ②
- ③ **Proximal end:** Shows **the medial and lateral condyles**.
- The medial condyle is relatively **larger** than the lateral one.
- The upper surface of each condyle is smooth and articulates with the corresponding condyle of femur (in the knee joint).



↻ elevation

- **Shaft:** **The tibial tuberosity** lies at the upper end of anterior border of the shaft.
- The lateral border is sharp and is called the interosseous border to which the interosseous membrane is attached
- On the posterior aspect of the lateral condyle there is a facet for articulation with the head of fibula forming the **superior tibio-fibular joint**.

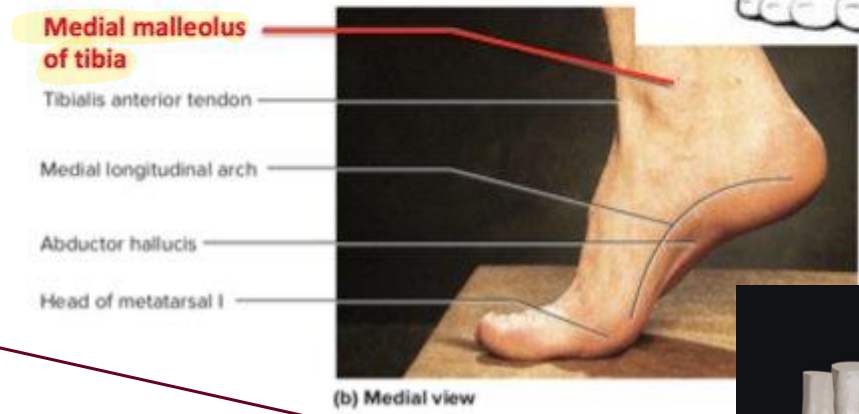
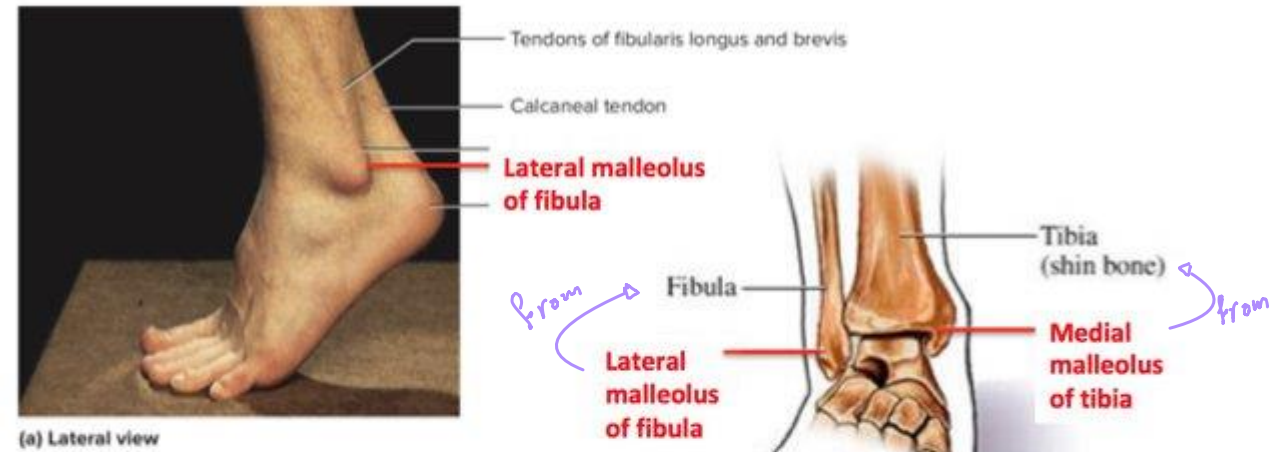
plane type of synovial joint, which allows the involved bones to glide over one another to create movement





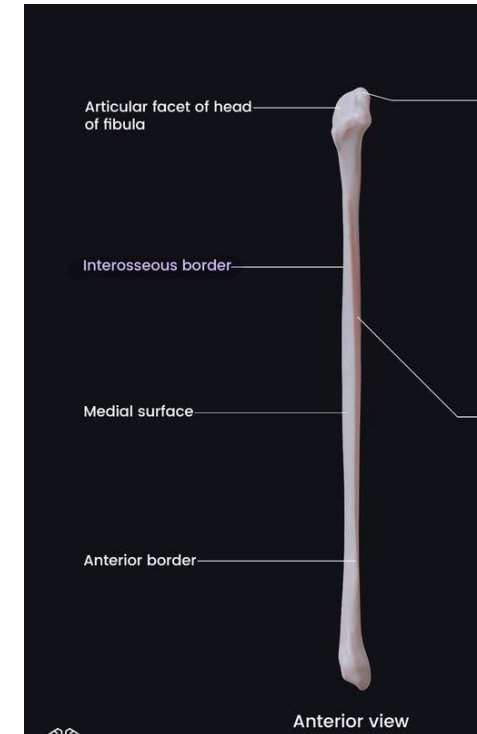
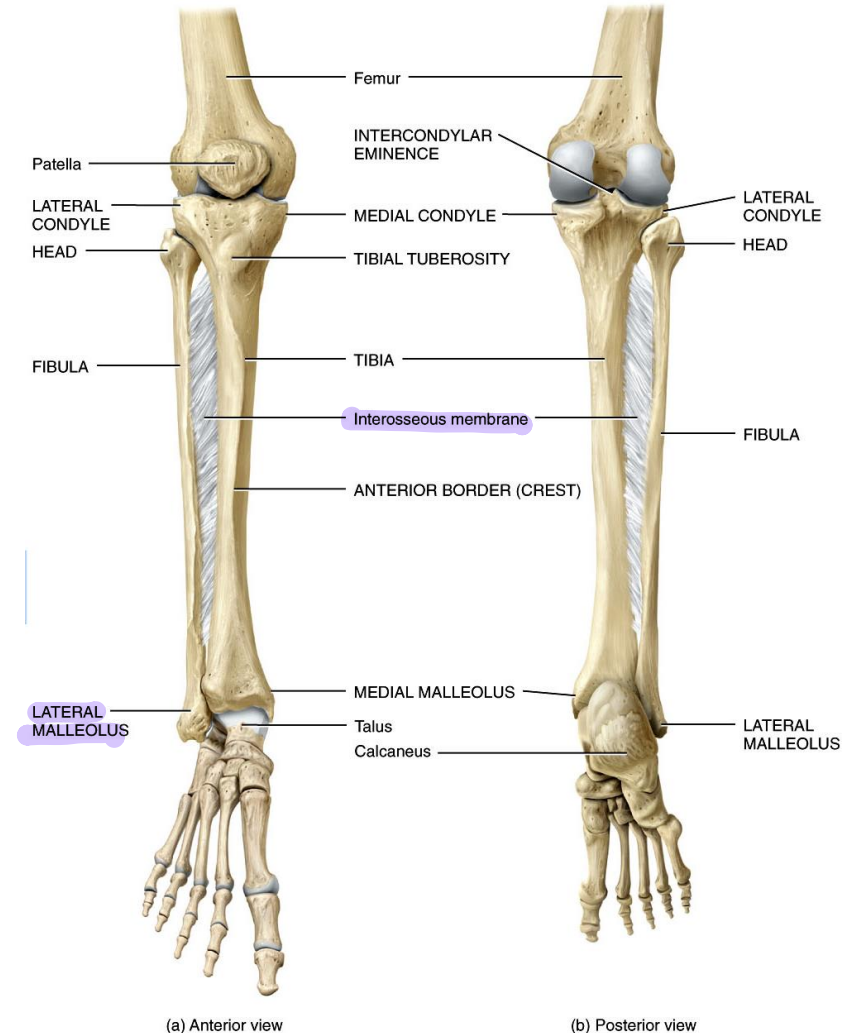
The ankle joint is a hinged synovial joint that is formed by the articulation of the talus, tibia, and fibula bones.

- **Distal end:** The medial aspect of the lower end presents inferiorly the **medial malleolus**. This forms the prominence on medial aspect of ankle.
- The inferior surface of this end articulates with talus bone (in ankle joint). \* On the lateral aspect of lower end, there is a rough depression, the fibular notch, to which the lower end of fibula articulates forming the **inferior tibiofibular joint**.



# Fibula

- The fibula is the lateral bone of the leg.
- It has an upper end (**head**), **shaft**, and **lower end**.
- The medial border of the shaft is called **interosseous border**, to which the interosseous membrane is attached.
- The lower end has a projection, **the lateral malleolus**. This forms the prominence on the lateral aspect of the ankle.
- <sup>ما يتحمل وزن</sup> it is not a weight-bearing bone. Its main function is to <sup>د</sup>combine with the tibia and provide stability to the ankle joint.



# Bones of Foot

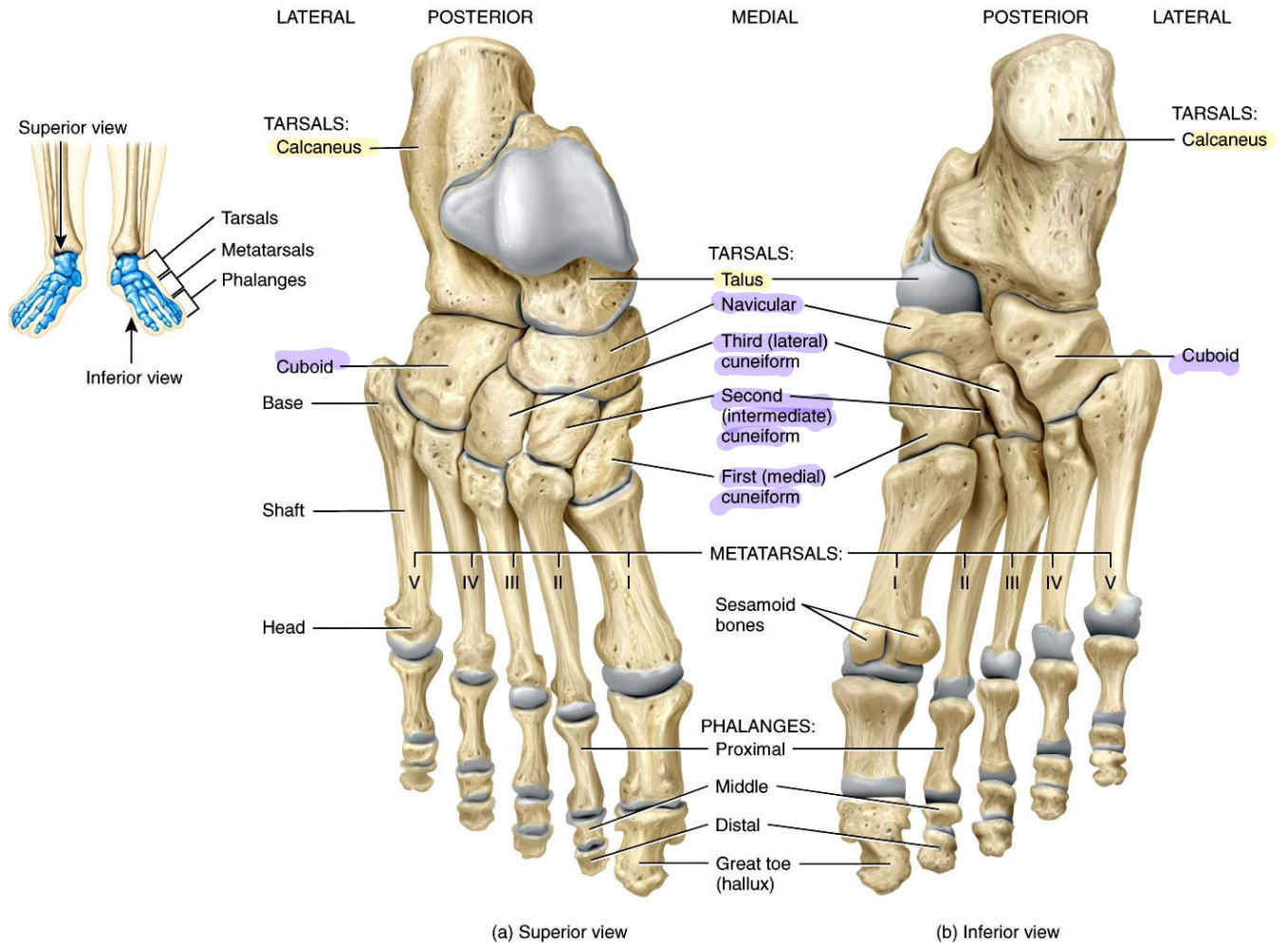
## • The Tarsal Bones (Tarsus):

Form the proximal region of foot. consist of two large bones: **talus & calcaneus** + five smaller bones: **cuboid & navicular bones and the medial, intermediate & lateral cuneiform bones.**

The talus bone articulates superiorly with lower end of the tibia to form ankle joint, inferiorly with calcaneus, and anteriorly with navicular bone.

*most important*

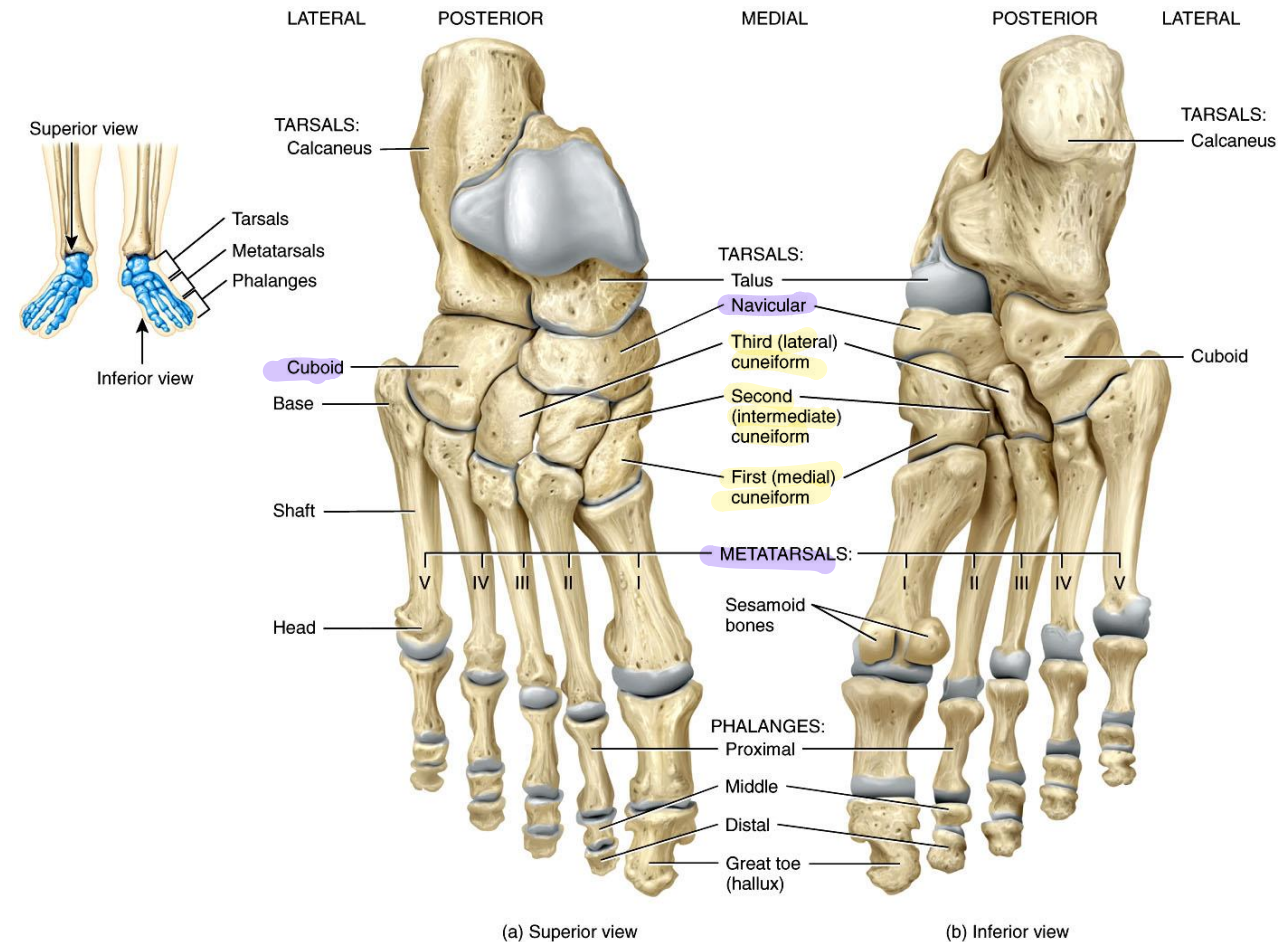
*7 bone*



(a) Superior view

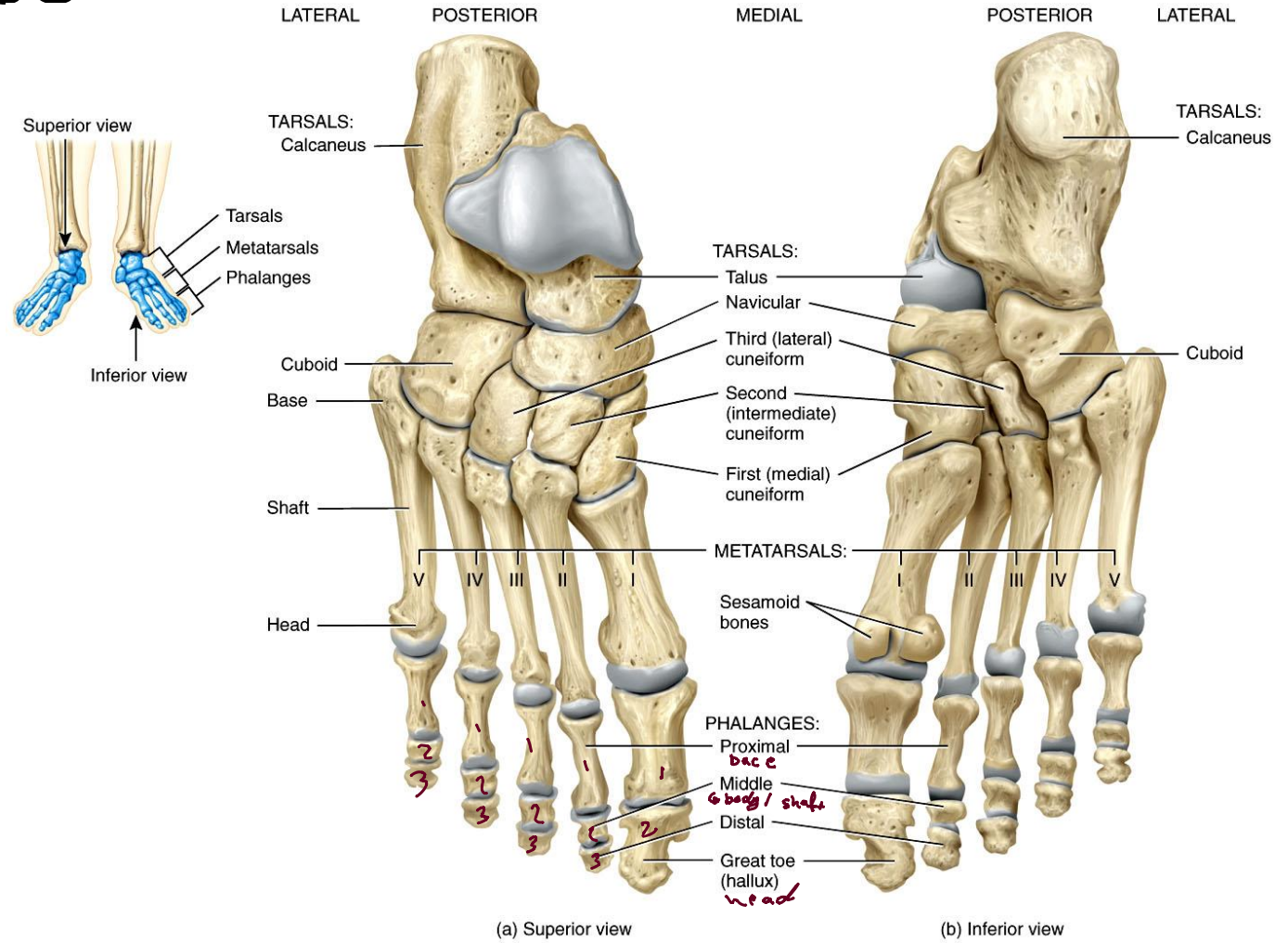
(b) Inferior view

- The three cuneiform bones articulate posteriorly with the navicular bone and anteriorly with the 1st, 2nd & 3rd metatarsal bones.
- The cuboid bone articulates posteriorly with calcaneus, medially with lateral cuneiform, and anteriorly with the fourth and fifth metatarsal bones.
- Joints between tarsal bones are called the **intertarsal joints**



# The Metatarsal Bones

- 5 • In each foot there are five metatarsal bones.
- The 1<sup>st</sup> one is that of the big toe. *→ largest*
- Each one has a proximal base, a body & a distal head. C. The Phalanges: There are two phalanges in the big toe and three in each one of the lateral four digits.



# Arches of the Foot

• The tarsal and metatarsal bones are arranged in such a way that they form arches in **longitudinal and transverse axes of the foot.**

الحواس

• The function of these arches is to **distribute body weight over the soft and hard tissues of the foot.**

توزيع

• Bones are held in position by ligaments and muscles tendons, Weakness of these ligaments and tendons results in a decrease in the height of the arches

• Flat foot

