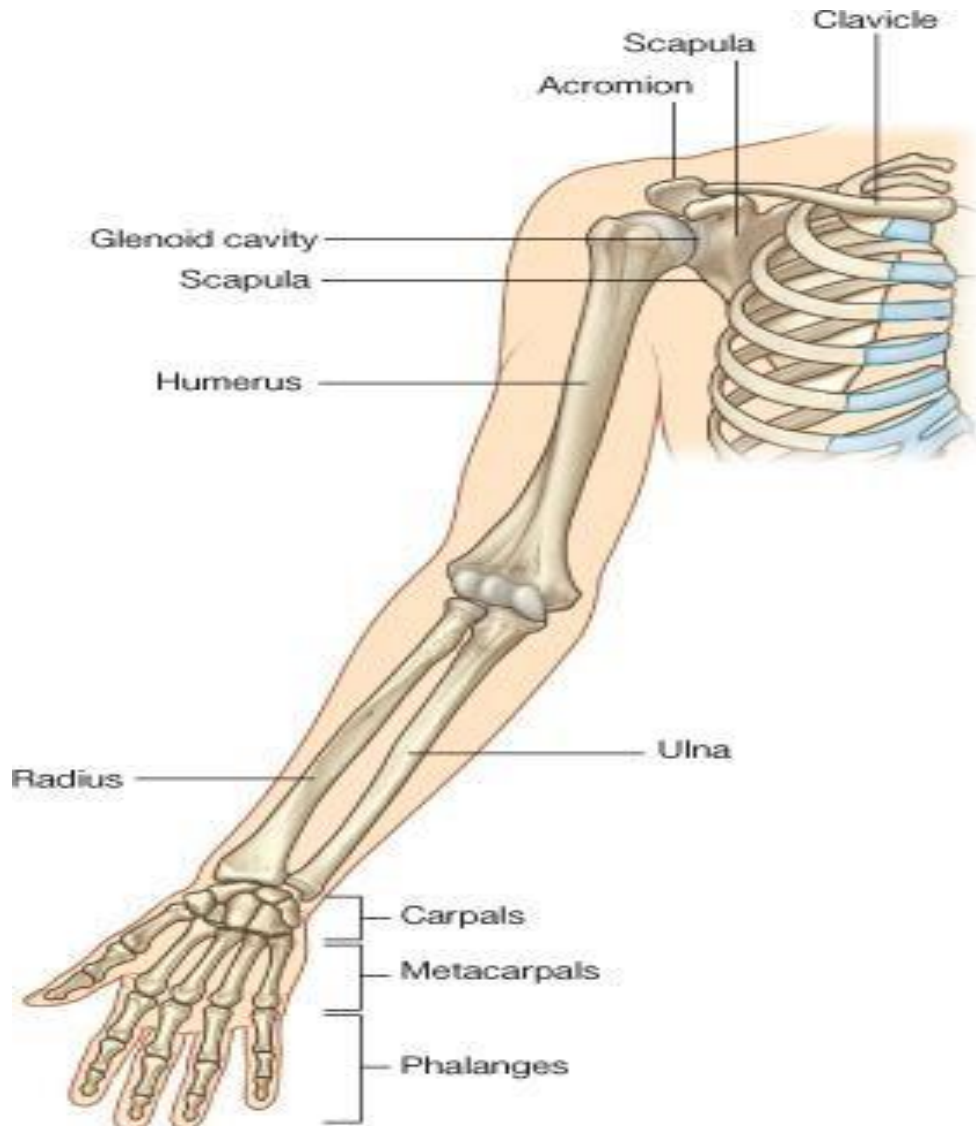


# Bones of the Upper and Lower limb

DR AMAL ALBTOOSH

| TERMS               | MEANING   |
|---------------------|---|
| Ridge               | The long and narrow upper ridge, angle, or crest of something   |
| Notch               | An indentation, (incision) on an edge or surface  |
| Tubercles           | A nodule or a small rounded projection on the   |
| Fossa               | A hollow place (The Notch is not complete but the fossa is complete and both of them act as the lock) |
| Tuberosity          | A large prominence on a bone usually serving for the attachment of muscles or ligaments               |
| Processes           | A V-shaped indentation (act as the key of the   |
| Groove              | A channel, a long narrow depression sure  |
| Interosseous border | Between bones (the place where the two parallel bones attach together by the interosseous)            |
| Spine               | Thick projecting ridge of bone  |
| Articulation        | Meeting of two bones to make the joints   |

# The Upper Limbs:



The Bones of the **Upper limbs** are:

Pectoral Girdle: **Clavicle** and **Scapula**

Arm : **Humerus**

Forearm : **Radius & Ulna**

Wrist : **Carpal** bones

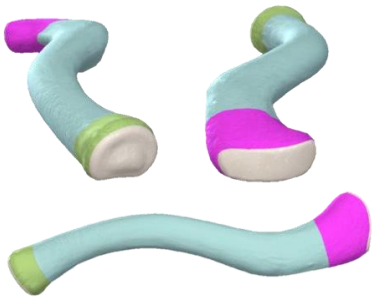



Hand: **Metacarpals & Phalanges**

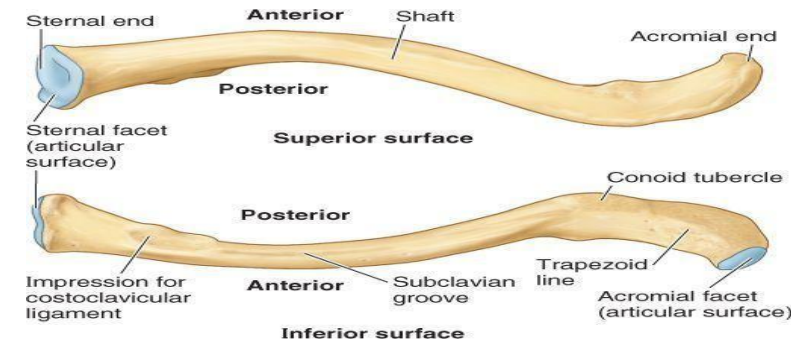
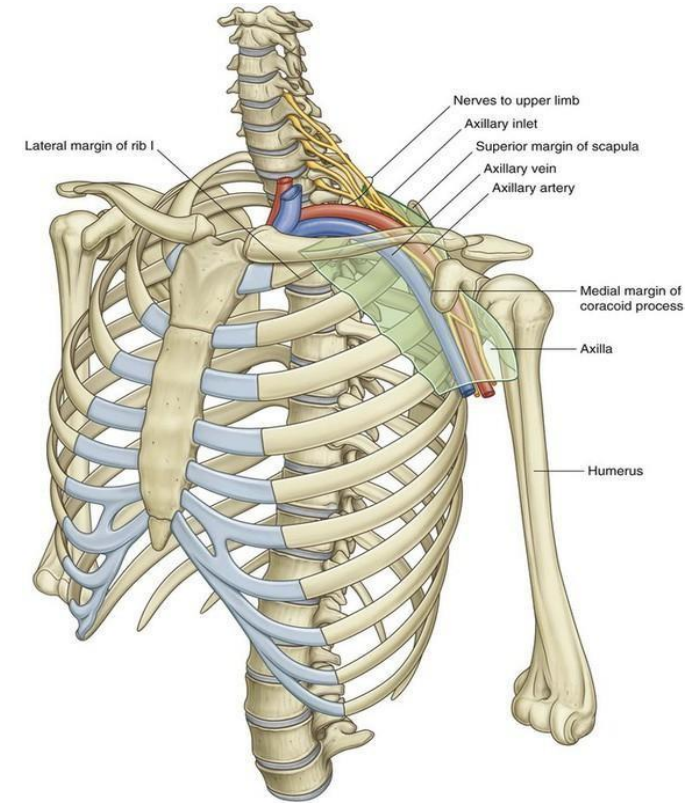
# Pectoral Girdle:

- **Formed of Two Bones:** 1- Clavicle (anteriorly) and 2-Scapula (posteriorly).
- It is very light and allows the upper limb to have exceptionally free movement.

**1- Clavicle:** it is a doubly curved **long bone** with no medullary (**bone marrow**) cavity, lying **horizontally** across the root of the neck. It is **subcutaneous** (**under the skin**) throughout its length.

it has :

| Two Ends  | Body (shaft)  | Two Surfaces   |
|---|---|--|
| <p><b>Medial(sternal):</b> enlarged and triangular</p> <p><b>Lateral(Acromial):</b> flattened</p> <p><small>note: The sternal end is attached to the sternum<br/>The acromial end is attached to the acromion part of scapula</small></p> | <p>It's <b>medial <math>\frac{2}{3}</math></b> is convex (محدب) forward</p> <p>It's <b>lateral <math>\frac{1}{3}</math></b> is concave (مقعر) forward</p>           | <p><b>Superior surface</b> which is smooth because it lies just deep to the skin</p> <p><b>Inferior surface</b> which is rough because strong ligaments bind to 1st rib</p>  |
|    |  <p>medial <math>\frac{2}{3}</math></p> <p>lateral <math>\frac{1}{3}</math></p> | <p><b>Superior surface (smooth)</b></p>  <p><b>Inferior surface (rough)</b></p>  |



# Pectoral Girdle:

**2- Scapula (shoulder blade):** It is a triangular Flat bone ,Extends between the 2<sup>nd</sup> 7<sup>th</sup> ribs.

It has :

**Three Processes:**

- 1 Spine
- 2 Acromion
- 3 Coracoid

**Three Borders:**

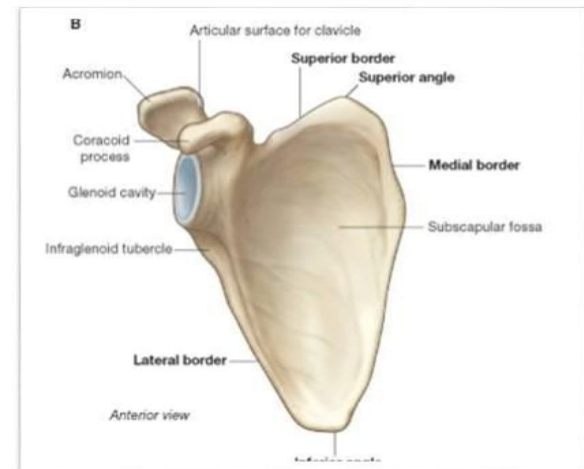
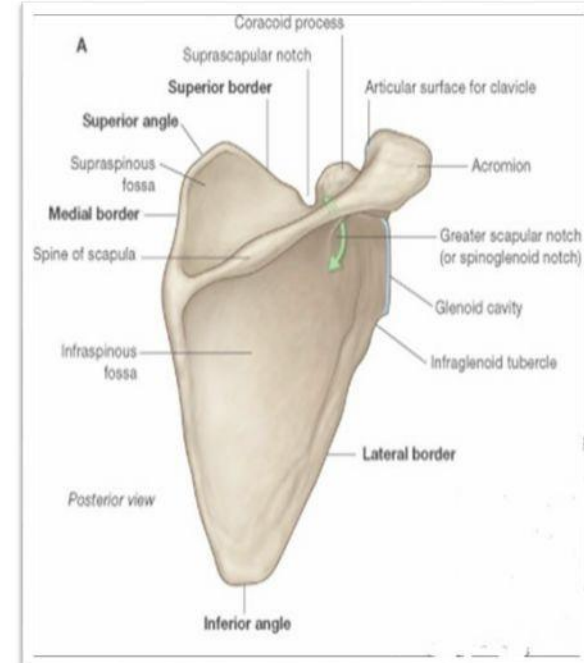
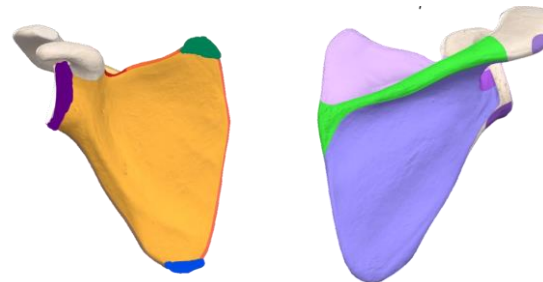
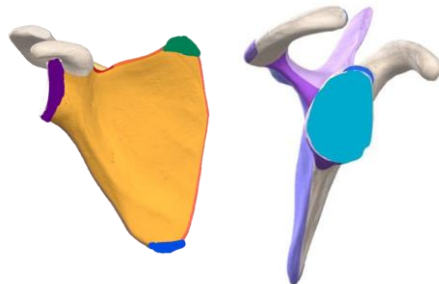
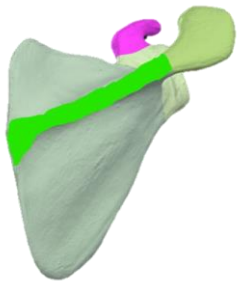
- 1 Superior
- 2 Medial (Vertebral)
- 3 Lateral (Axillary)

**Three Angles:**


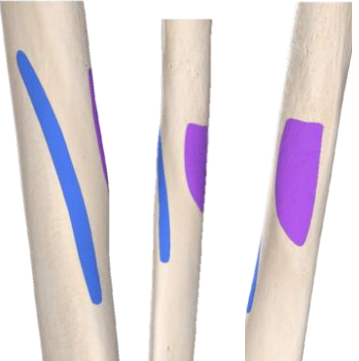


- 1 Superior
- 2 Lateral (forms the Glenoid cavity)
- 3 Inferior.

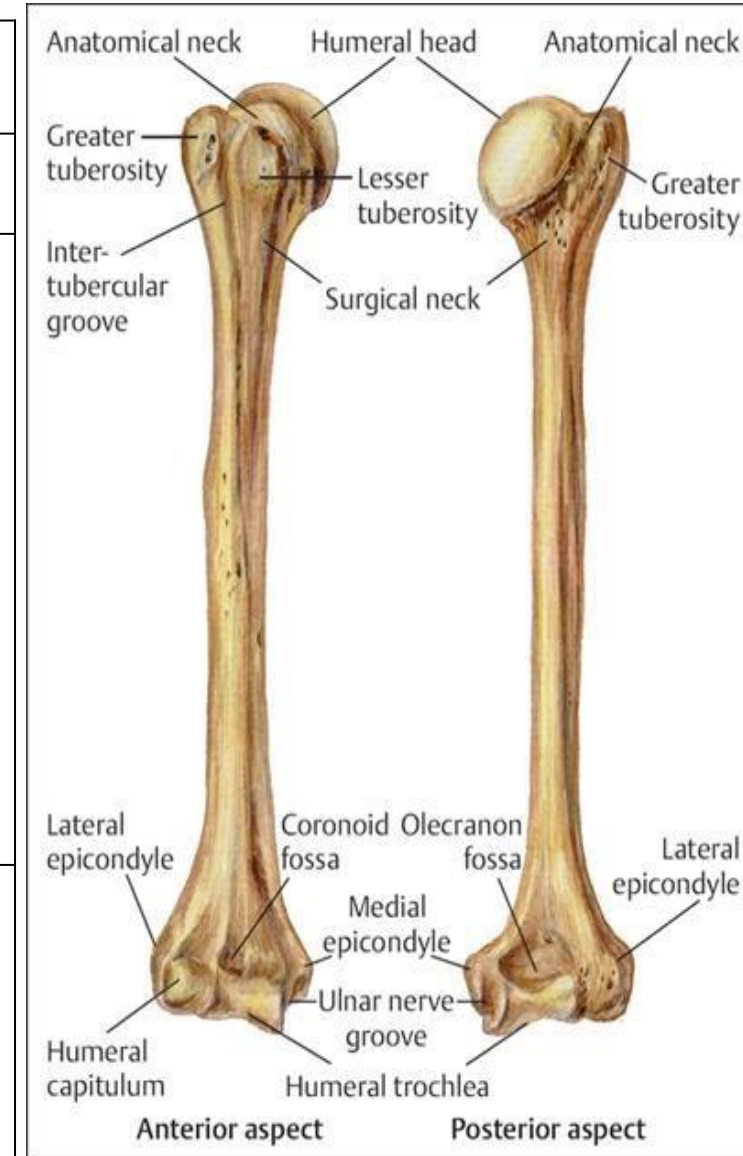
**Two Surfaces:**

- 1 Convex Posterior, **Smaller Supraspinous Fossa** (above the spine) and the larger **Infraspinous Fossa** (below the spine).
- 2 **Concave Anterior (Costal)** it forms the large Subscapular Fossa



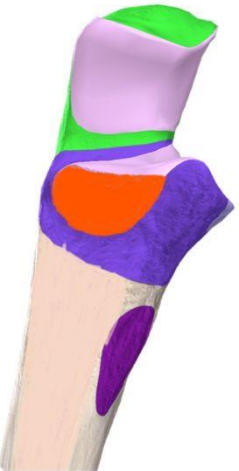


# Humerus: Typical Long bone **it has:**

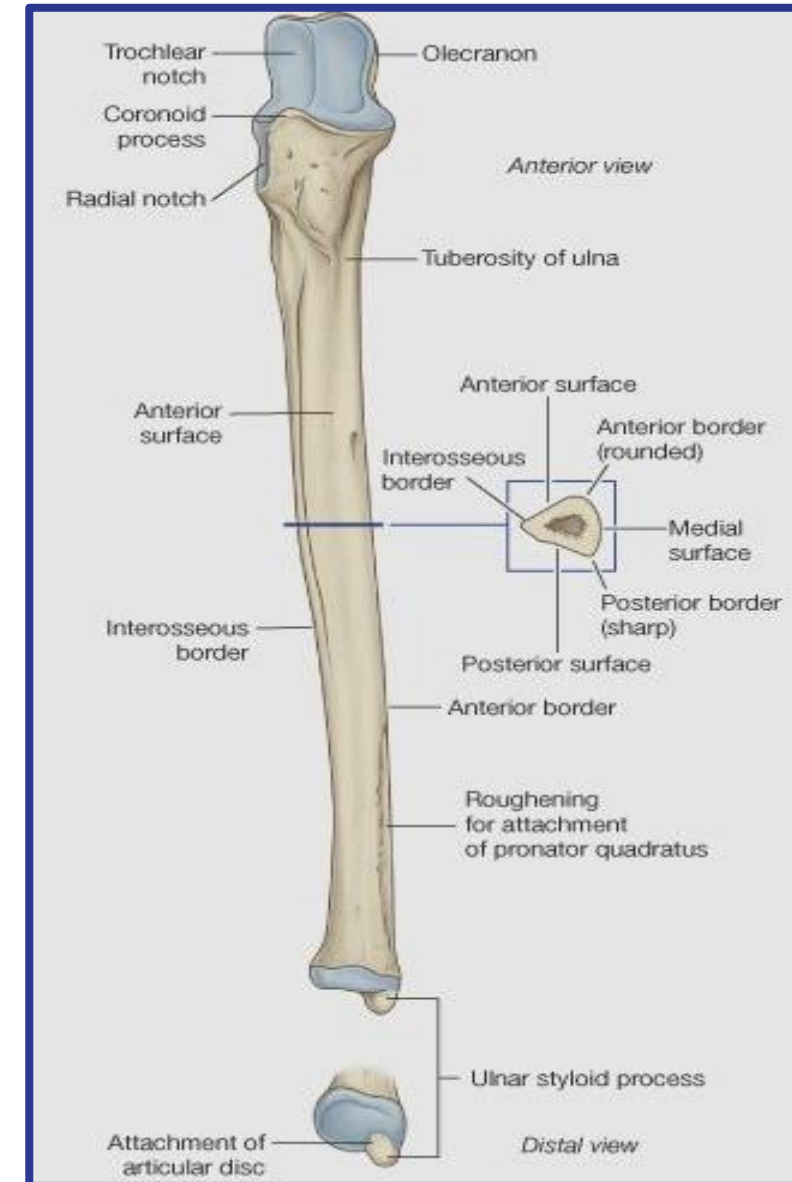
| Proximal End   | Shaft (Body)   | Distal end   |  |
|--|--|--|--|
| <ul style="list-style-type: none"> <li>● <b>Head</b> ,Neck</li> <li>● <b>Greater Tubercles</b></li> <li>● <b>Lesser Tubercles</b></li> <li>● <b>Intertubercular Groove.</b></li> <li>● <b>Anatomical neck:</b> formed by a groove separating the head from the tubercles.</li> <li>● <b>Surgical Neck:</b> a narrow part distal to the tubercles.</li> </ul> | <p>Has <b>two</b> prominent features:</p> <ol style="list-style-type: none"> <li>1. <b>Deltoid tuberosity</b></li> <li>2. <b>Spiral (Radial) groove</b></li> </ol> <p>Note: The radial nerve passe along the the radial groove</p> | Anteriorly   | Posteriorly  |
|    |    | <ul style="list-style-type: none"> <li>● <b>Trochlea:</b> (medial) for articulation with the ulna</li> <li>● <b>Capitulum:</b> (lateral) for articulation with the radius.</li> <li>● <b>Coronoid fossa:</b> above the trochlea.</li> <li>● <b>Radial fossa:</b> above the capitulum.</li> </ul> | <ul style="list-style-type: none"> <li>● <b>Olecranon fossa:</b> above the trochlea.</li> <li>● <b>Medial epicondyle</b> (can be felt)</li> <li>● <b>Lateral epicondyle</b></li> </ul> |
|  |  |   |   |



**IMPORTANT:** Don't mix up between the coracoid in the scapula and the coronoid in the humerus


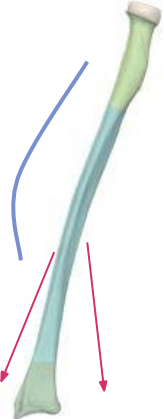
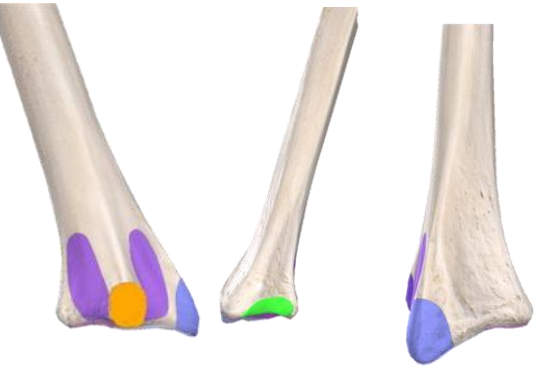
# Ulna: it is stabilizing bone of the forearm also it longest bone in forearm

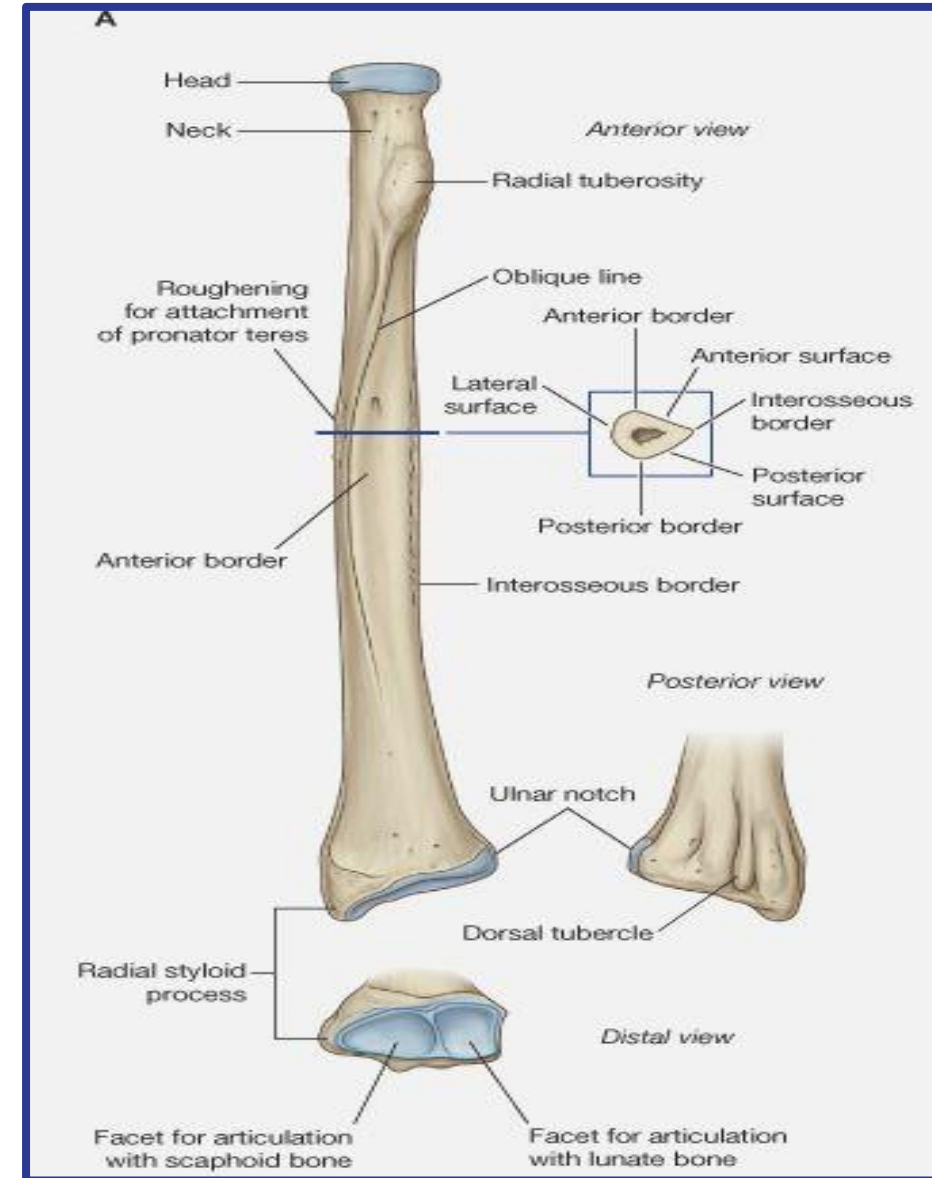
| Proximal End  | Shaft (Body)   | Distal end   |
|---|--|--|
| <ol style="list-style-type: none"> <li>1. Olecranon Process</li> <li>2. Coronoid Process</li> <li>3. Tuberosity of Ulna</li> <li>4. Trochlear Notch</li> <li>5. Radial Notch</li> </ol> | <p>Thick &amp; cylindrical superiorly but diminishes in diameter inferiorly<br/>It has<br/><u>Three Surfaces</u><br/>(Anterior, Medial &amp; Posterior).<br/><b>Sharp Lateral Interosseous border.</b></p> | <ul style="list-style-type: none"> <li>• Small rounded               <ol style="list-style-type: none"> <li>1. Head: lies distally at the wrist. .</li> <li>2. Styloid process: Medial.</li> </ol> </li> </ul> |
|   |   |    |



Helpful Note The ulna is a medial bone it has a medial surface and a medial styloid process

# Radius: it shortest and lateral bone of forearm

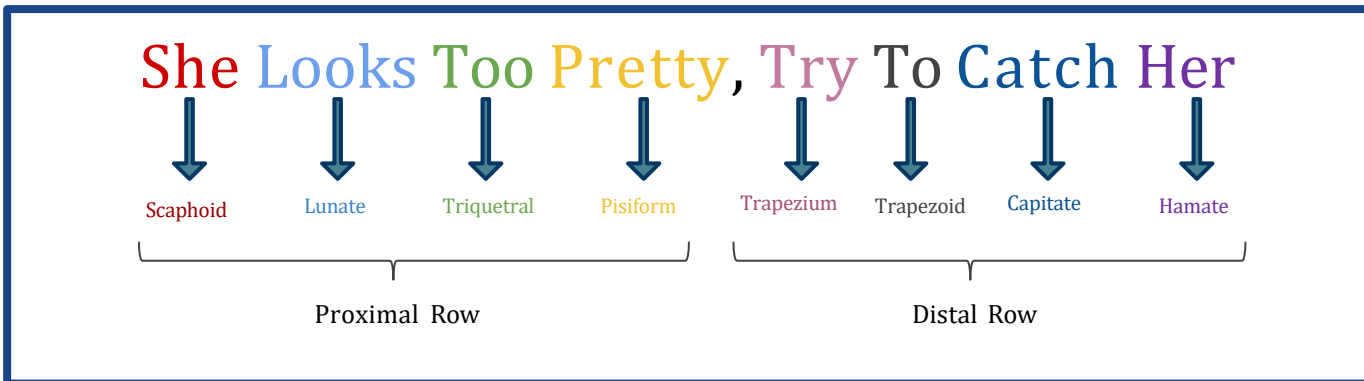
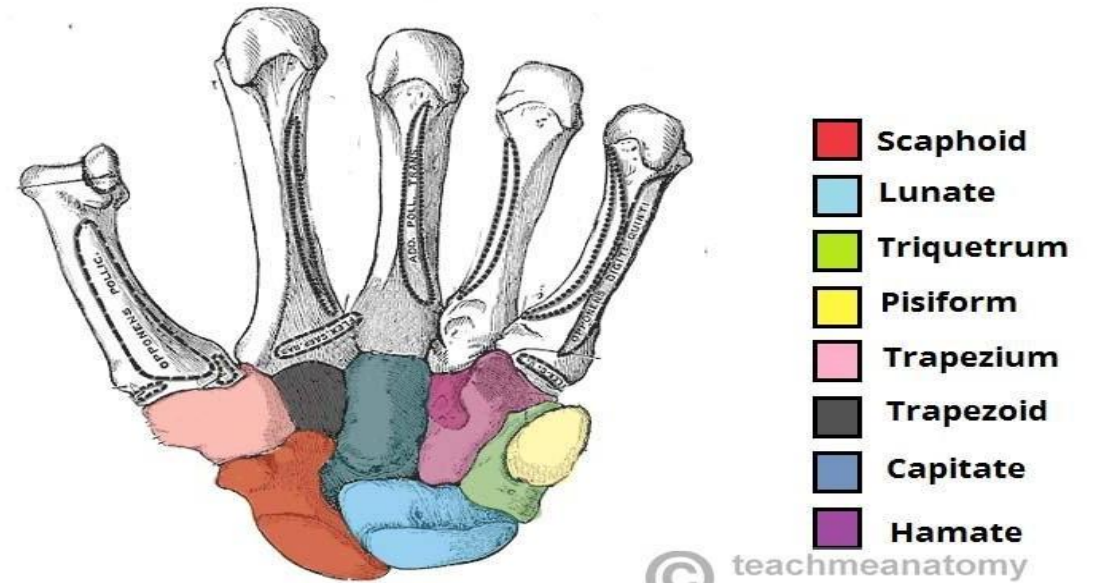
| Proximal End  | Shaft (Body)  | Distal end  |
|---|---|---|
| <p>1. <b>Head:</b> small &amp; circular, it's upper surface is concave for articulation with the capitulum.</p> <p>2. <b>Neck</b></p> <p>3. <b>Radial (bicipital) tuberosity:</b> medially directed and separates the proximal end from the body.</p> | <ul style="list-style-type: none"> <li>• Has a <b>lateral convexity</b></li> <li>• It <b>gradually enlarges</b> as it passes distally.</li> </ul> | <ul style="list-style-type: none"> <li>• It is rectangular</li> </ul> <p><b>Ulnar Notch</b> : a medial concavity to accommodate the head of the ulna.</p> <p>2. <b>Radial Styloid process:</b> extends from the lateral aspect.</p> <p>3. <b>Dorsal tubercle:</b> projects dorsally</p> |
|   |   |    |





# Bones of the Wrist and Hand :

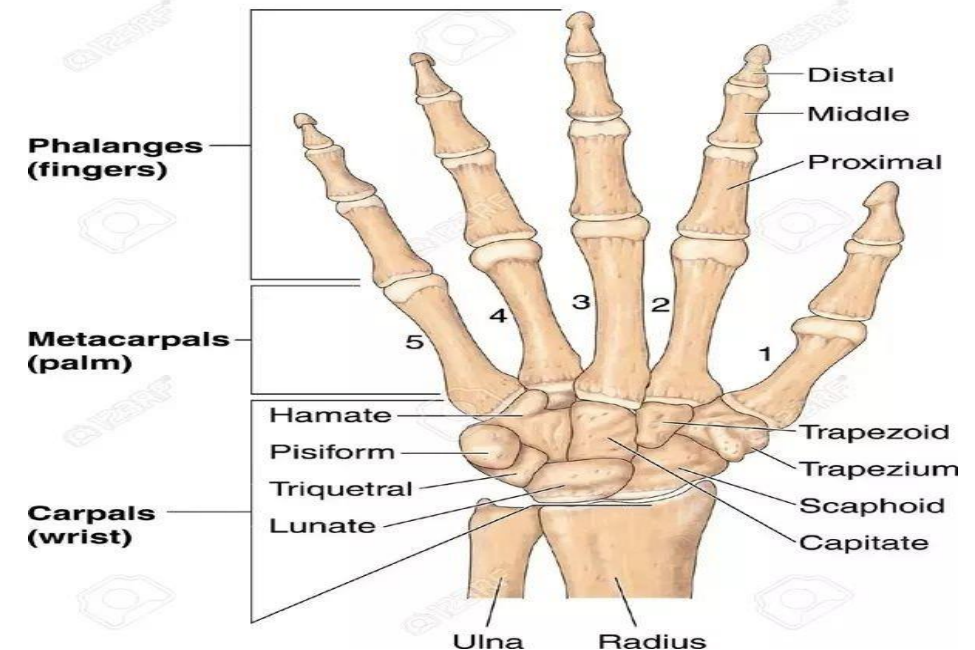
1. **Carpal bones** : Composed of **Eight** short bones
  - **Proximal row** (from lateral to medial): **Scaphoid**, **Lunate**, **Triquetrum** & **Pisiform** bones.
  - **Distal row** (from lateral to medial): **Trapezium**, **Trapezoid**, **Capitate** & **Hamate**.



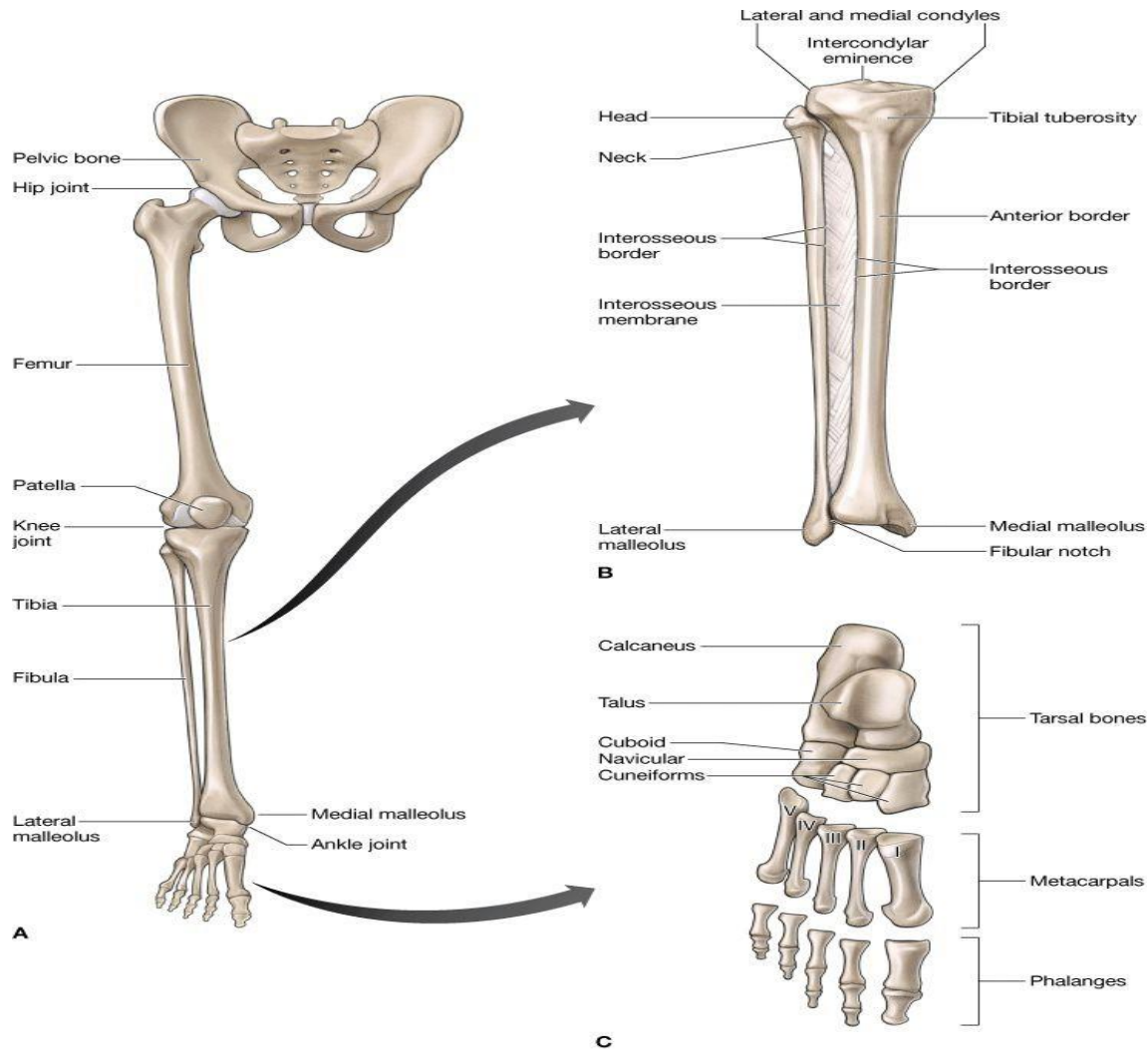
2. **Metacarpal bones**: **Five** Metacarpal bones, each has a Base, Shaft, and a Head.

3. **Phalanges**: **Fourteen** Each digit has **Three** Phalanges **Except** the **Thumb** which has only **Two**

*Don't forget we start from thumb always.*



# The Lower Limbs:




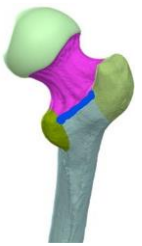

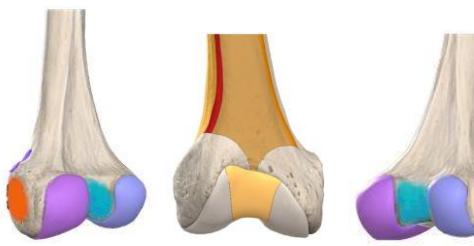
Source: Morton DA, Foreman KB, Albertine KH: *The Big Picture: Gross Anatomy*; www.accessmedicine.com  
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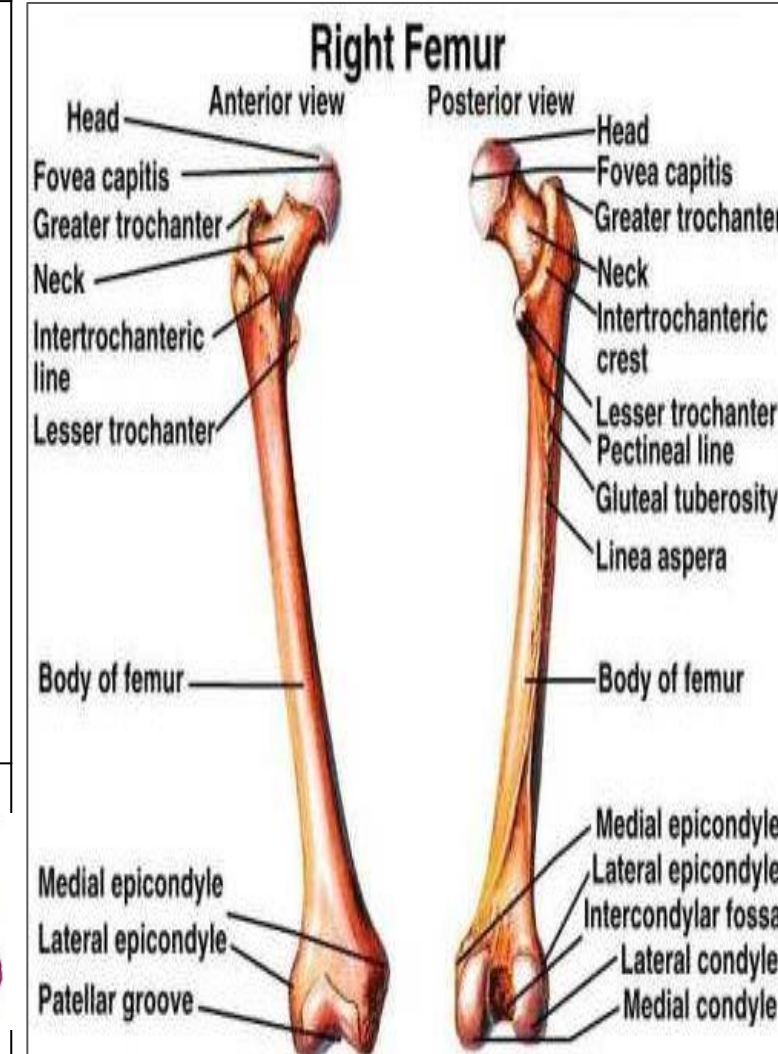
The Bones of **Lower limbs** are:

- Pelvic Girdle: **Hip bone & Sacrum**
- Thigh: **Femur & Patella**
- Leg: **Tibia & Fibula**
- Ankle: **Tarsal bones**
- Foot : **Metatarsal & Phalanges**

**Femur:** Articulates above with **acetabulum** of **hip bone** to form the **hip joint** .Articulates below with **tibia** and **patella** to form the **knee joint**.

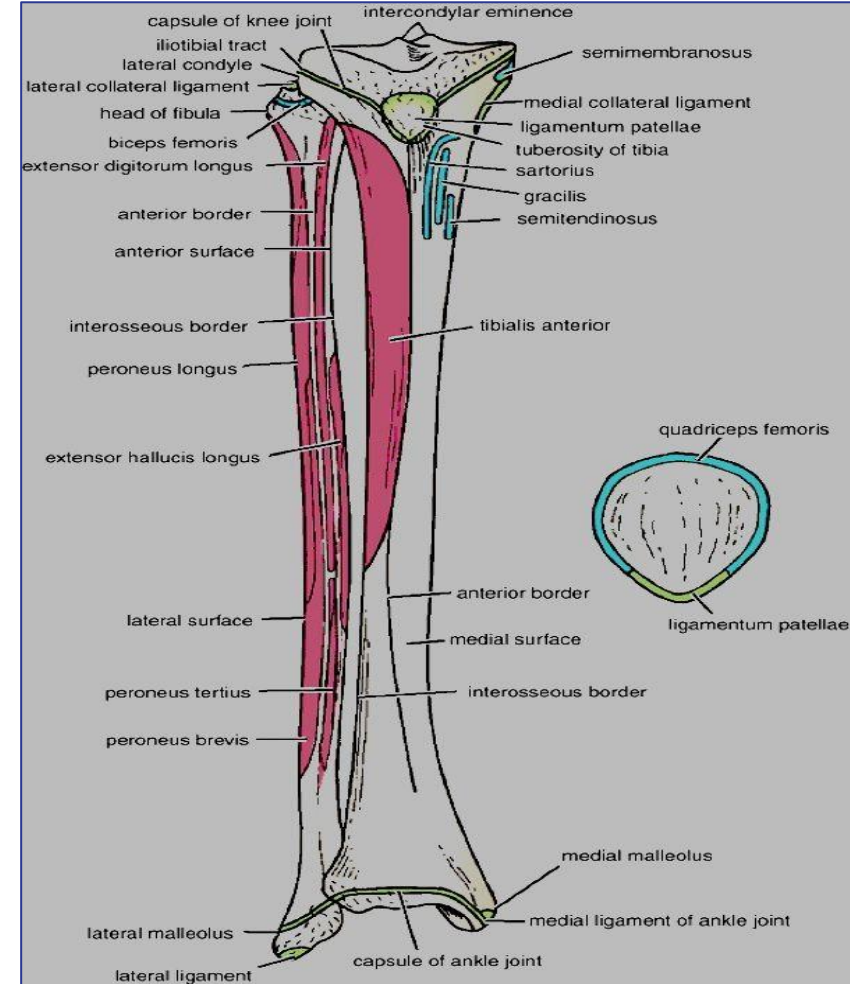
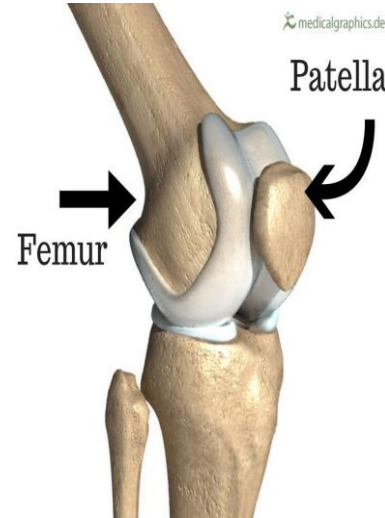
Consists of:

| Upper End  | Shaft (Body)   |           | Lower end   |
|--|--|-----------|---|
| <ul style="list-style-type: none"> <li>● <b>Head</b> :It articulates with acetabulum of hip bone to form hip joint.</li> <li>● <b>Neck</b> : It connects head to the shaft.</li> <li>● <b>Greater &amp; lesser trochanters</b></li> <li>● Anteriorly, connecting the 2 trochanters, the <b>inter-trochanteric line</b>, where the iliofemoral ligament(ligament of the hip joint which extends from the ilium to the femur in front of the joint). is attached.</li> <li>● Posteriorly, the <b>inter-trochanteric crest</b>, on which is the quadratus femoris muscle).</li> </ul> | 3 surfaces   | 3 borders | <ul style="list-style-type: none"> <li>● Has <b>lateral</b> and <b>medial</b> condyles, separated anteriorly by articular <b>patellar surface</b>, and posteriorly by <b>intercondylar notch or fossa</b>.</li> <li>● The 2 condyles take part in the knee joint.</li> <li>● Above the condyles are the <b>medial &amp; lateral</b> epicondyles.</li> </ul> |
| <p>Anteriorly</p>  <p>Posteriorly</p>    |  |           |    |



# Patella:

- It's the **largest sesamoid bone**. It lies inside the Quadriceps tendon in front of the knee joint
- It's **anterior surface** is rough and **subcutaneous**
- It's **posterior surface** articulates with the **condyles of the femur** to form the knee joint
- It's **apex** lies inferiorly and is connected to the tuberosity of the tibia by **ligamentum patellae**
- It's **upper, lateral, and medial margins** gives **attachments to quadriceps femoris** muscle
- **Base of patella\*** (Extra note)

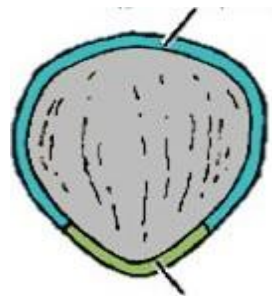


Anterior



posterior

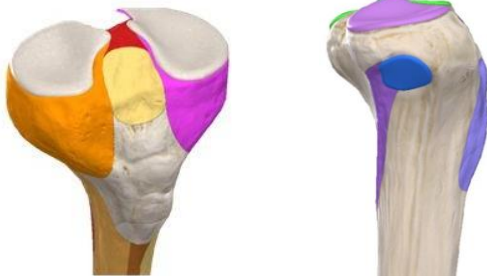



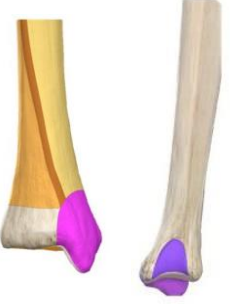
quadriceps femoris

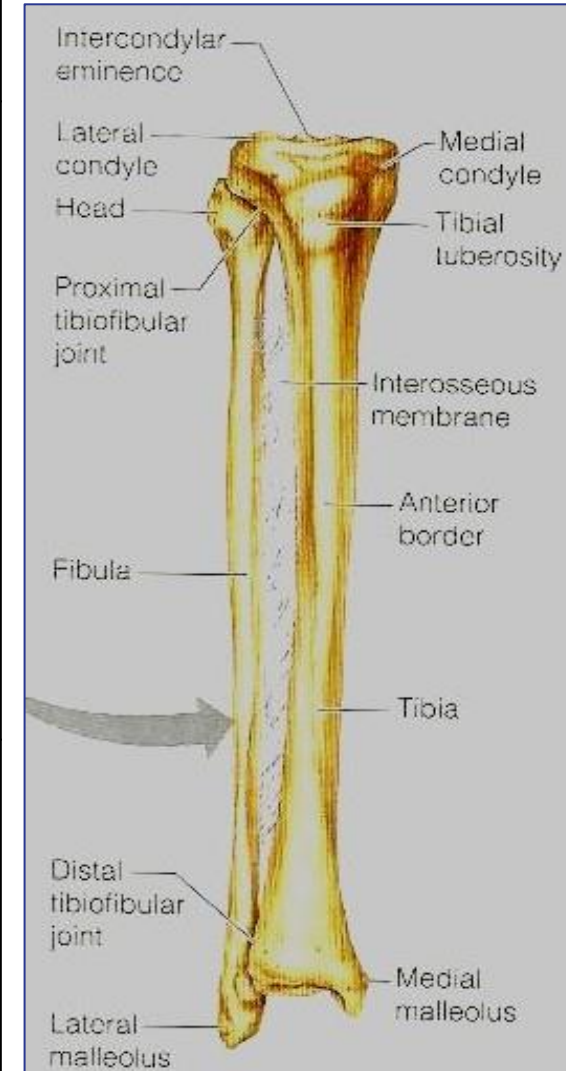


ligamentum patellae

# Bones of leg(Tibia and Fibula): Each of them has upper end, shaft, and lower end.

## 1- Tibia :It is the medial bone of leg.

| Upper End  | Shaft (Body)  |  |  | Lower end  |
|--|---|--|--|--|
| <p><b>Medial condyle</b> : is larger and articulate with medial condyle of femur. It has a groove on its posterior surface for semimembranosus muscles.</p> <p><b>Lateral condyle</b> : is smaller and articulates with lateral condyle of femur.</p> <p>It has <b>facet on its lateral</b> side for articulation with head of fibula to form proximal tibio-fibular joint.</p> <p><b>Intercondylar area</b> : is rough and has <b>intercondylar eminence</b>.</p> | <p><b>Tibial tuberosity</b> :</p>   | <p>It has 3 surfaces</p>   | <p>It has 3 borders</p>  | <p>Articulates with talus for formation of ankle joint.</p> <p><b>Medial malleolus</b>: Its <b>medial surface</b> is subcutaneous. Its <b>lateral surface</b> articulate with talus.</p> <p><b>Fibular notch</b>: lies on its lateral surface of lower end to form distal tibiofibular joint</p> |
|   |  |  <p>Posterior</p> |  <p>Anterior      Medial      Lateral</p> |   |



## 2- Fibula: It is the lateral bone of leg.

- It is the slender lateral bone of the leg
- It takes no part in articulation of knee joint

### Upper End

### Shaft

### Lower end

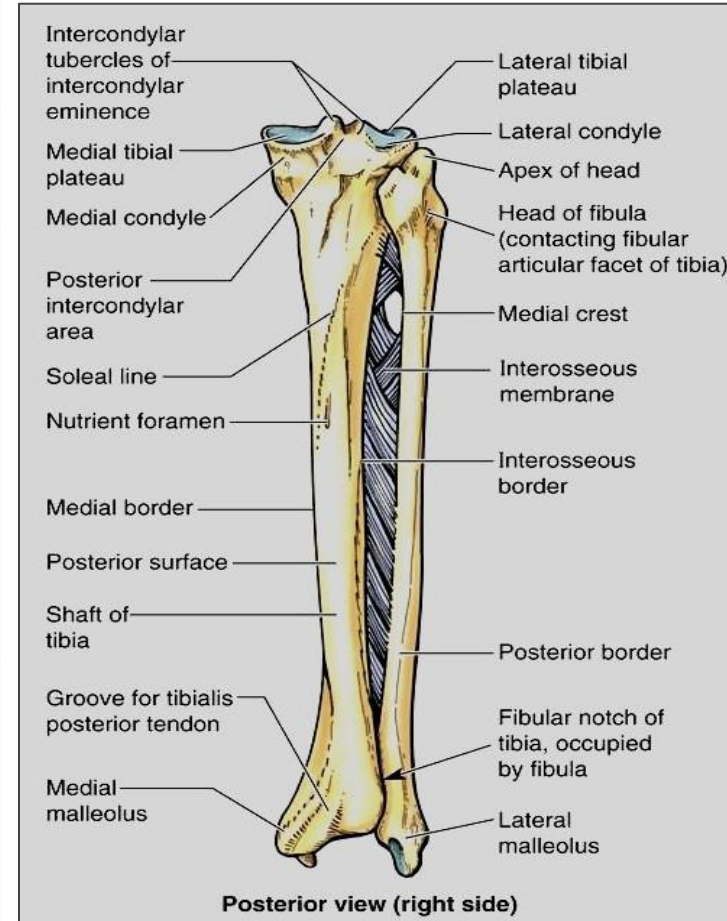
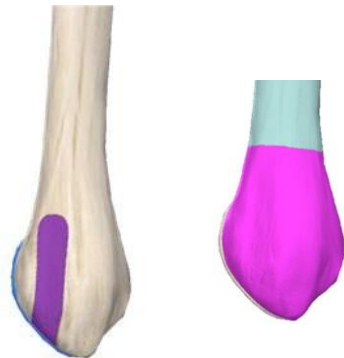
- **Head:** articulates with lateral condyle of tibia
- **Neck**
- **Styloid process**

- **4 borders:** it's medial **interosseous border** gives attachment to interosseous membrane
- **4 surfaces:**

**Lateral malleolus:**  
It's subcutaneous, it's medial surface is smooth for articulation with talus to form ankle joints

**Malleolus Groove\***

Extra note



## Fibula

### Upper end:

- fibular head
- neck of fibula

### Shaft:

- interosseous border

### Lower end:

- lateral malleolus



# Bones of the Ankle and Foot:

- **7** Tarsal Bones:

1. **Calcaneum**
2. **Talus**
3. **Navicular**
4. **Cuboid**
5. **Medial cuneiform**
6. **Intermediate cuneiform**
7. **Lateral cuneiform**



- Only **Talus** articulates with the tibia & fibula at ankle joint
- **Calcaneum** is the largest bone of the foot, it forms the heel

- **5** Metatarsal Bones

They are numbered from medial (big toe) to lateral.  
 1st metatarsal bone is large and lies medially.  
 Each metatarsal bone has a base (proximal), a shaft, and a head (distal).

- **14** Phalanges:

2 phalanges for the big toe (proximal & distal)  
 3 phalanges for each of the lateral 4 toes (proximal, middle, and distal).

