

# THE SKELETAL SYSTEM: APPENDICULAR SKELETON

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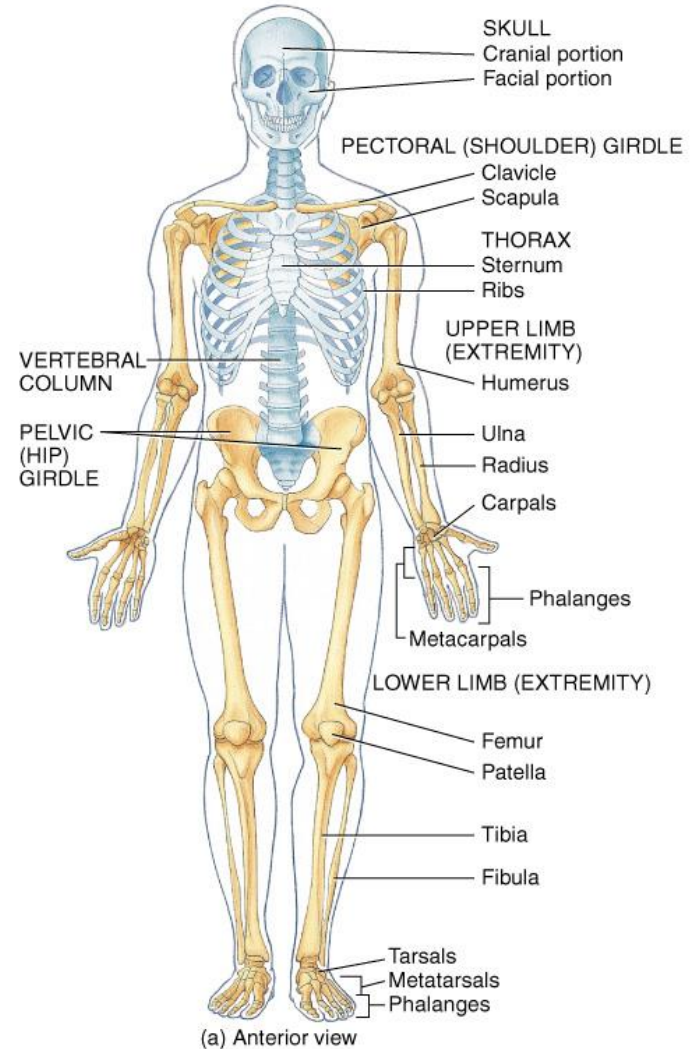
# The Skeletal System:

## □ Axial Skeleton

- 80 bones
- lie along longitudinal axis
- skull, hyoid, vertebrae, ribs, sternum, ear ossicles

## □ Appendicular Skeleton

- 126 bones
- upper & lower limbs and pelvic & pectoral girdles



# Bone Surface Markings

- Foramen = opening
- Fossa = shallow depression
- Sulcus = groove
- Meatus = tubelike passageway or canal
- Condyle = large, round protuberance
- Facet = smooth flat articular surface
- Trochanter = very large projection
- Tuberosity = large, rounded, roughened projection
- Learning the terms found in this Table will simplify your study of the skeleton.

TABLE 6.1

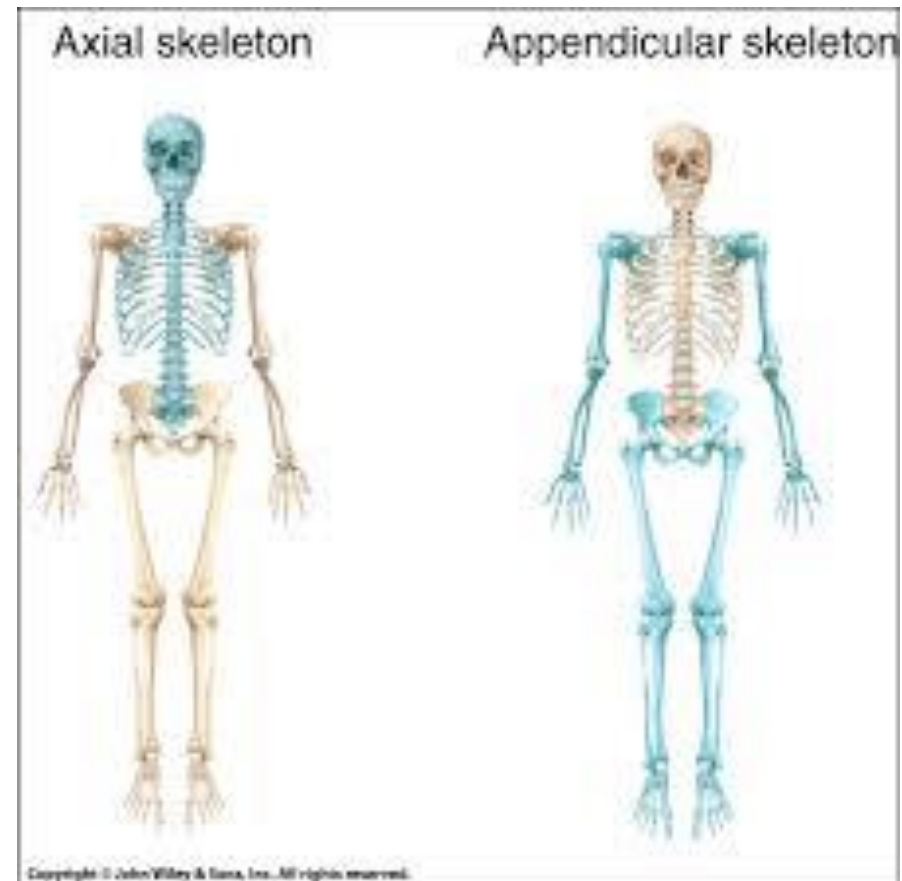
## Bone Surface Markings

| MARKING   | DESCRIPTION  | EXAMPLE   |
|---|--|---|
| <b>DEPRESSIONS AND OPENINGS:</b> Sites allowing the passage of soft tissue (nerves, blood vessels, ligaments, tendons) or formation of joints   |  |   |
| <b>Fissure</b> (FISH-ur)  | Narrow slit between adjacent parts of bones through which blood vessels or nerves pass     | Superior orbital fissure of the sphenoid bone (Figure 7.6f and 7.10b)   |
| <b>Foramen</b> (fō-RĀ-men-hole; plural is <i>foramina</i> )   | Opening through which blood vessels, nerves, or ligaments pass                             | Optic foramen of the sphenoid bone (Figure 7.6f and 7.10b)              |
| <b>Fossa</b> (FOS-a-trench; plural is <i>fossae</i> , FOS-ē)  | Shallow depression ( <i>fossa</i> =trench)   | Coronoid fossa of the humerus (Figure 8.4a)                             |
| <b>Sulcus</b> (SUL-kus-groove; plural is <i>sulci</i> , SUL-sī)   | Furrow along a bone surface that accommodates a blood vessel, nerve, or tendon             | Intertubercular sulcus of the humerus (Figure 8.4a)                     |
| <b>Meatus</b> (mē-Ā-tus-passageway; plural is <i>meati</i> , me-Ā-tī)   | Tubelike opening   | External and internal auditory meati of the temporal bone (Figure 7.2a) |
| <b>PROCESSES:</b> Projections or outgrowths on bone that form joints or attachment points for connective tissue, such as ligaments and tendons. |  |   |
| <i>Processes that form joints:</i>  |  |   |
| <b>Condyle</b> (KON-dīl; <i>condylus</i> =knuckle)  | Large, round protuberance with a smooth articular surface at the end of a bone             | Lateral condyle of the femur (Figure 8.10a)                             |
| <b>Facet</b> (FAS-et or fa-SET)   | Smooth, flat, slightly concave or convex articular surface                                 | Superior articular facet of a vertebra (Figure 7.16a)                   |
| <b>Head</b>   | Usually rounded articular projection supported on the neck (constricted portion) of a bone | Head of the femur (Figure 8.10a)  |
| <i>Processes that form attachment points for connective tissue:</i>   |  |   |
| <b>Crest</b>  | Prominent ridge or elongated projection  | Iliac crest of the hip bone (Figure 8.8a)                               |
| <b>Epicondyle</b> ( <i>epi</i> --above)   | Typically roughened projection above a condyle   | Medial epicondyle of the femur (Figure 8.10a)                           |
| <b>Line</b>   | Long, narrow ridge or border (less prominent than a crest)                                 | Linea aspera of the femur (Figure 8.10b)                                |
| <b>Spinous process</b>  | Sharp, slender projection  | Spinous process of a vertebra (Figure 7.16a)                            |
| <b>Trochanter</b> (trō-KAN-ter)   | Very large projection  | Greater trochanter of the femur (Figure 8.10a)                          |
| <b>Tubercle</b><br>(TOO-ber-kul; <i>tuber</i> =knob)  | Variable sized rounded projection  | Greater tubercle of the humerus (Figure 8.4a)                           |
| <b>Tuberosity</b>   | Variable sized projection that has a rough, bumpy surface                                  | Ischial tuberosity of the hip bone (Figure 8.8b)                        |

# INTRODUCTION

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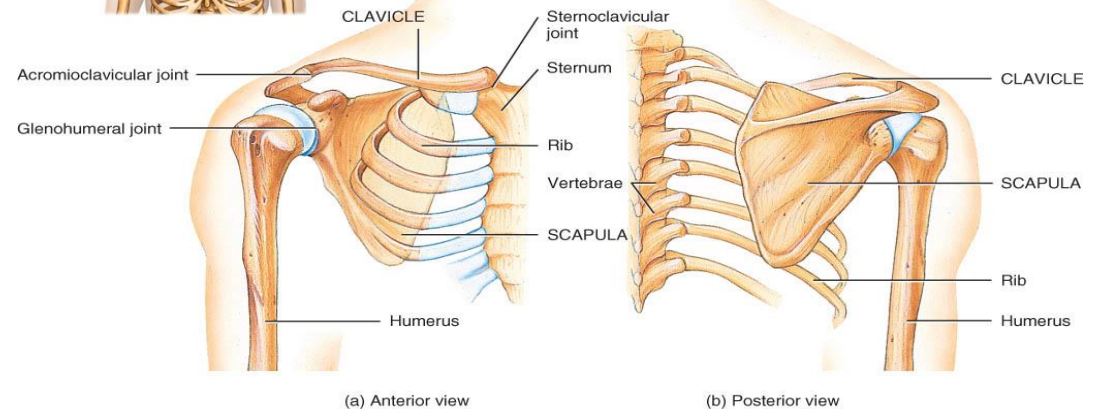
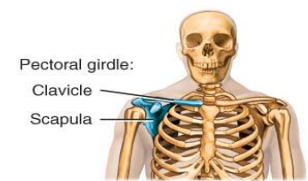
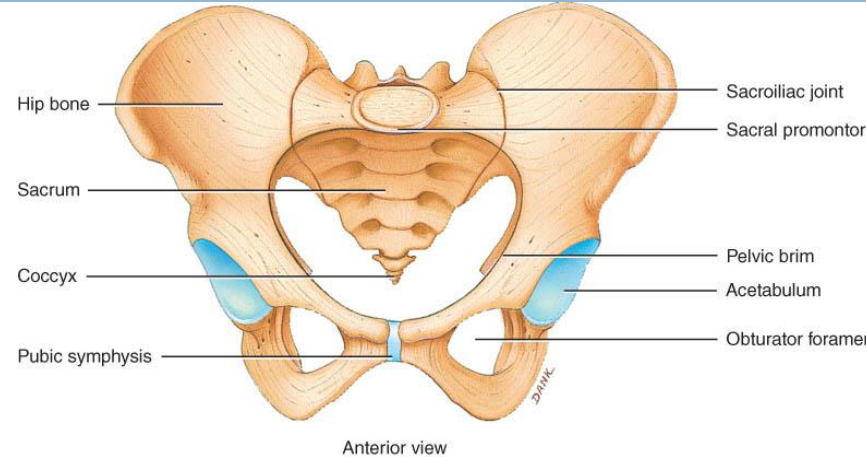
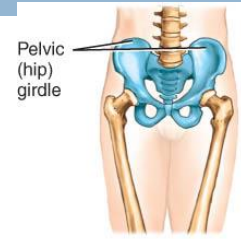
- The *appendicular skeleton* includes the bones of the upper and lower extremities and the shoulder and hip girdles.
- The appendicular skeleton functions primarily to facilitate movement.



# Appendicular Skeleton



- Pectoral girdle
- Pelvic girdle
- Upper limbs
- Lower limbs

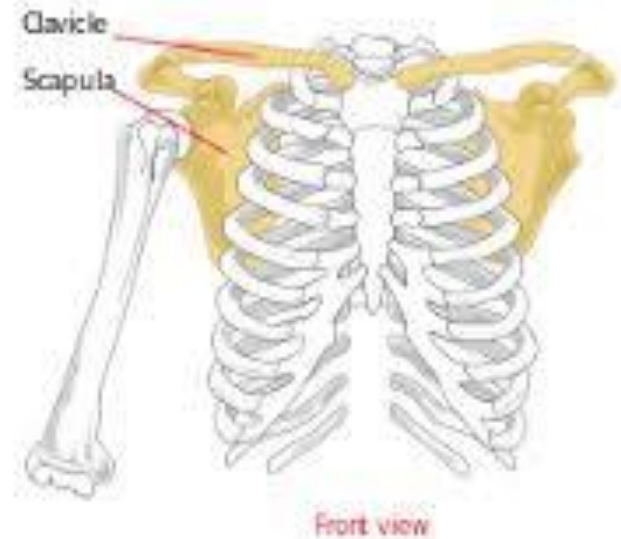


# Pectoral (Shoulder) Girdle

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The *pectoral* or *shoulder girdle* attaches the bones of the upper limbs to the axial skeleton.

- Consists of scapula and clavicle
- Clavicle articulates with sternum
- Clavicle articulates with scapula
- Scapula held in place by muscle only
- Upper limb attached to pectoral girdle at shoulder joint.

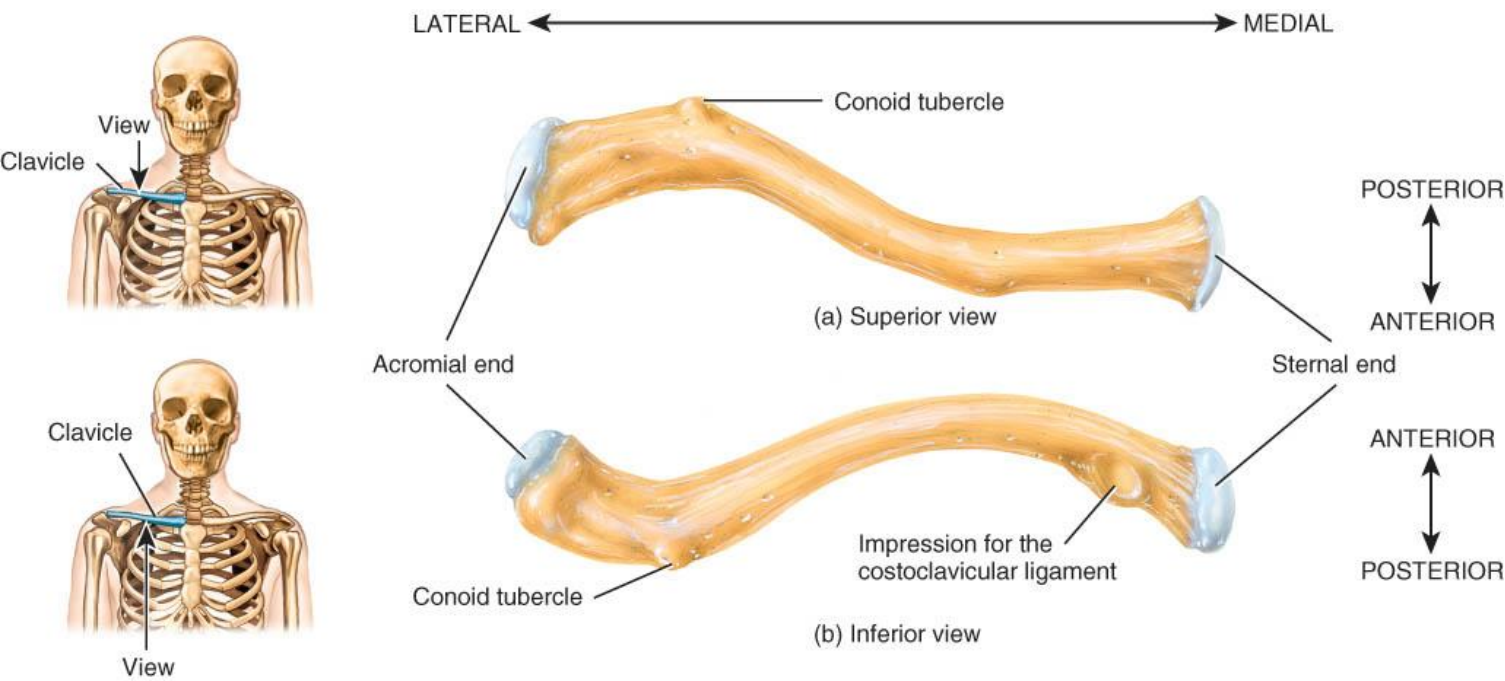




# Clavicle

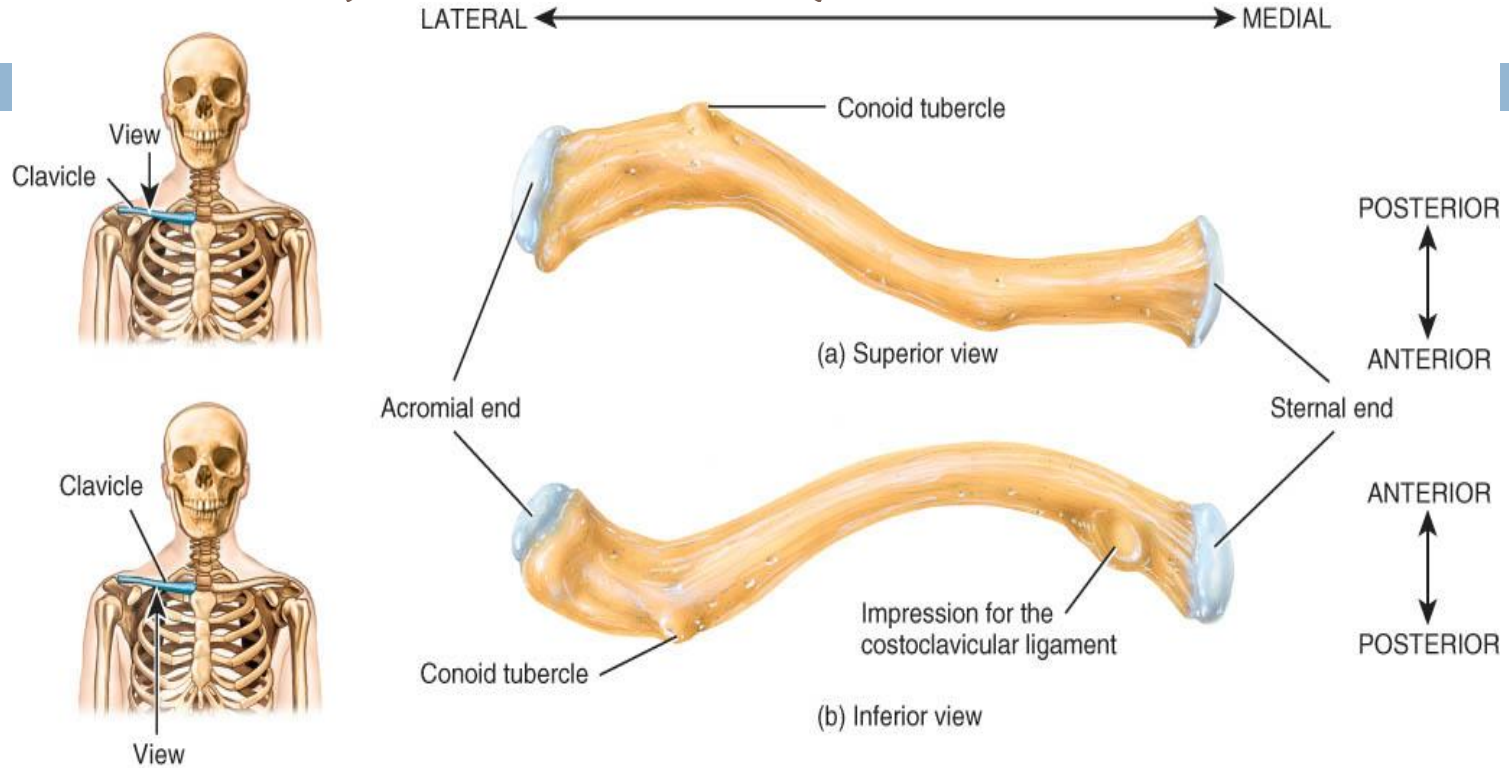
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- The *clavicle* or *collar bone* lies horizontally in the superior and anterior part of thorax superior to the first rib and articulates with the sternum and the scapula.
- The clavicle, one of the most frequently broken bones in the body, transmits mechanical force from the upper limb to the trunk.





# Clavicle (collarbone)

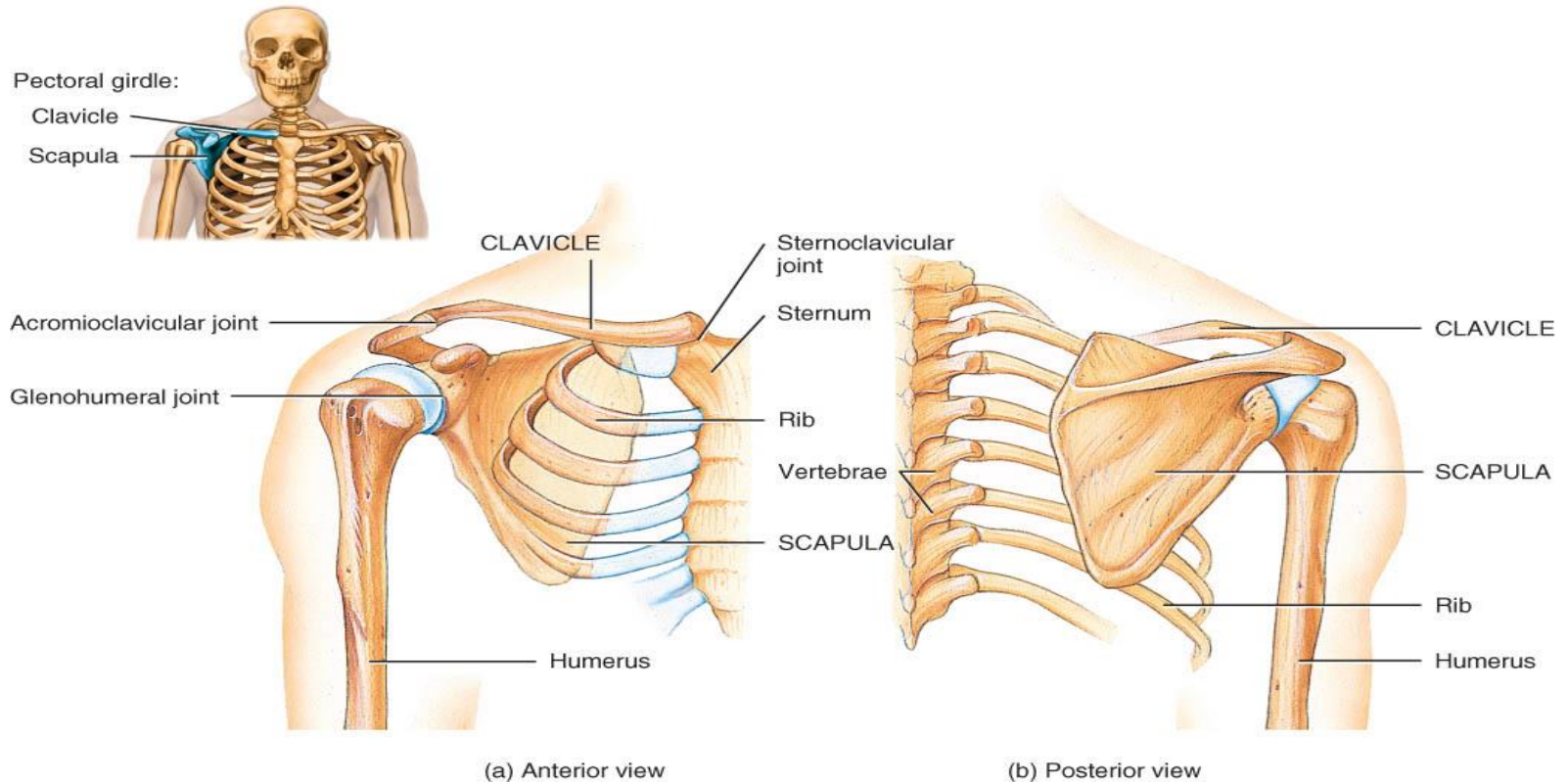


- S-shaped bone.
- Extends from sternum to scapula above 1st rib

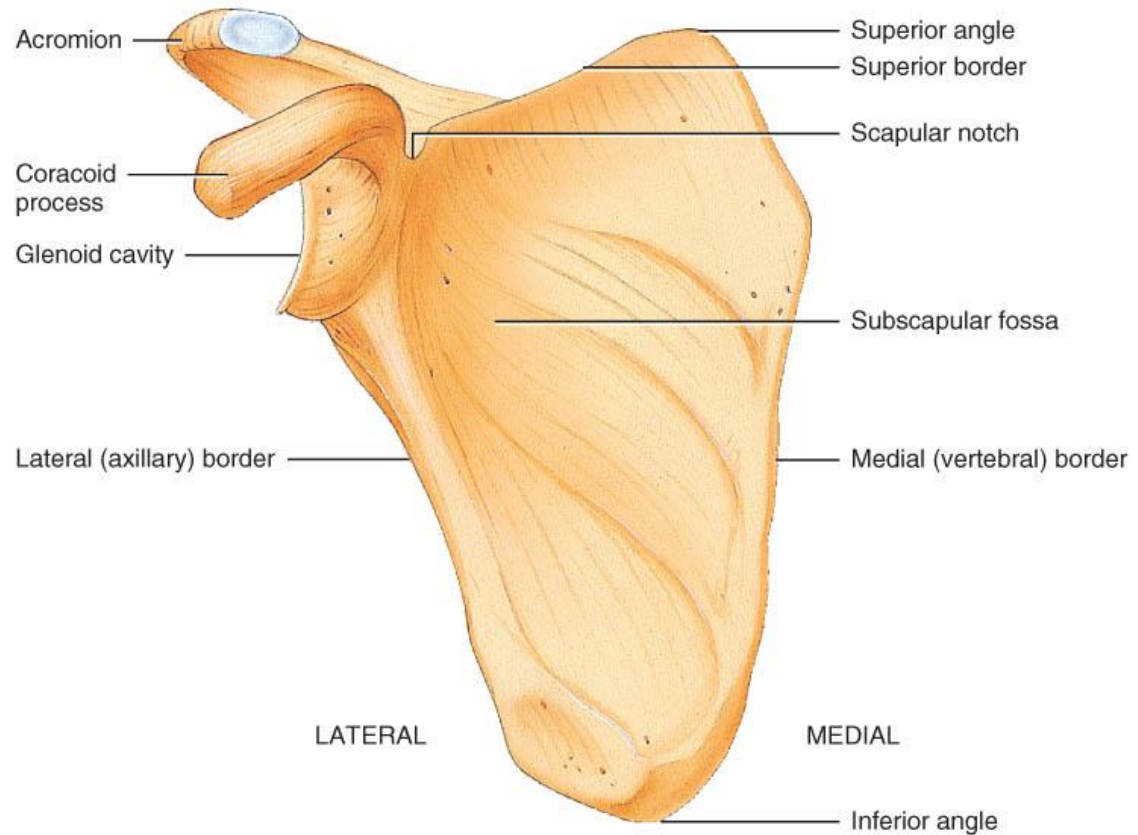
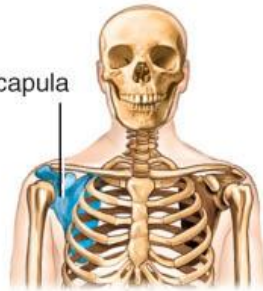
# Scapula

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- The *scapula* or *shoulder blade* articulates with the *clavicle* and the *humerus* .



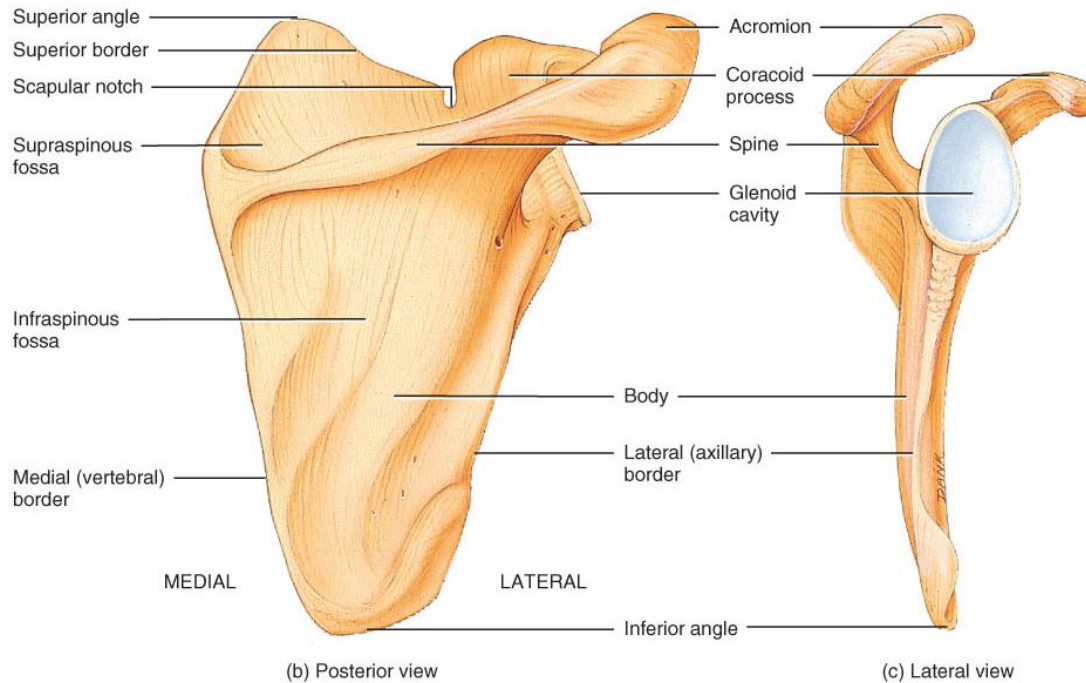
# Anterior Surface of Scapula



(a) Anterior view

- ❑ Subscapular fossa filled with muscle
- ❑ Coracoid process for muscle attachment

# Posterior Surface of Scapula

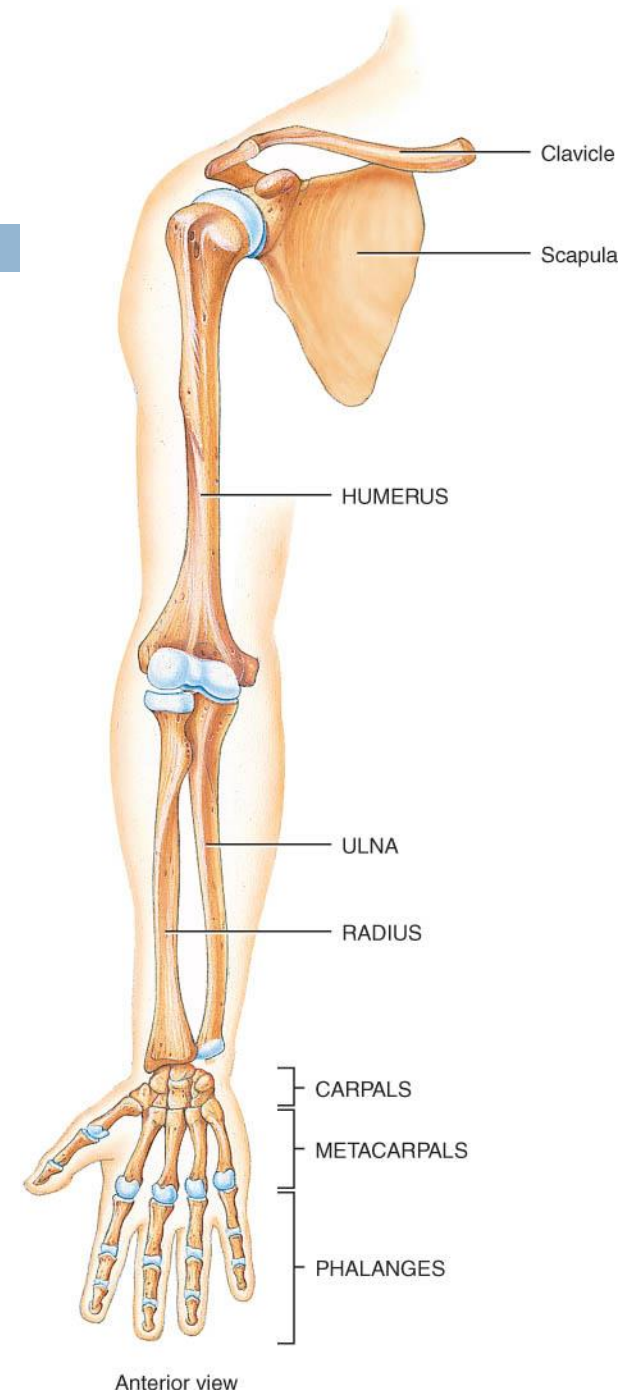


- ❑ Scapular spine ends as acromion process
- ❑ Glenoid cavity forms shoulder joint with head of humerus
- ❑ Supraspinous & infraspinous fossa for muscular attachments

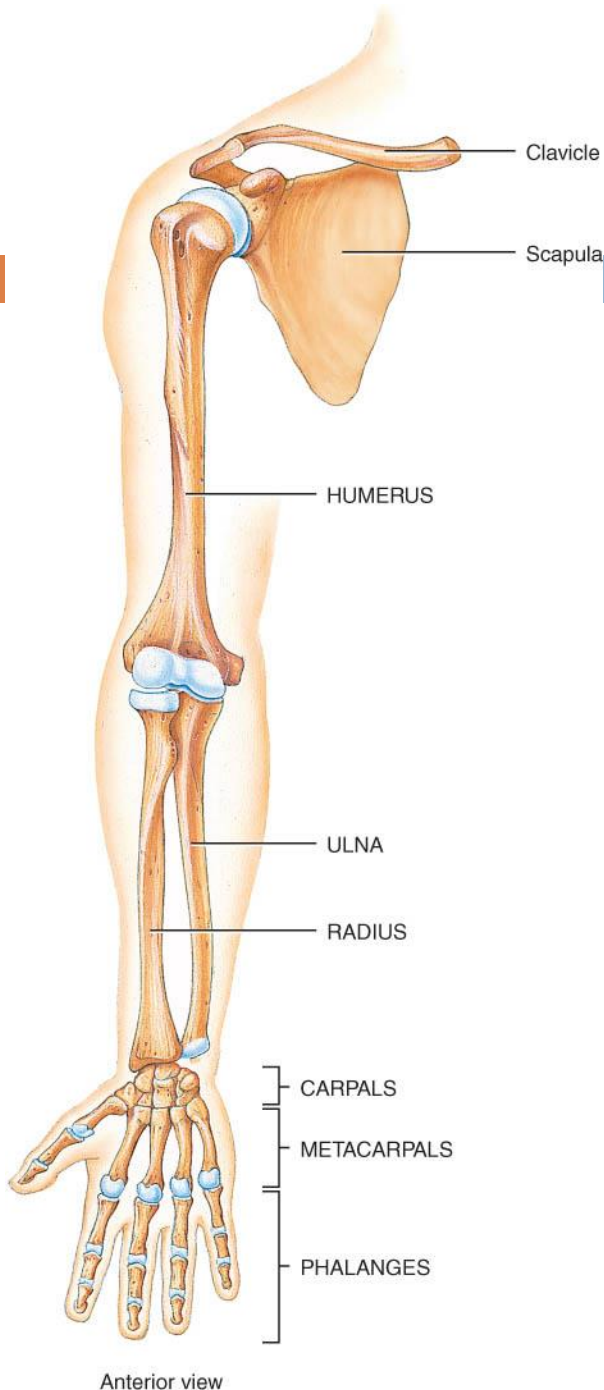
# UPPER LIMB (EXTREMITY)

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- Each upper limb consists of 30 bones including the humerus, ulna, radius, carpals, metacarpals, and phalanges.



# Upper Extremity



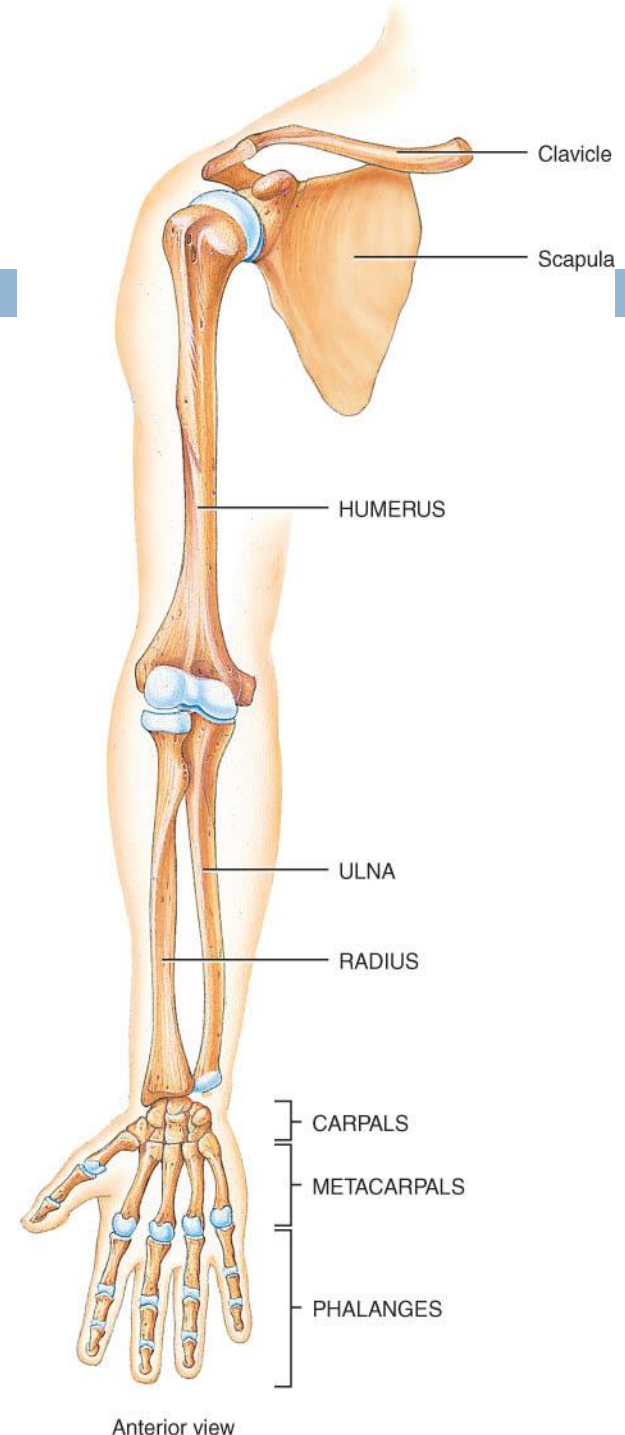
- Each upper limb = 30 bones
  - humerus within the arm
  - ulna & radius within the forearm
  - carpal bones within the wrist
  - metacarpal bones within the palm
  - phalanges in the fingers



# Humerus

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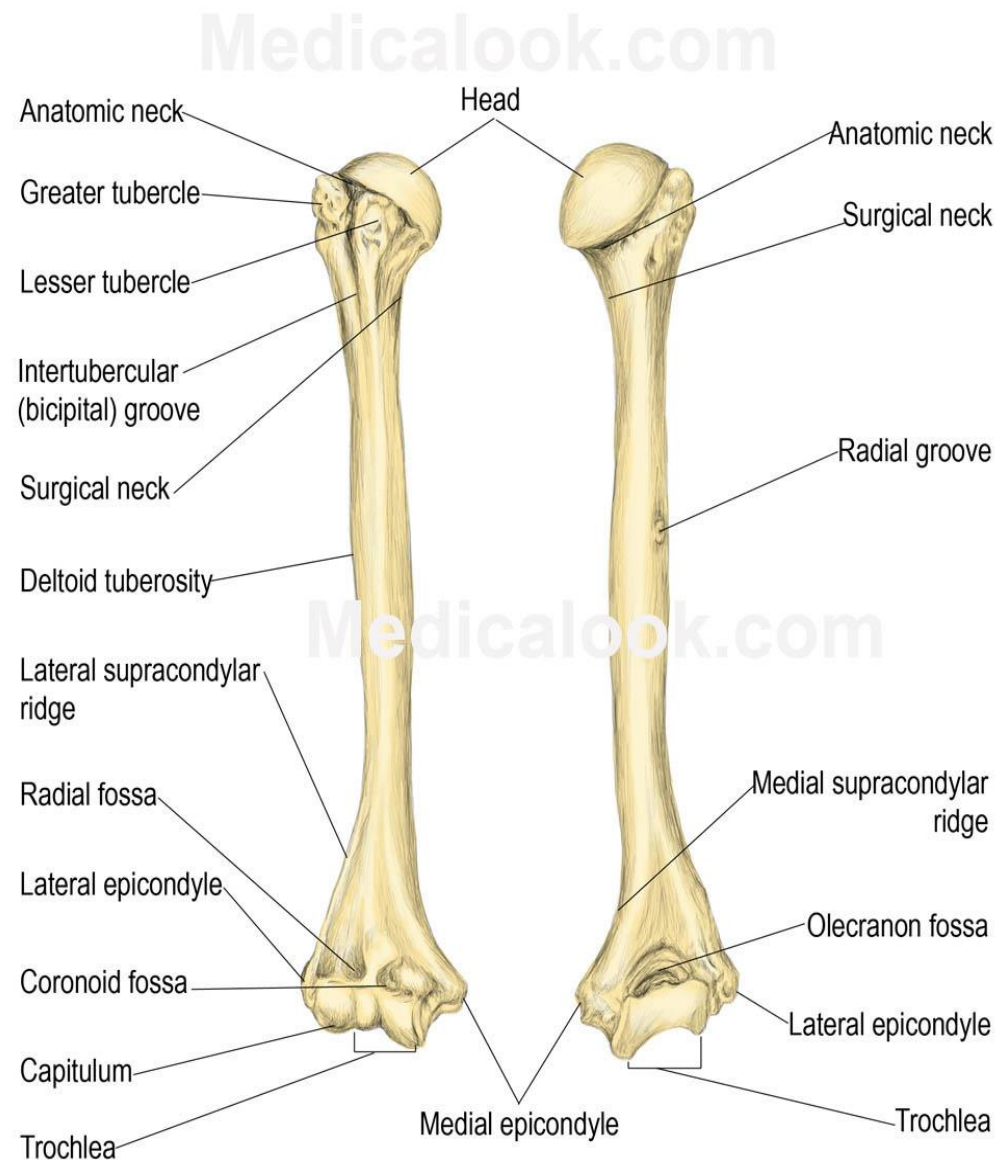
- The *humerus* is the longest and largest bone of the upper limb.
- It articulates proximally with the scapula and distally at the elbow with both the radius and ulna.





# Humerus --- Proximal End

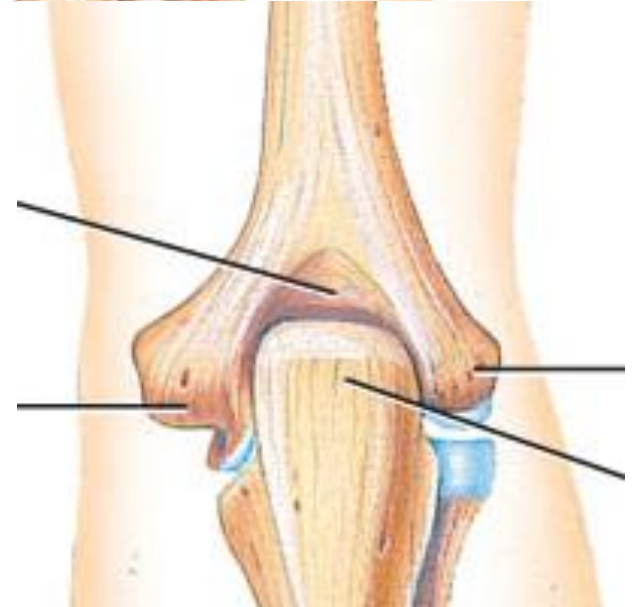
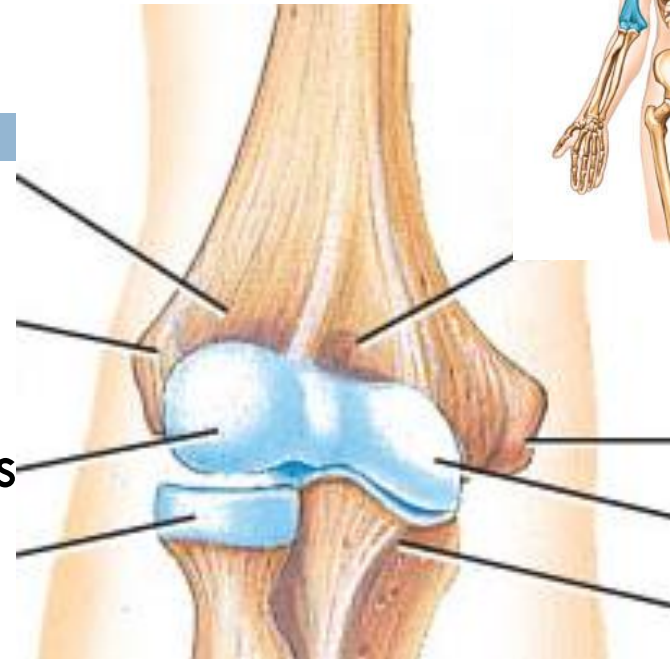
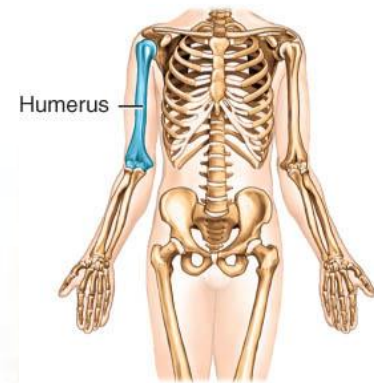
- Part of shoulder joint
- Head & anatomical neck
- Greater & lesser tubercles for muscle attachments
- Surgical neck is fracture site
- Deltoid tuberosity
- Shaft



# Humerus --- Distal End

anterior and posterior

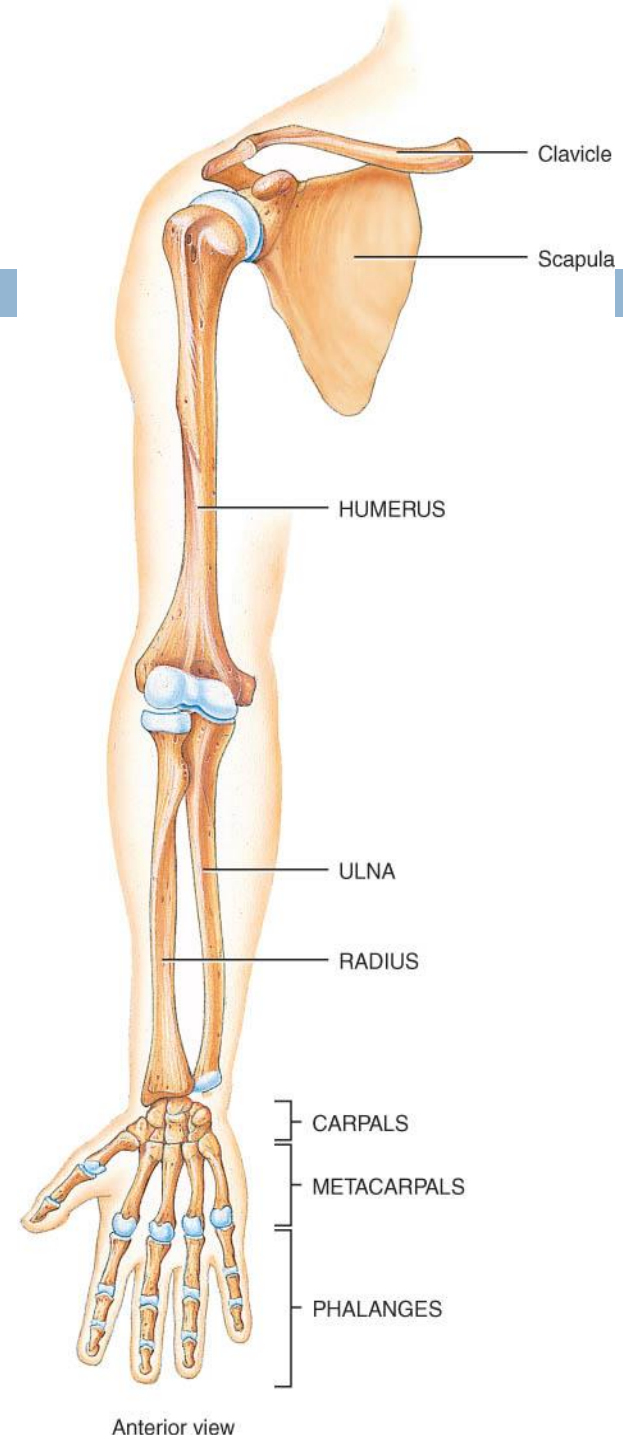
- Forms elbow joint with ulna and radius
- Capitulum
  - ▣ articulates with head of radius
- Trochlea
  - ▣ articulation with ulna
- Olecranon fossa
  - ▣ posterior depression for olecranon process of ulna
- Medial & lateral epicondyles
  - ▣ attachment of forearm muscles



# Ulna and Radius

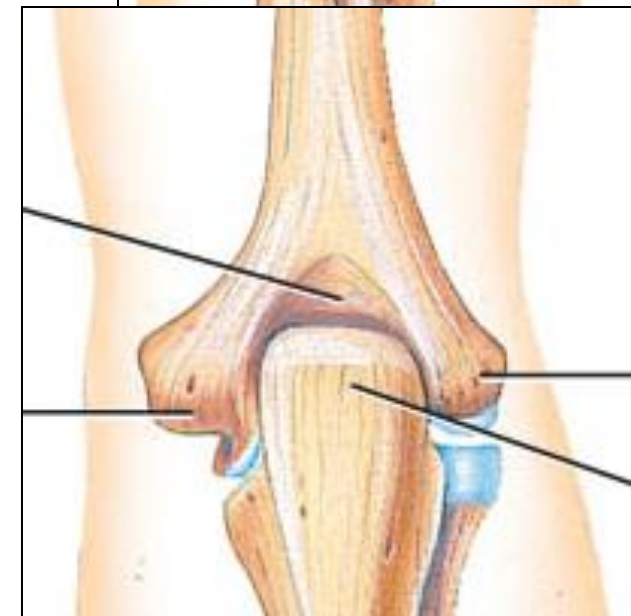
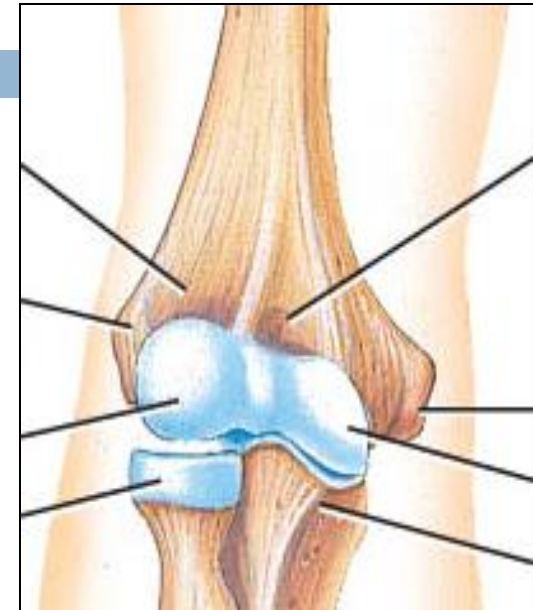
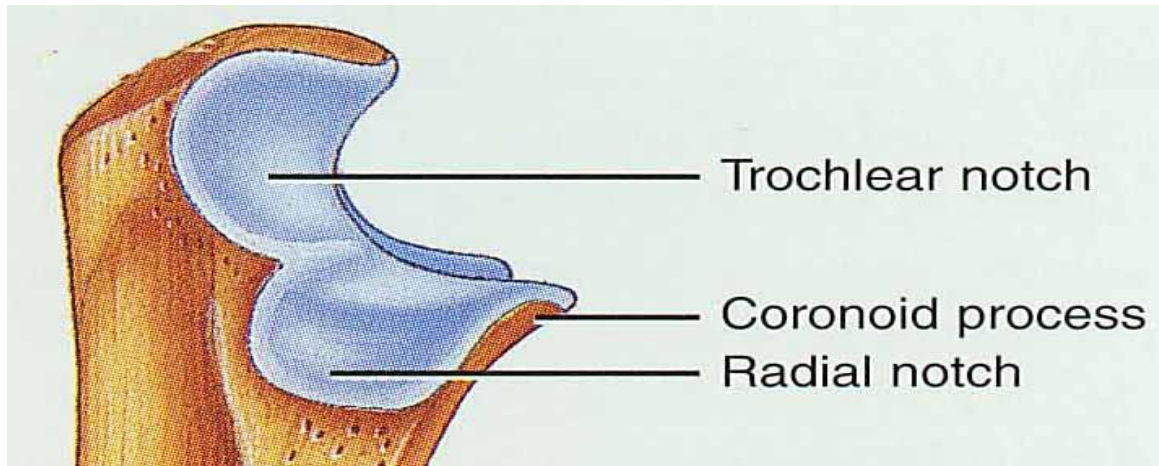
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- The *ulna* is located on the medial aspect of the *forearm*.
- The *radius* is located on the lateral aspect (thumb side) of the forearm
- The radius and ulna articulate with the humerus at the elbow joint, with each other, and with three carpal bones.



# Ulna --- Proximal End

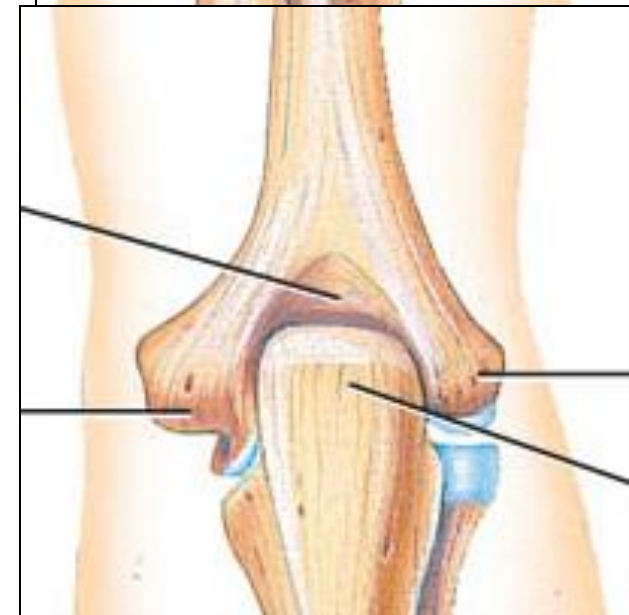
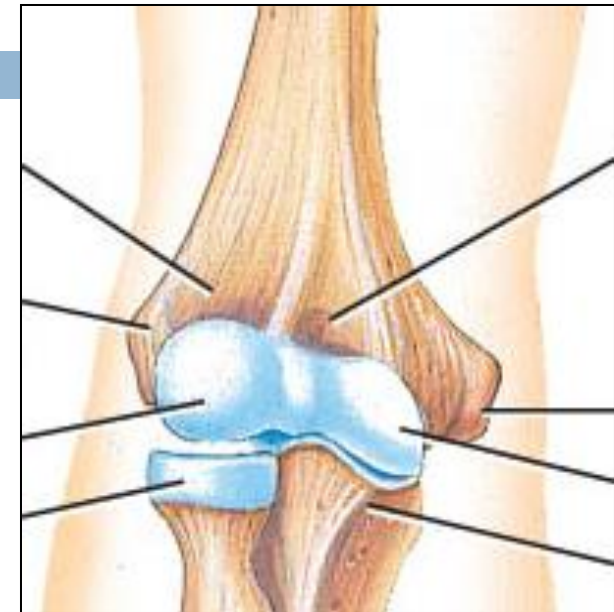
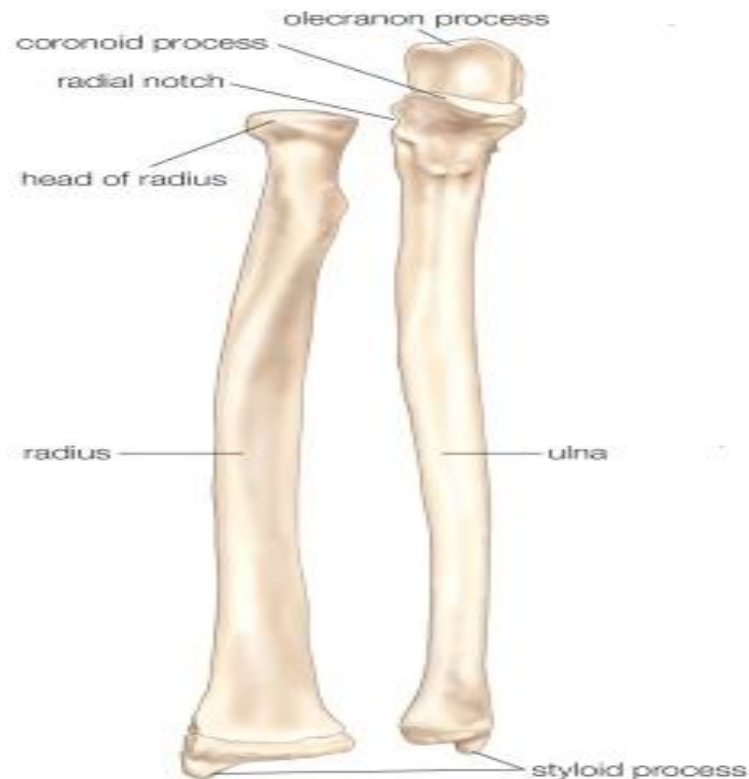
- Ulna (on little finger side)
  - ▣ trochlear notch articulates with humerus & radial notch with radius
  - ▣ olecranon process articulates with olecranon fossa of the humerus



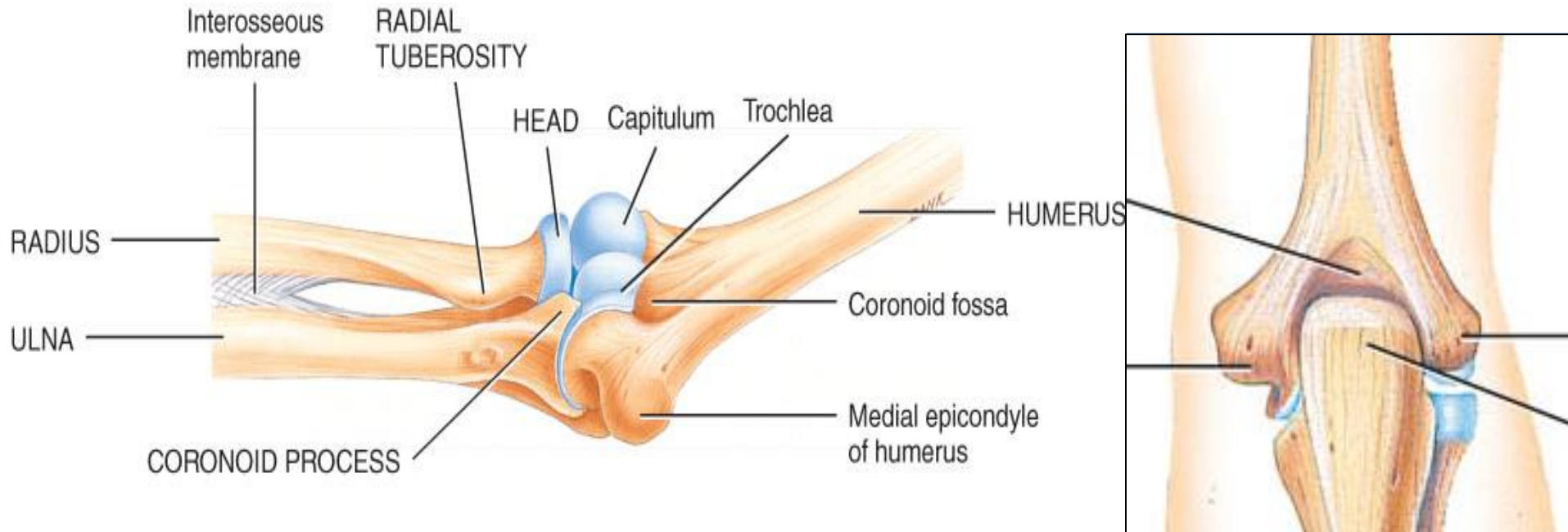


# Radius --- Proximal End

- Radius (on thumb side)
  - ▣ head articulates with capitulum of humerus & radial notch of ulna
  - ▣ tuberosity for muscle attachment



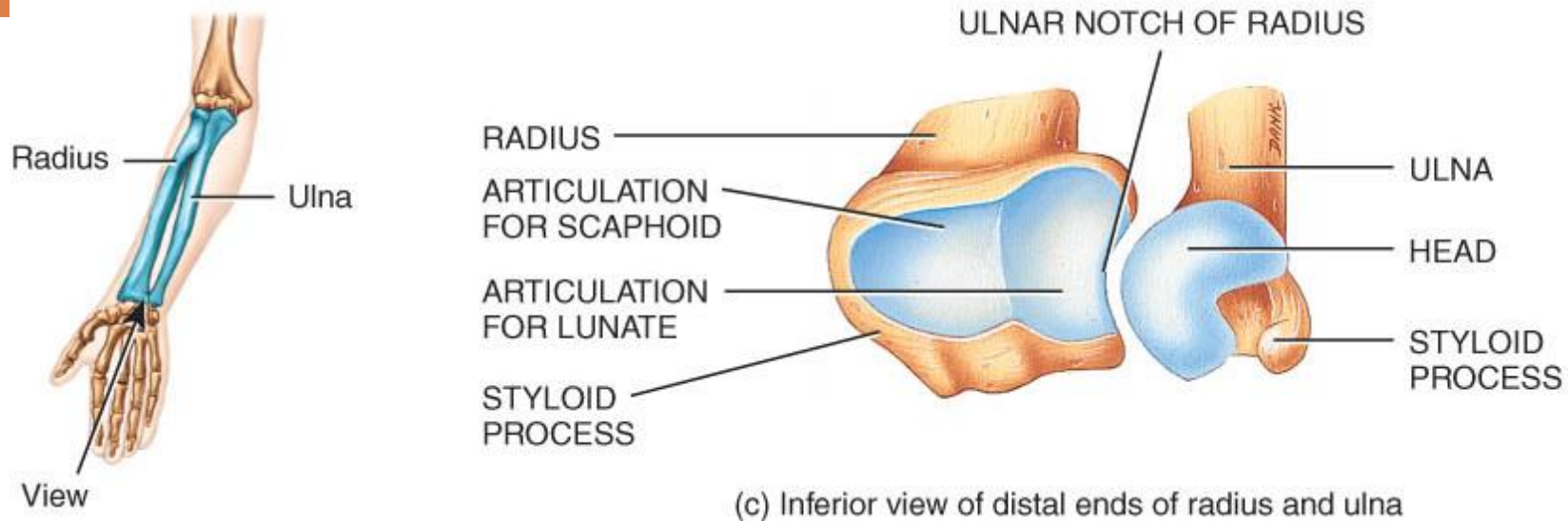
# Elbow Joint



## Articulation of humerus with ulna and radius

- Ulna articulates with trochlea of humerus
- Radius articulates with capitulum of humerus
- olecranon process of ulna articulates with olecranon fossa of the humerus

# Ulna and Radius - Distal End



(c) Inferior view of distal ends of radius and ulna

- Distally, the head of the ulna articulates with the *ulnar notch of the radius* .
- *the distal* end of the radius articulates with three bones of the wrist to form the *radiocarpal (wrist) joint*.



# Carpals, Metacarpal, and Phalanges

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- The eight *carpal* bones, bound together by ligaments, comprise the *wrist*.
- Five *metacarpal* bones are contained in the palm of each hand .
- Each hand contains 14 *phalanges*, three in each finger and two in each thumb

