

# Exercise 11

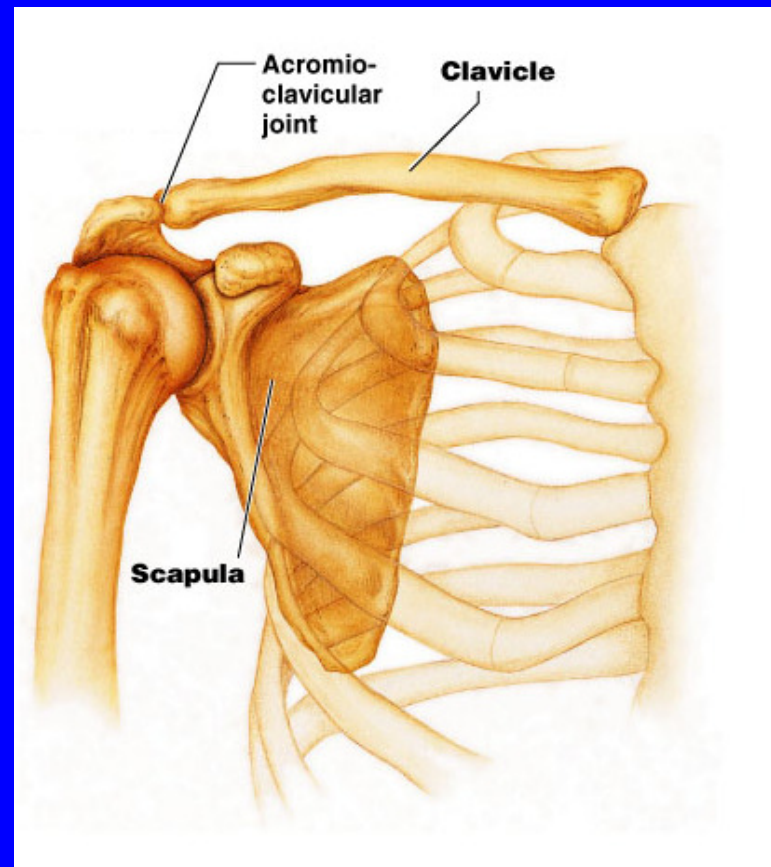
## The Appendicular Skeleton

# The Appendicular Skeleton

- The appendicular skeleton contains 126 bones.
- Consists of the upper and lower limbs, the pectoral girdles, and the pelvic girdles.
- The pectoral girdles attach the upper limbs to the axial skeleton.
- The pelvic girdles attach the lower limbs to the axial skeleton.

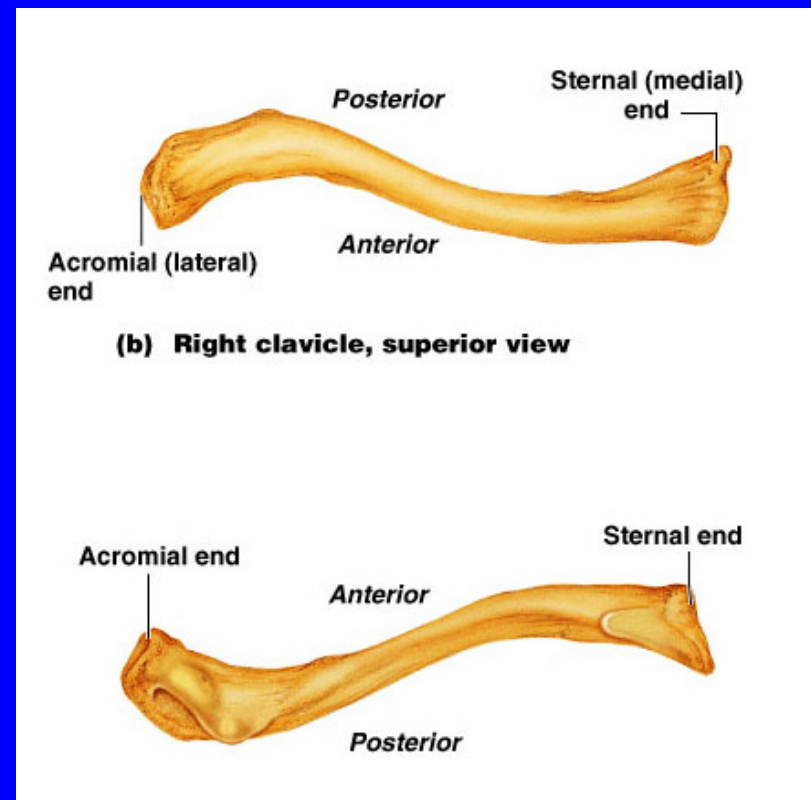
# The Pectoral Girdles

- The pectoral girdles each consist of a clavicle and a scapula.
- The clavicle and scapula together form the shoulder joint and stabilize the head of the humerus.
- The clavicle articulates with the sternum.



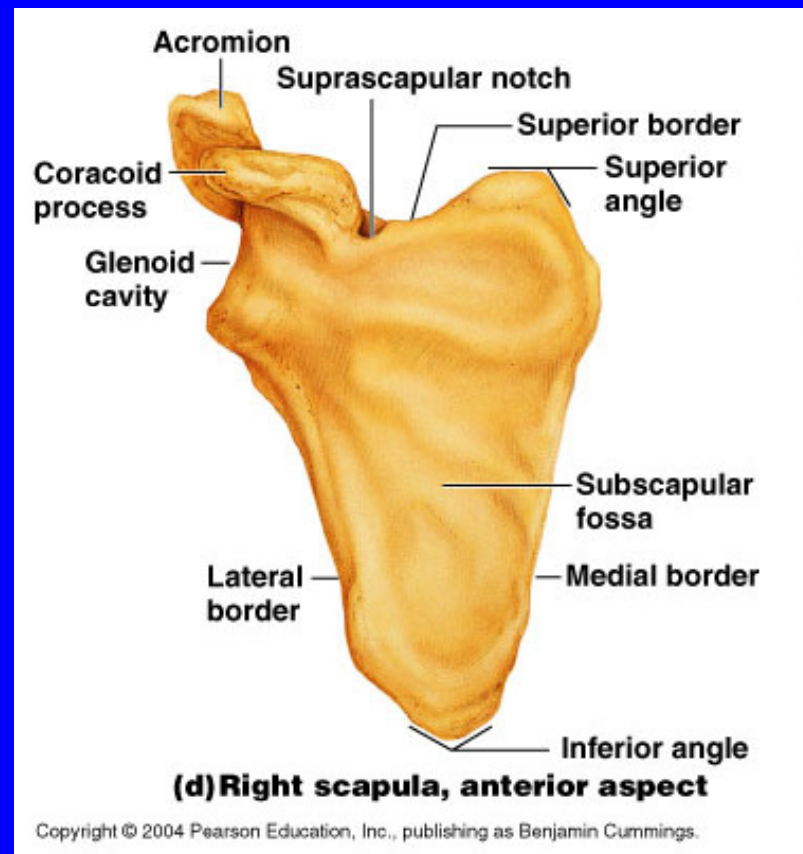
# The Clavicle

- The clavicle is an S-shaped bone that forms the anterior portion of the pectoral girdle.
- It has a sternal end, an acromial end, and a conoid tubercle.



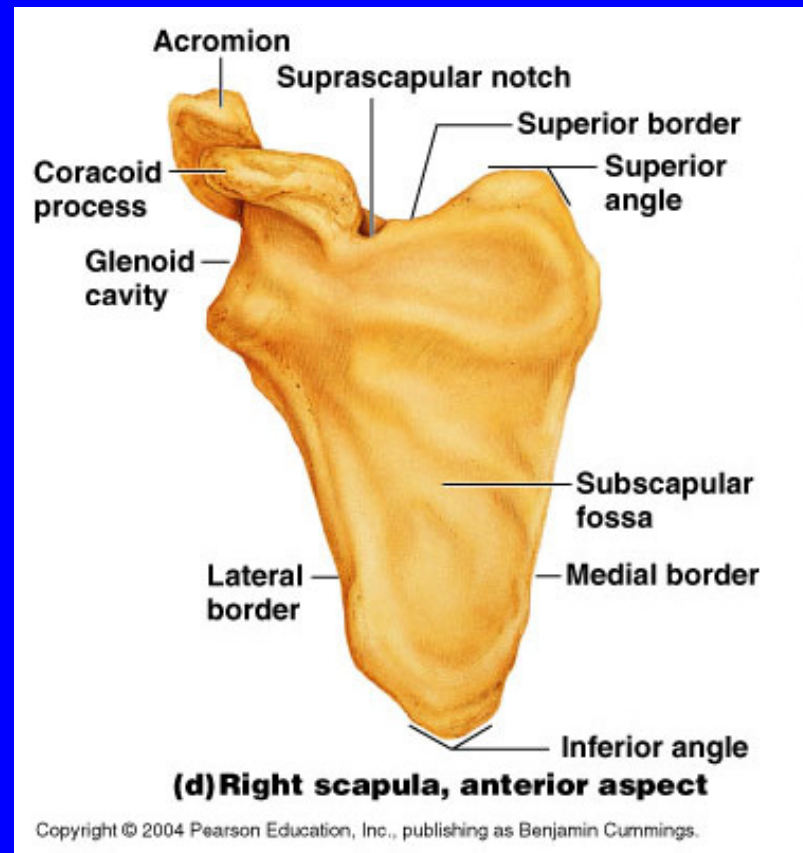
# The Scapula

- The scapula is a triangular bone that forms the posterior portion of the pectoral girdle.
- The scapula does not directly articulate with the axial skeleton



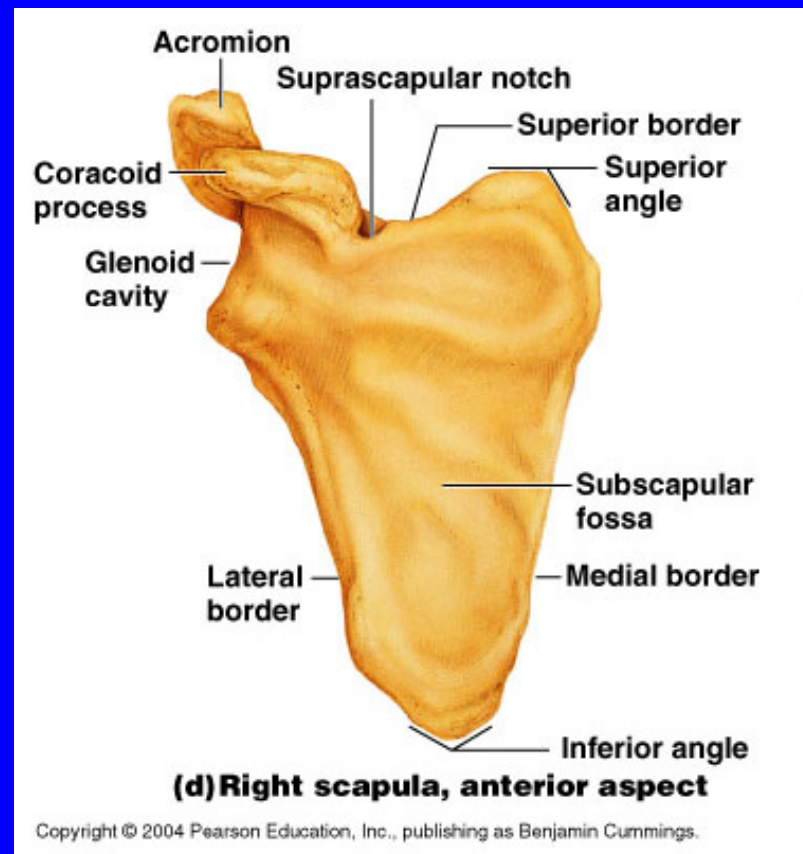
# The Scapula

- The acromion articulates with the clavicle, and the glenoid cavity articulates with the head of the humerus.
- The coracoid process is an attachment site for muscles of the upper arm.



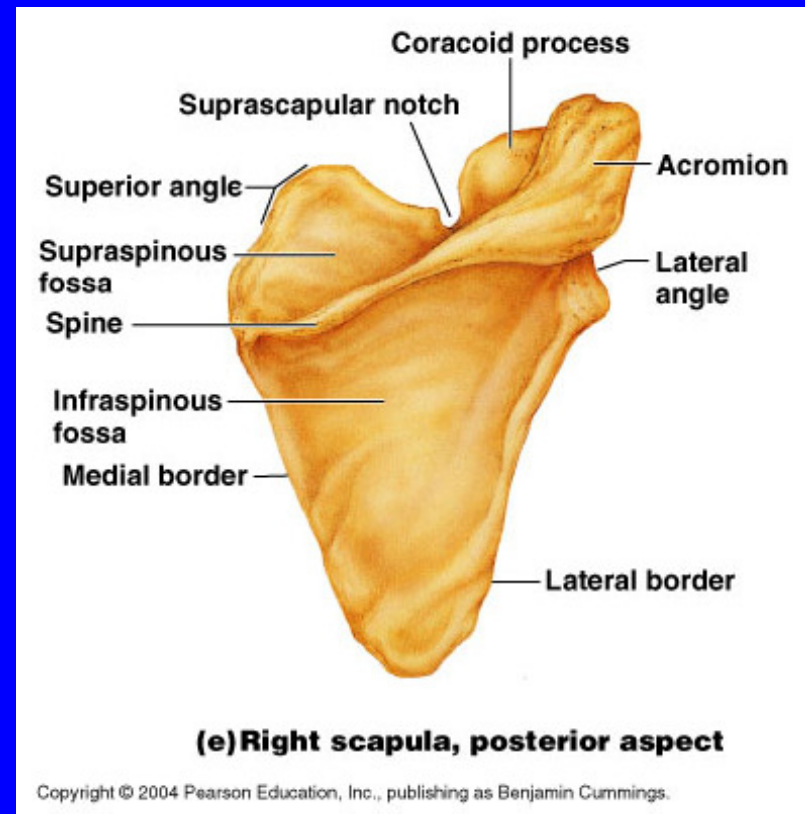
# The Scapula

- The suprascapular notch allows the passage of nerves.
- The subscapular fossa is a large surface area for the attachment of muscles.



# The Scapula

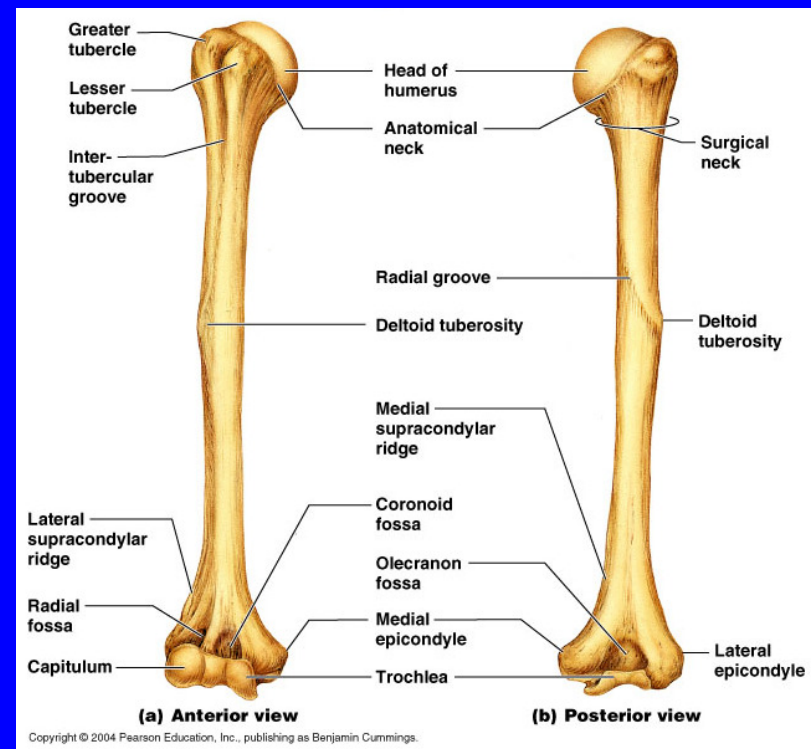
- The spine is an attachment site for numerous muscles and holds the acromion.
- The spine divides the posterior surface of the scapula into supra- and infra-spinous fossae.





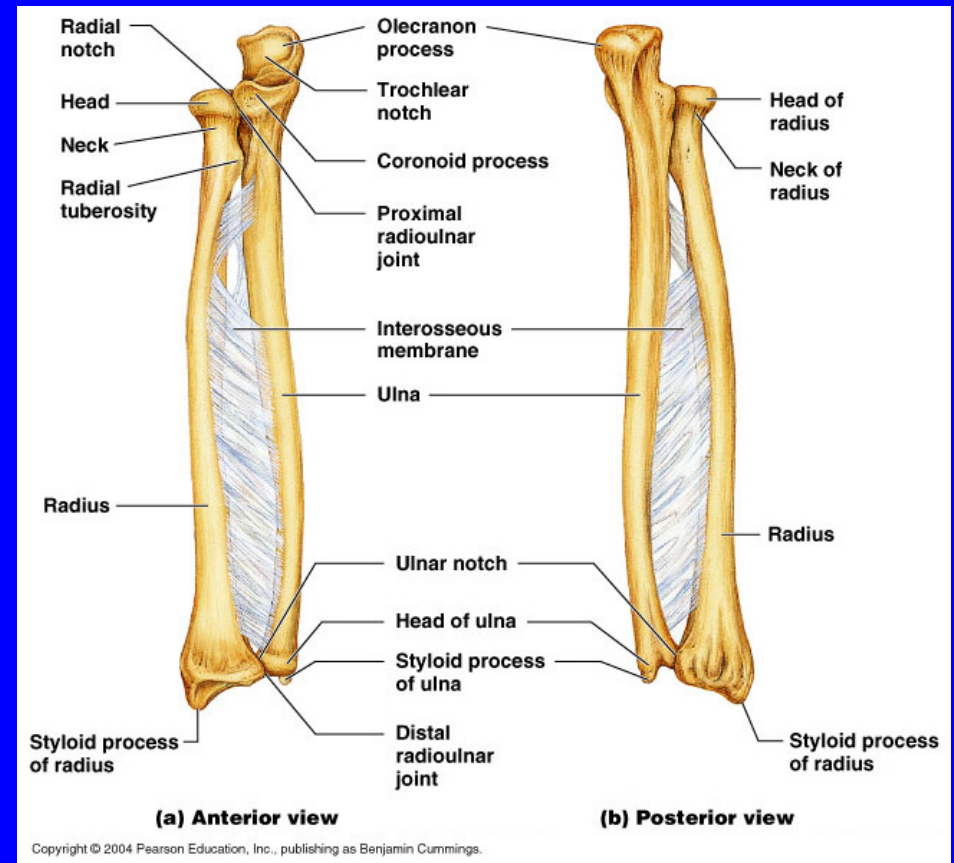
# The Humerus

- The humerus is the bone of the brachium.
- It contributes to the shoulder joint proximally and the elbow joint distally.
- The wide head allows for extreme freedom of movement at the shoulder, an ancestral remnant of brachiation (tree-swinging)



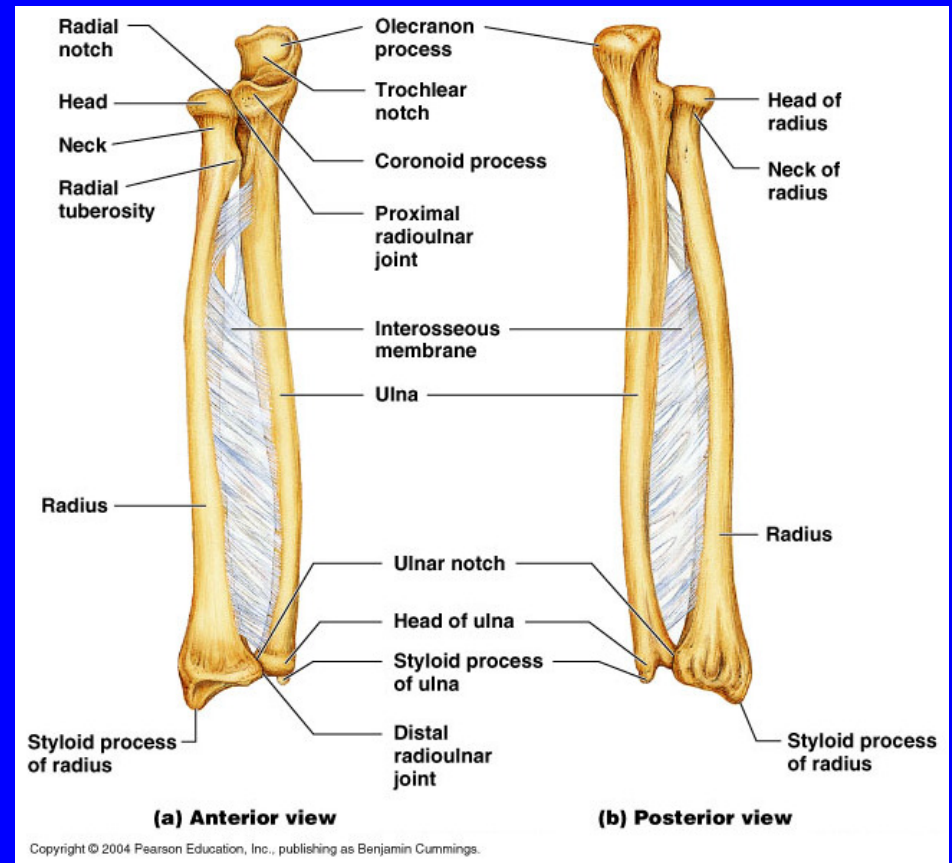
# The Radius and Ulna

- The radius and ulna are the bones of the antebrachium.
- They both articulate with the humerus proximally at the elbow joint.
- The both articulate with the carpals distally.



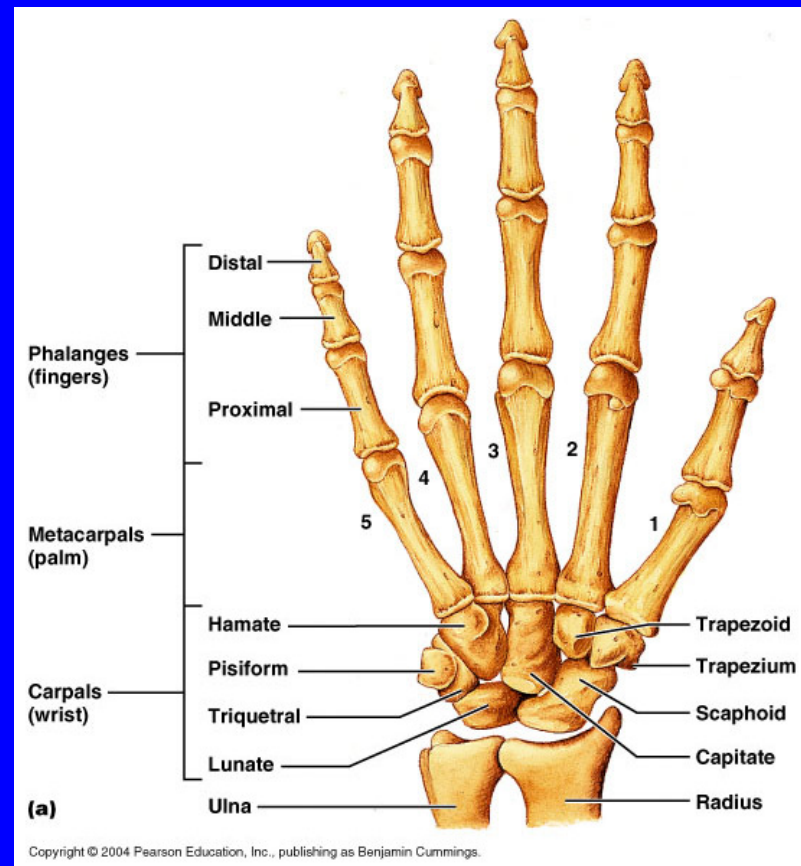
# The Radius and Ulna

- The radius and ulna are held together by an interosseous membrane.
- When the forearm is rotated (pronation), the radius crosses over the ulna and forms an X.



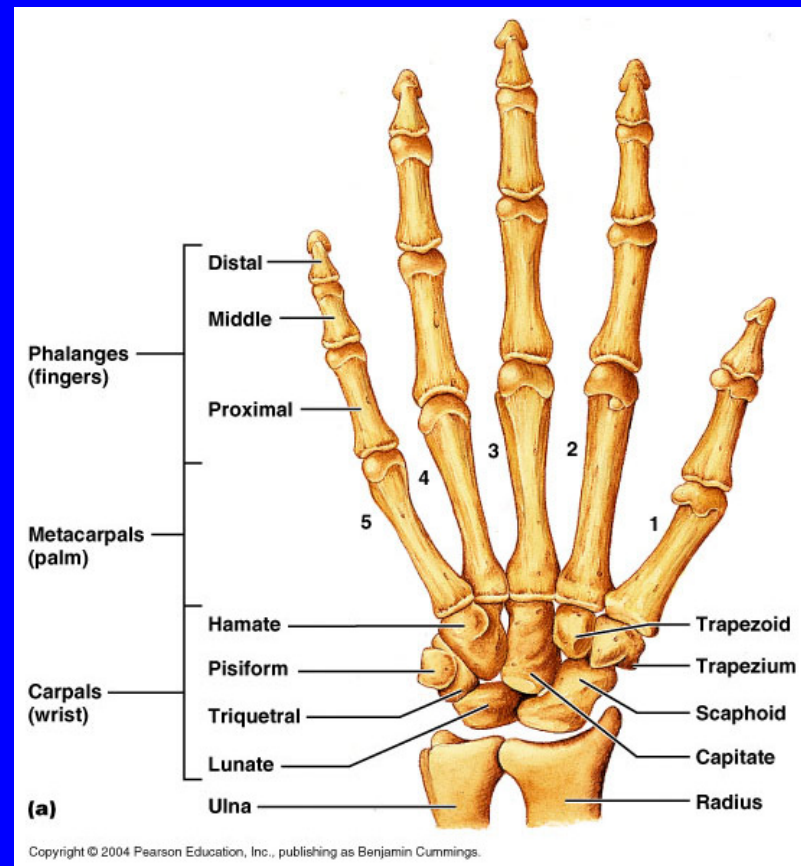
# The Manus

- The manus is supported by 27 bones in three groups.
- The 8 carpals form the wrist.
- The 5 metacarpals form the palm.
- The 14 phalanges form the fingers.



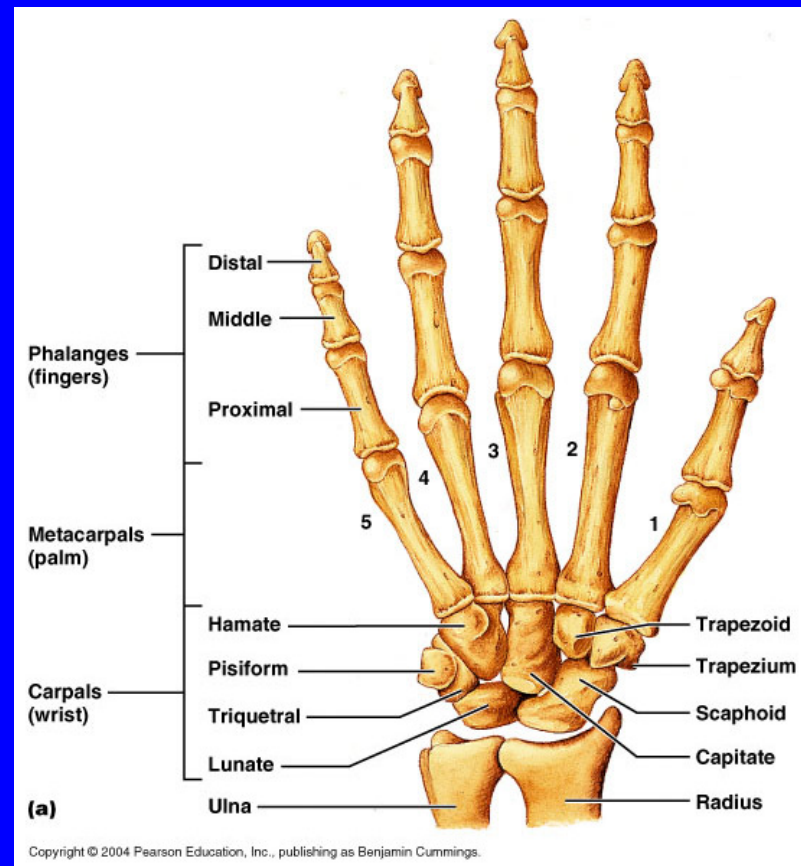
# The Carpals

- The carpals form two rows of four bones.
- The proximal row (from lateral to medial) are the scaphoid, the lunate, the triquetral, and the pisiform.



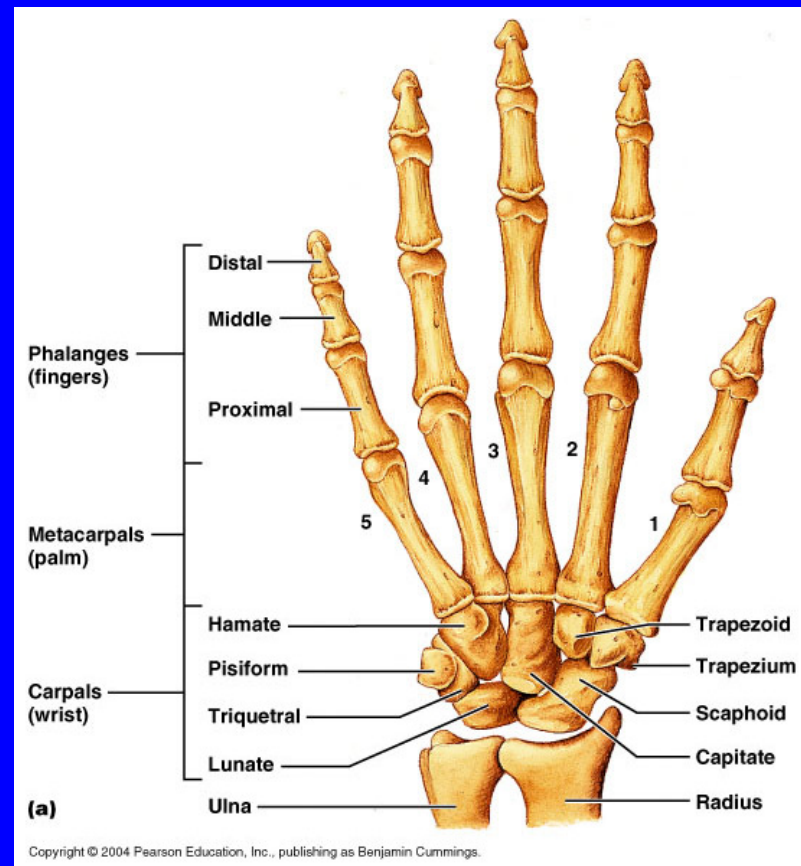
# The Carpals

- The distal row are the trapezium, the trapezoid, the capitate, and the hamate.
- The scaphoid is also sometimes known as the navicular.



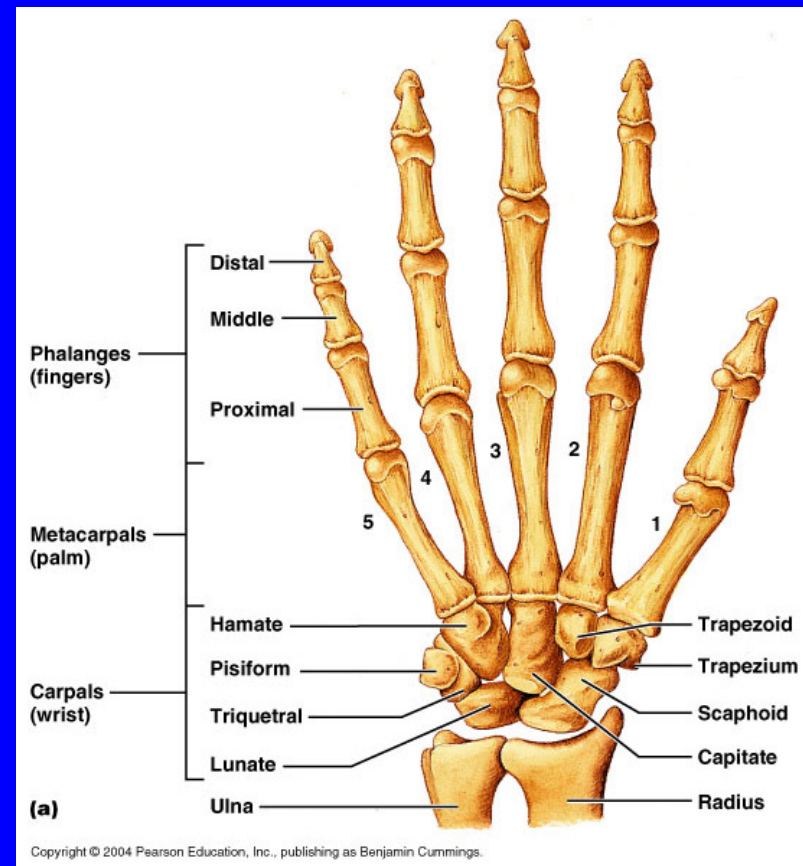
# The Metacarpals

- The five metacarpals are numbered from one to five, starting with the lateral (thumb) side.
- The metacarpals articulate with the distal row of carpals and with the proximal phalanges.



# The Phalanges

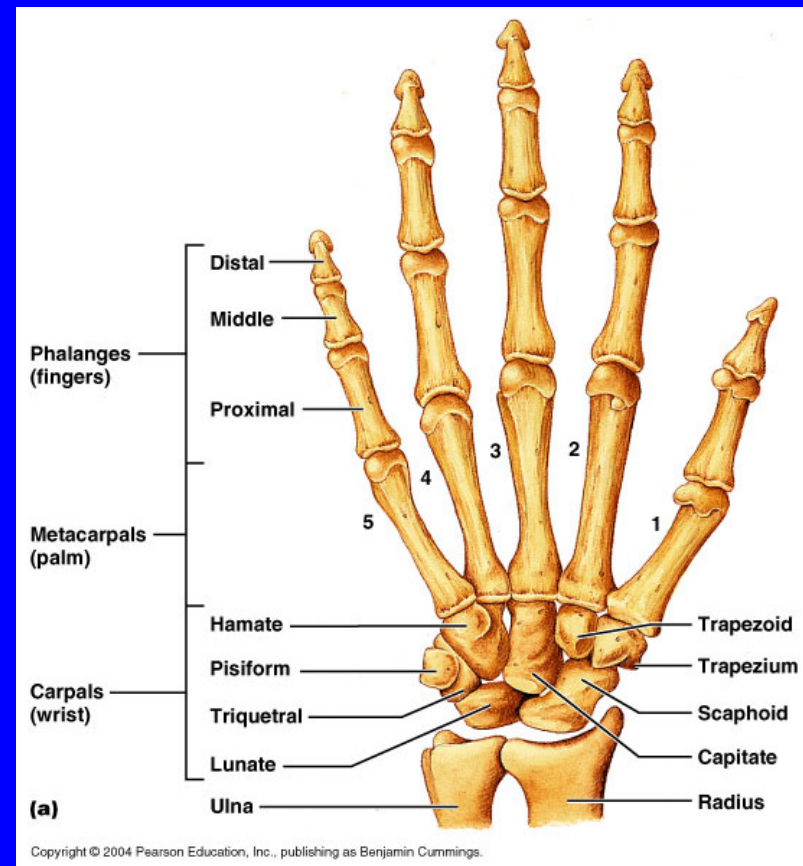
- The fingers are numbered the same way as the metacarpals, with the thumb being number one.
- Each finger has three phalanges, except for the thumb, which has two.





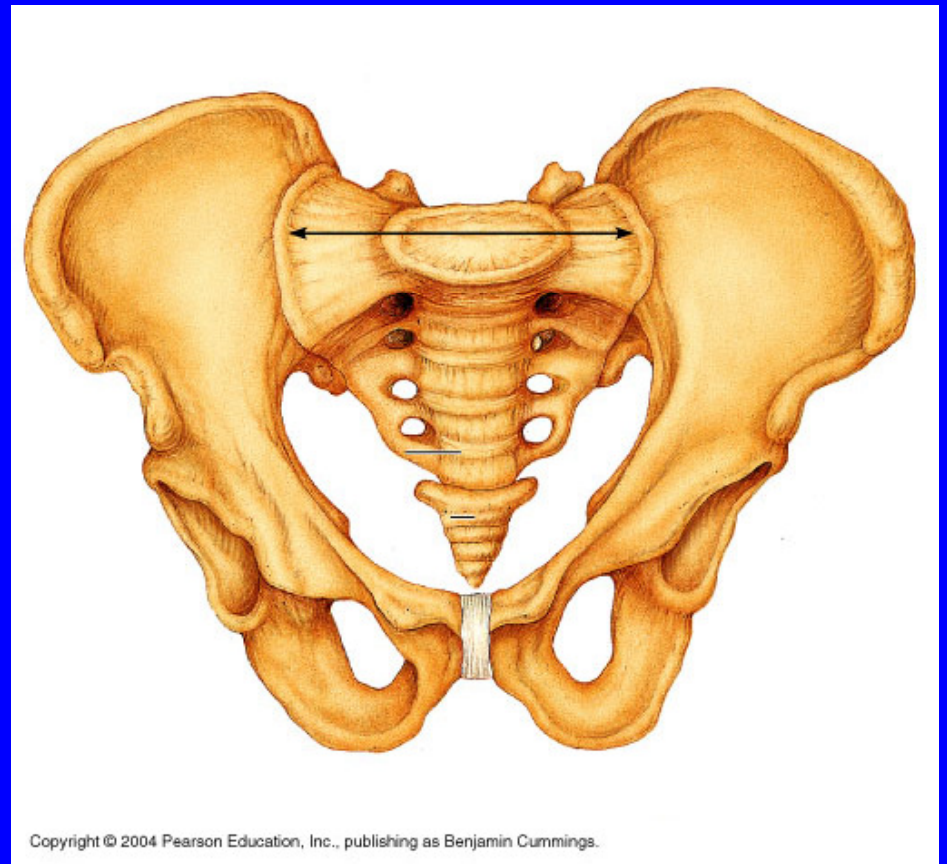
# The Phalanges

- Each finger has a proximal, a middle, and a distal phalanx, except for the thumb, which has only a proximal and distal phalanx.
- All of the phalanges and metacarpals are long bones.



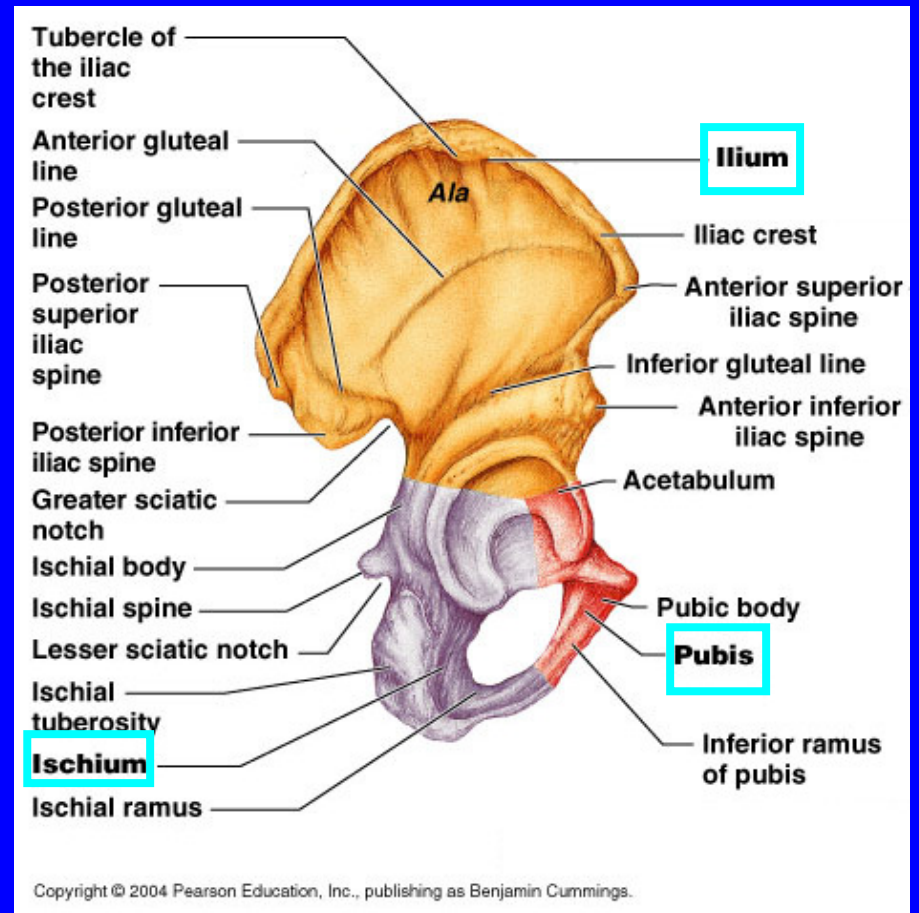
# The Pelvic Girdles

- Each pelvic girdle consists of a single bone, the innominate.
- These bones are also called the coxal bones, or ossa coxae.
- Together with the sacrum, they form the bony pelvis.



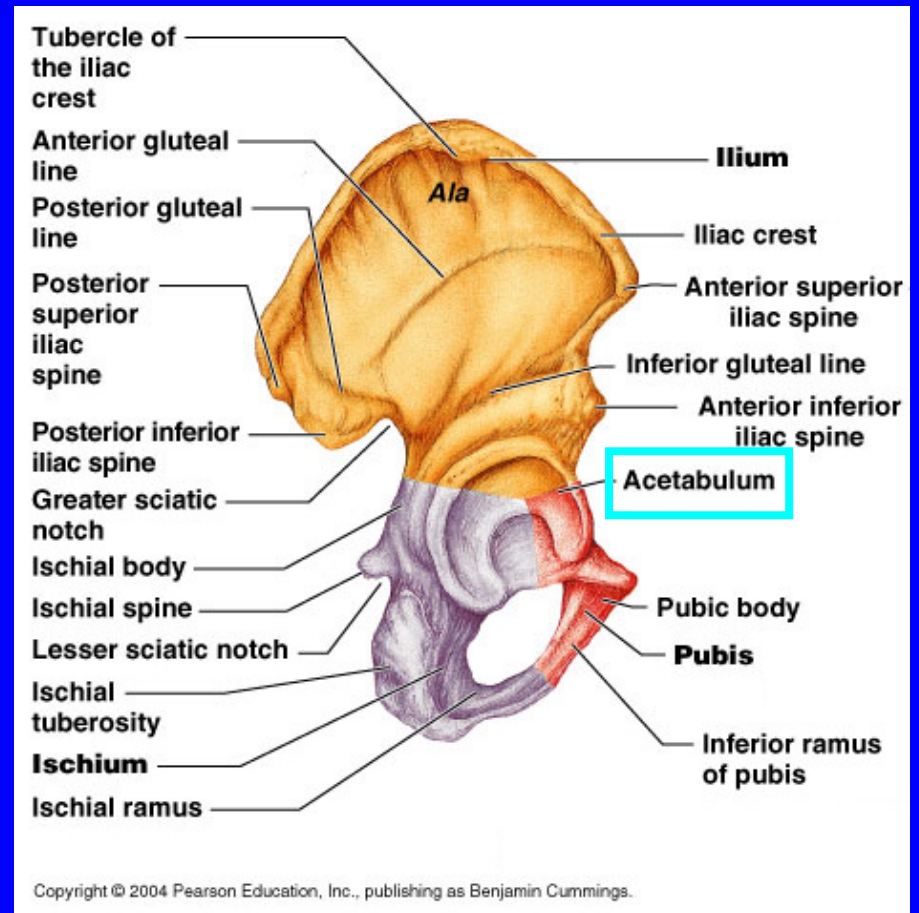
# The Innominate (Os Coxa)

- Each innominate is formed from three bones that fuse during development.
- These bones are the ilium, the ischium, and the pubis.
- On the lateral surface, at the point where they meet is a depression called the acetabulum.



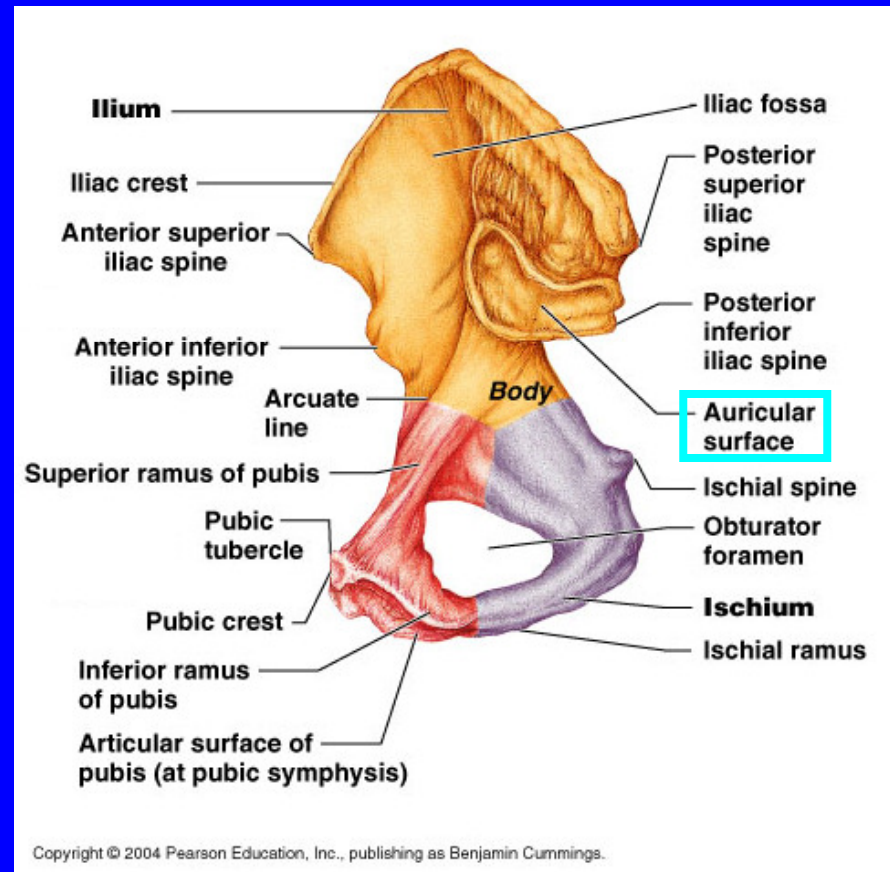
# The Innominate (Os Coxa)

- The acetabulum is the articular surface between the innominate and the head of the femur.
- Acetabulum means “*vinegar bowl*”, so named for its resemblance to the shallow bowls used by the Romans. The bowls were filled with vinegar, and diners would dip their fingers after meals to clean them.



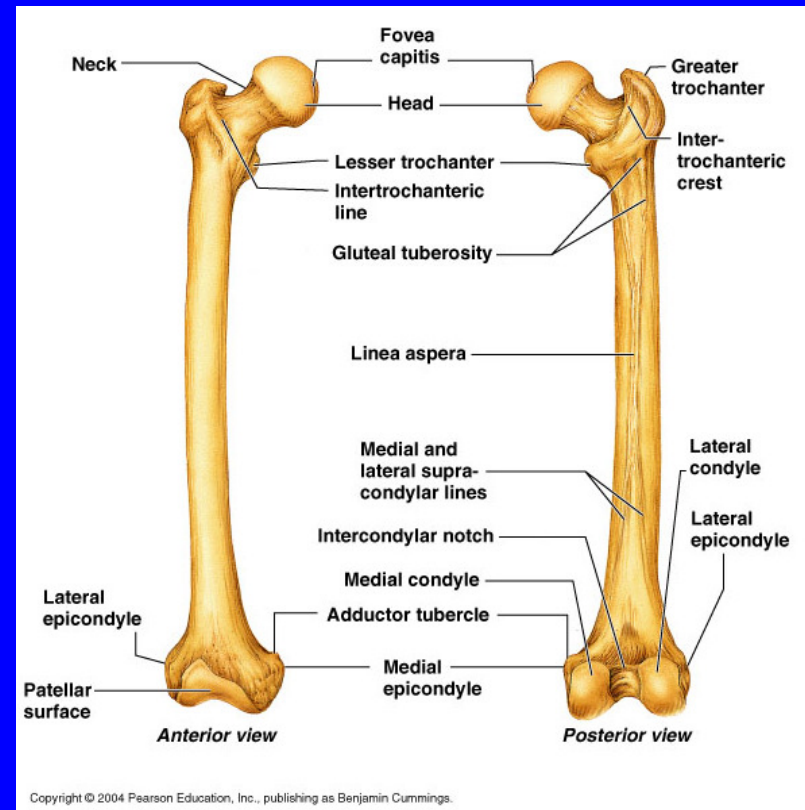
# The Innominate (Os Coxa)

- The medial surface of the innominate is the site of the auricular surface, where the innominate articulates with the sacrum.
- Auricular means “*ear like*”.



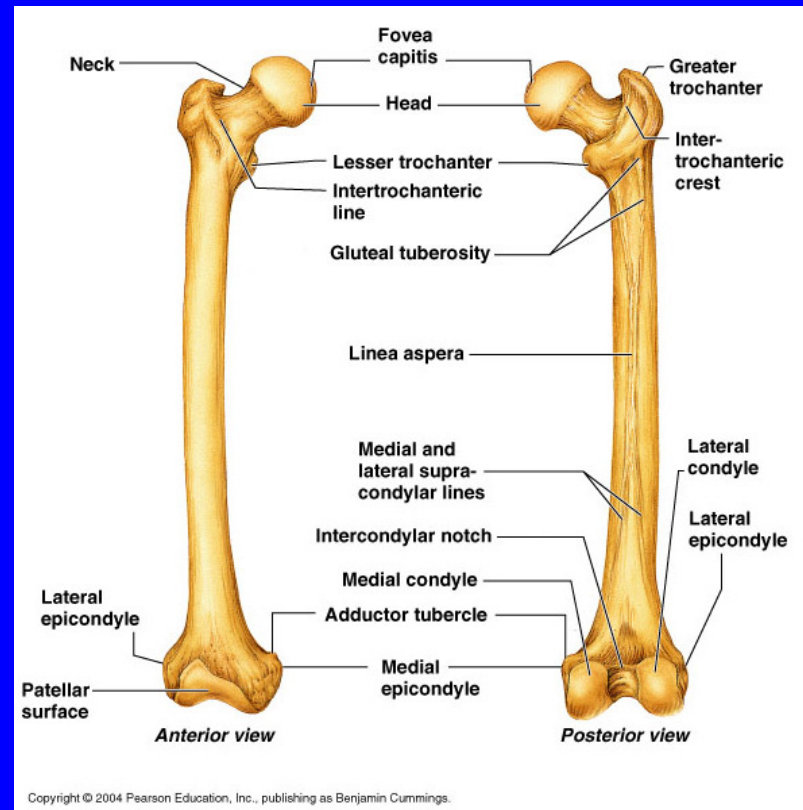
# The Femur

- The femur is the bone of the thigh.
- It articulates with the innominate proximally and the patella and tibia distally.
- It is the heaviest and strongest bone in the body to bear the weight of our upright posture.



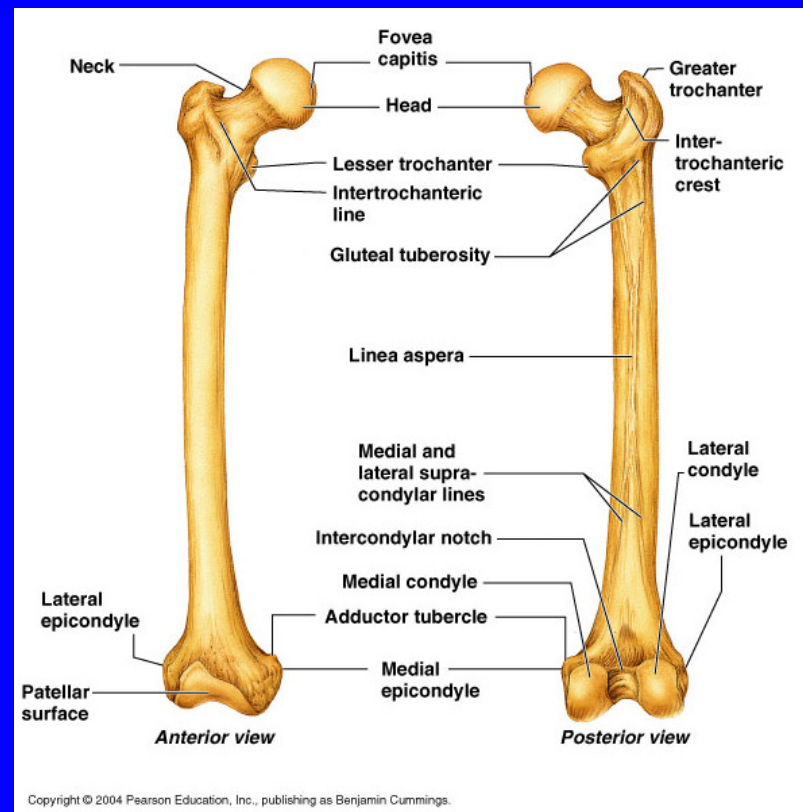
# The Femur

- The head of the femur sits deeply within the hip joint, providing maximum stability.
- The small depression on the medial surface of the head, the fovea capitis, is the site of attachment of a ligament that anchors the femur to the acetabulum.



# The Femur

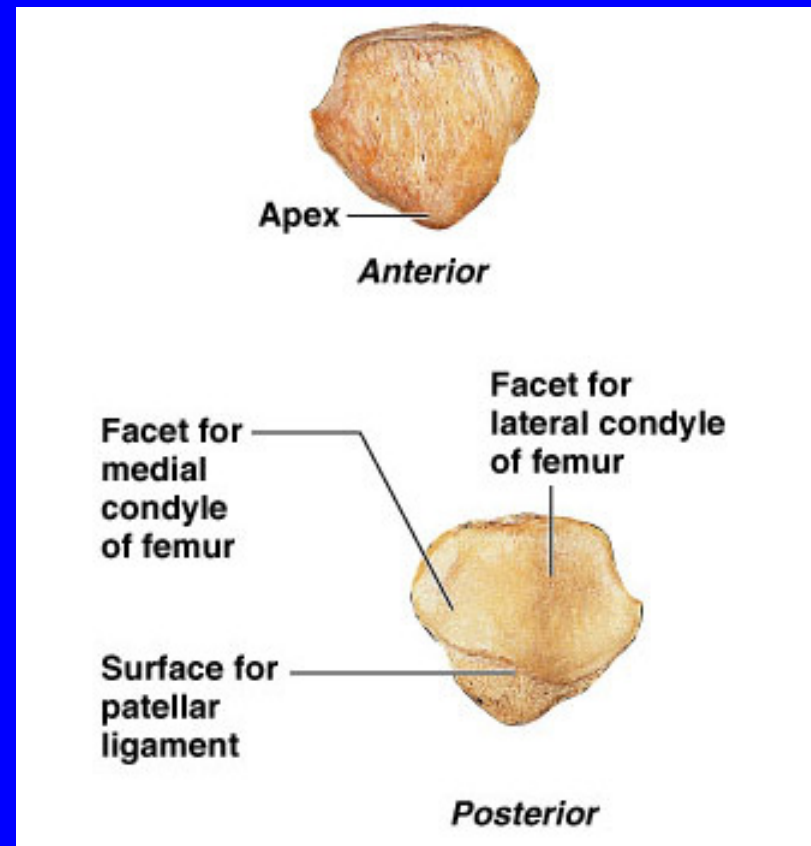
- The medial and lateral condyles form the knee joint with the tibia.
- The angle of the femur distributes weight directly over the knee for maximum stability.





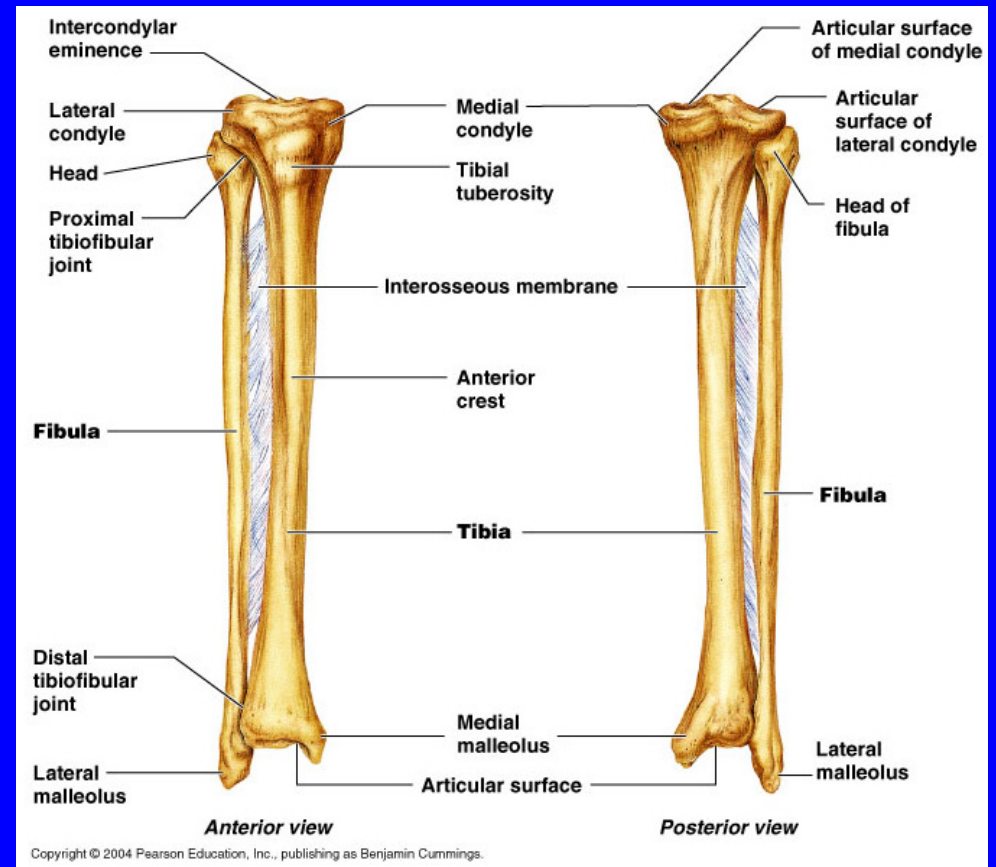
# The Patella

- The patella is the only sesamoid bone present in all humans.
- It forms within the quadriceps tendon/ patellar ligament.
- The anterior surface is much rougher than the posterior, which articulates with the distal end of the femur.



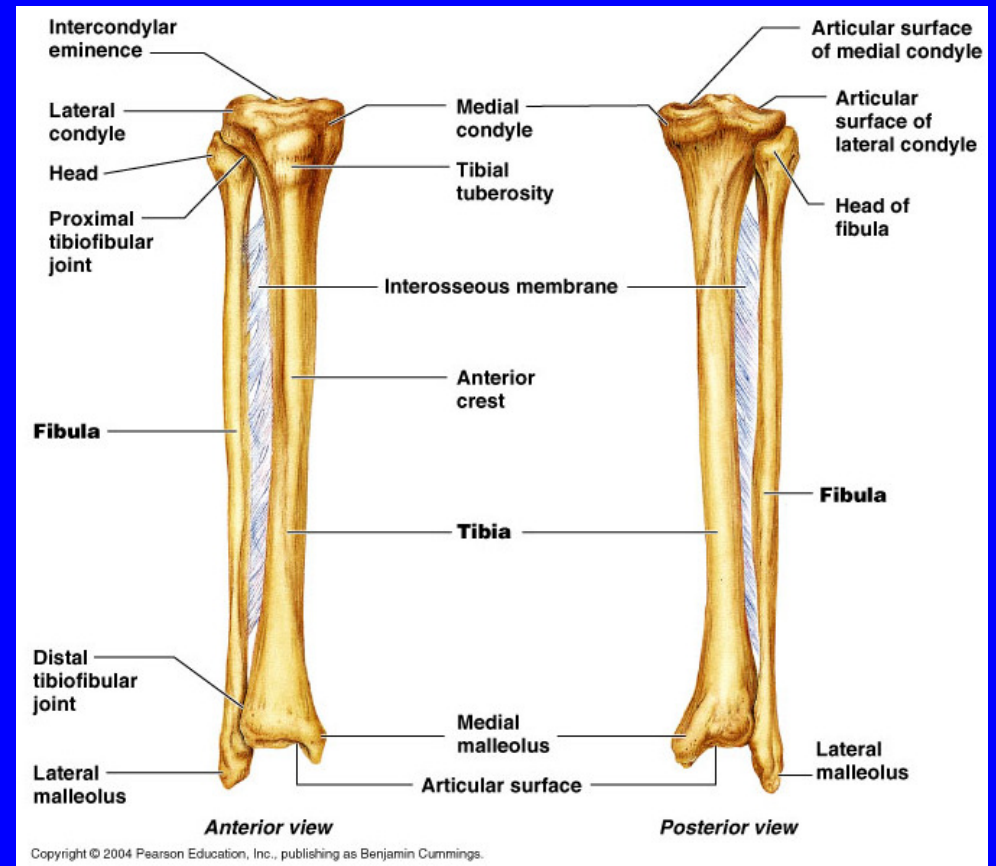
# The Tibia and Fibula

- The tibia and fibula are the bones of the leg.
- They both articulate distally with the tarsals.
- The tibia articulates proximally with the femur.



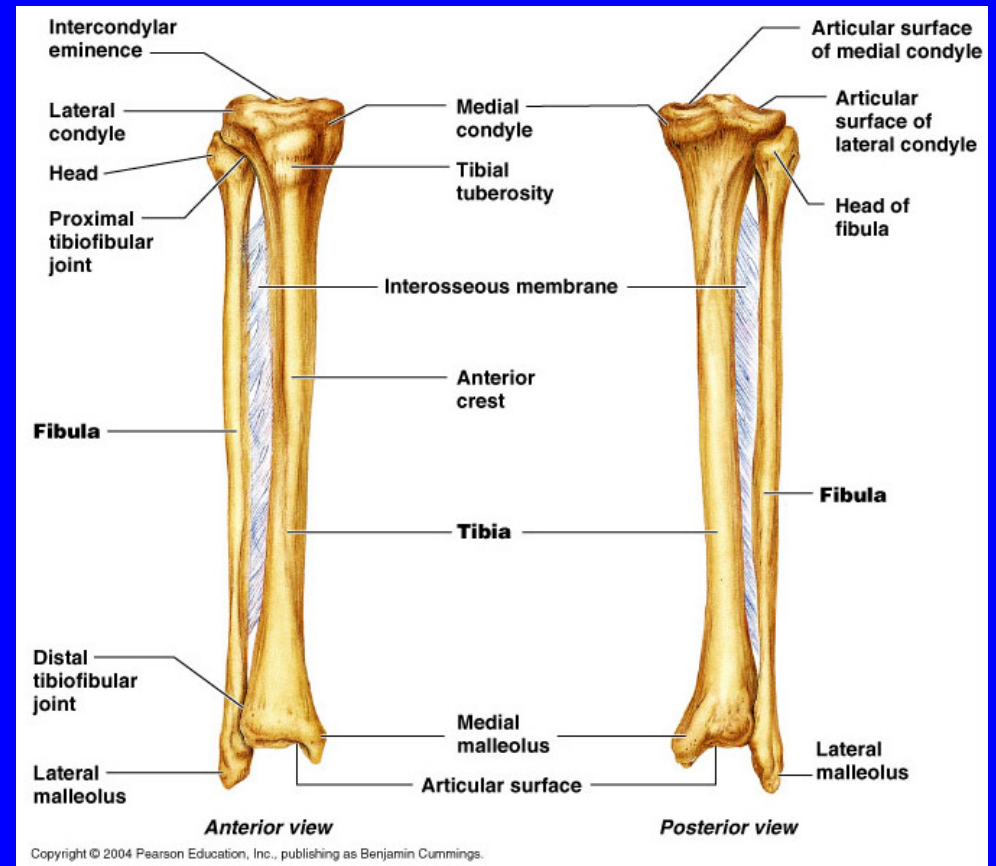
# The Tibia and Fibula

- The tibia and fibula are held together by an interosseous membrane.
- The fibula stabilizes the ankle joint, but does not carry much weight.



# The Tibia and Fibula

- The medial malleolus of the tibia, and the lateral malleolus of the fibula form the bulges palpable on either side of the ankle.
- The anterior border of the tibia is palpable on the front of the shin.



# The Pes

- The pes is supported by 26 bones in three groups.
- 7 tarsal bones form the ankle.
- 5 metatarsal bones form the foot.
- 14 phalanges form the toes.



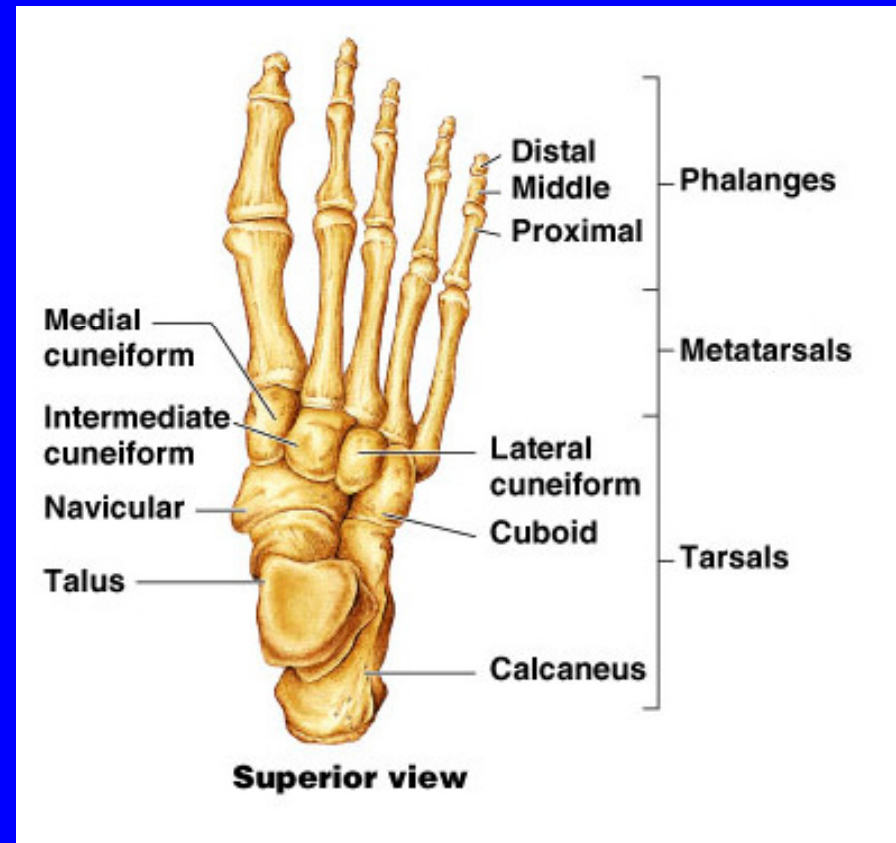
# The Tarsals

- The tarsals are arranged in two rows.
- The proximal row (from medial to lateral) are the navicular, the talus, and the calcaneus.



# The Tarsals

- The distal row are the medial cuneiform, the intermediate cuneiform, the lateral cuneiform, and the cuboid.
- The calcaneus is the site of attachment of the calcaneal (or Achilles) tendon.



# The Metatarsals

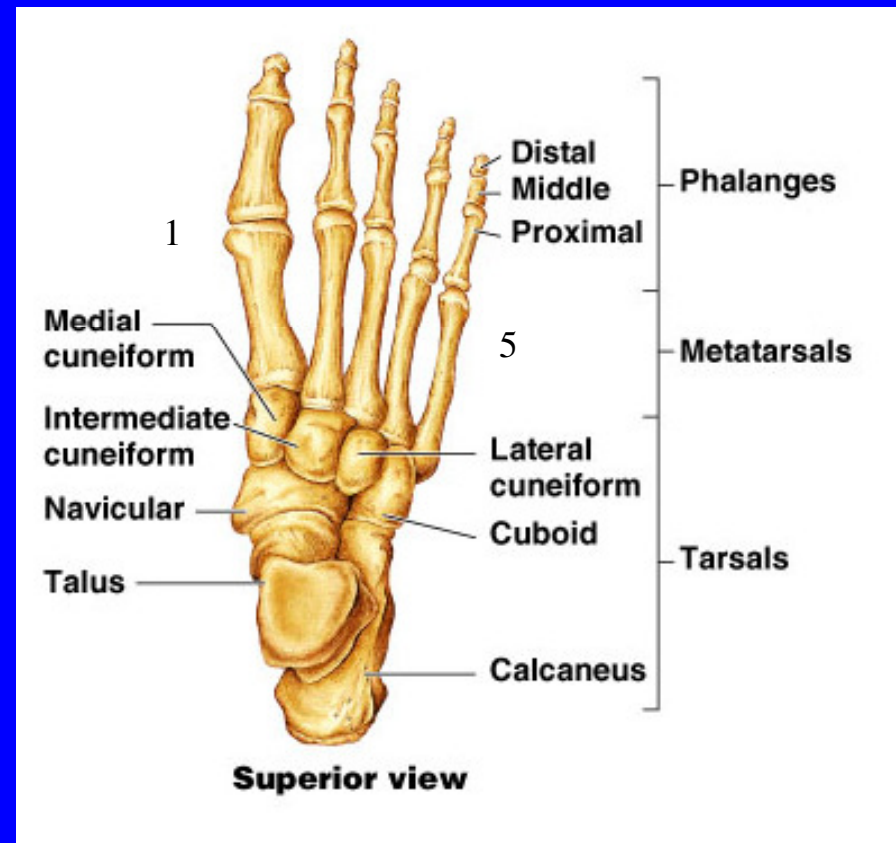
- The five metatarsals are numbered from one to five starting with the medial (great toe) side.
- They articulate with the distal row or tarsals proximally and the proximal phalanges distally.





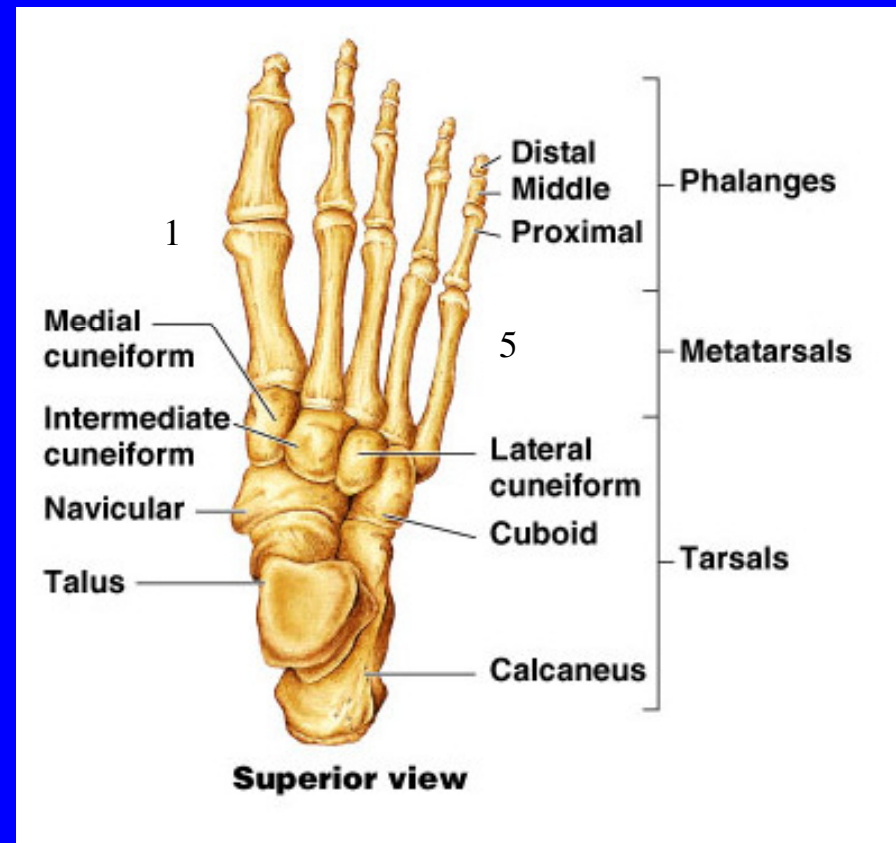
# The Phalanges

- The toes are numbered the same way as the metatarsals, with the great toe being number one.
- Each toe has three phalanges, except for the great toe, which has two.



# The Phalanges

- Each toe has a proximal, a middle, and a distal phalanx, except for the great toe, which has only a proximal and distal phalanx.
- All of the phalanges and metatarsals are long bones.



# General Considerations

- Study the bones and bone markings listed on your structure list.
- Use not only the diagrams in your manual, but also the bones in class.
- You will be required to identify left from right bones for the appendicular skeleton.
- Learning left from right will be much easier if you study the 3D models.

# General Considerations

- On the exam, make sure that you provide the full name for a bone or bone marking, especially if there is more than one of a particular structure.
- For example, styloid process (or just styloid) is not enough. You must specify styloid process of the radius (or ulna, or temporal bone).

# General Considerations

- Finally, do not point to the bones with the tip of a pen or pencil. Use a mall probe.
- It is too easy to inadvertently mark a bone, and the marks are extremely difficult to clean off.
- Anyone caught deliberately marking on a bone will have their highest quiz grade converted to a zero.