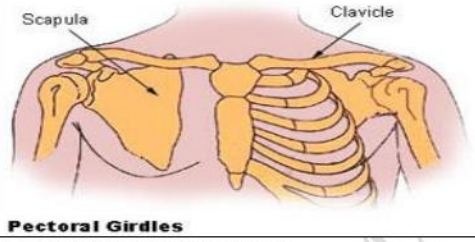
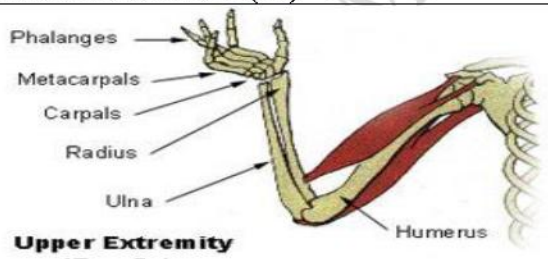
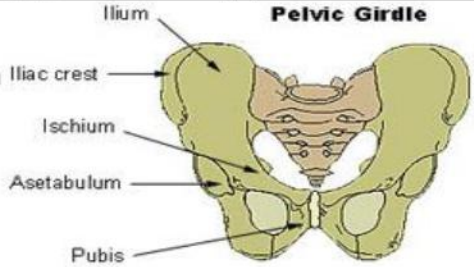
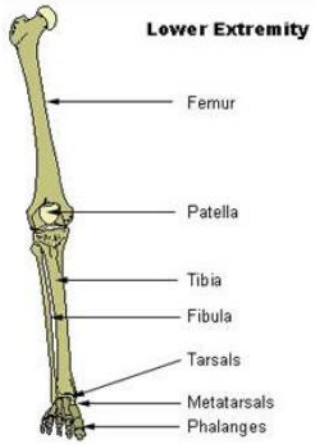
EXPERIMENT NO.: 6 **DATE:**

AIM: TO STUDY AND INTRODUCTION OF APPENDICULAR BONES.

TOTAL APPENDICULAR BONES: 126

SR. NO	BONES	NUMBERS	DAIGRAM
PECTORAL GIRDLES (4)			
1	Clavicle	2	
2	Scapula	2	
UPPER EXTREMITY (58)			
1	Humerus	2	
2	Radius	2	
3	Ulna	2	
4	Carpals	16	
5	Metacarpals	10	
6	Phalanges	28	
PELVIC GIRDLE (4)			
1	Coxal,	2	
2	innominate, or hip bones	2	
LOWER EXTREMITY (60)			
1	Femur	2	
2	Tibia	2	
3	Fibula	2	
4	Patella	2	
5	Tarsals	14	
6	Metatarsals	10	
7	Phalanges	28	
Total bones		126	

APPENDICULAR SKELETON

The appendicular skeleton is composed of the 126 bones of the appendages and the pectoral and pelvic girdles, which attach the limbs to the axial skeleton.

A] UPPER LIMB

Thirty-two (32) separate bones form the bony framework of each upper limb.

PECTORAL (Shoulder)

- The paired pectoral girdles each consist of two bones, the anterior clavicle and the posterior scapula. The shoulder girdles function to attach the upper limbs to the axial skeleton.
- The pectoral girdle is exceptionally light and allows the upper limb a degree of mobility not seen anywhere else in the body. This is due to multiple factors including:
  - ✓ The sternoclavicular joints are the only site of attachment of the shoulder girls to the axial skeleton.

1. **Clavicle**: A slender, doubly-curved bone that joins the sternum to the scapula.
   - **Sternal end**: Rounded terminus; articulates with the sternal manubrium.
   - **Acromial end**: Flattened terminus articulates with the scapula to form part of the shoulder joint.
2. **Scapula**: Thin, triangular flat bone; lies on the dorsal surface of the rib cage serves as the attachment point for the arm.
   - **Superior border**: Short, sharp border that forms the upper margin of the scapula.
   - **Medial (vertebral) border**: Border which parallels the vertebral column when articulated with the axial skeleton.
   - **Lateral (axillary) border**: The thick border that abuts the armpit when articulated with the axial skeleton.
   - **Glenoid cavity (fossa)**: Small, shallow depression superior to the lateral border, articulates with humerus of the arm.
   - **Spine**: The upper posterior surface of the scapula; site of muscle attachment.
   - **Acromion**: Enlarged, roughened triangular structure of the lateral end of the scapular spine; articulates with the acromial end of the clavicle.
   - **Coracoid process**: Beak-like structure projecting anteriorly from the superior scapular border; site of muscle attachment.
   - **Suprascapular notch**: Shallow groove in the superior border of the scapula at the base of the coracoid process; passageway for nerves.

- **Supraspinous fossa**: Deep depression superior to the spine on the posterior surface of the scapula; site of muscle attachment.
- **Infraspinous fossa**: Shallow depression inferior to the spine on the posterior surface of the scapula; site of muscle attachment.
- **Subscapular fossa**: Shallow depression formed by the entire anterior scapular surface; site of muscle attachment.

ARM

The arm consists of a single bone, the humerus. The largest and longest bone of the upper limb, it articulates with the scapula at the shoulder and with the radius and ulna (forearm bones) at the elbow.

1. **Humerus**:
   - **Head**: Smooth, hemispherical projection at the proximal end of the humerus; articulates with glenoid cavity of scapula.
   - **Anatomical neck**: Slight constriction just distal to the head of the humerus.
   - **Greater Tubercle** [lateral surface] and **Lesser Tubercle** [medial surface] sites of muscle attachment.
   - **Intertubercular sulcus**: Shallow groove between lesser and greater tubercles; guides tendon.
   - **Surgical neck**: Constricted region of the humerus; common site of bone fracture.
   - **Deltoid tuberosity**: V-shaped rough region; site of muscle attachment.
   - **Radial groove**: nerve passageway.
   - **Trochlea**: Medial spool-shaped structure; articulates with ulna of the forearm.
   - **Capitulum**: Lateral ball-like structure; articulates with radius of the forearm.
   - **Medial epicondyle and Lateral epicondyle:** site of muscle attachment.
   - **Coronoid fossa**: receives process from ulna when elbow flexes / extends.
   - **Radial fossa**: receives head of radius when elbow flexes.
   - **Olecranon fossa**: receive process from ulna to form elbow joint.

FOREARM

Two parallel bones, the radius and the ulna, form the forearm.

1. **Ulna**: Long, slender bone with a hook at the proximal end that forms the elbow joint with the humerus; lies medially in the forearm when the body is in anatomical position.
   - **Olecranon process**: On the proximal end of the ulna; forms the upper portion of the hook that articulates with the trochlea of the humerus.

- **Coronoid process**: forms the lower portion of the hook that articulates with the trochlea of the humerus.
- **Trochlear notch**: Deep concavity found between the olecranon process and coronoid process; 'grips' trochlea to form elbow joint.
- **Radial notch**: Small depression of the coronoid process; articulates with head of radius.
- **Head**: Knob-like structure and the distal end of the ulna; articulates with wrist bone.
- **Styloid process**: Pointed process medial to the head of the ulna; site of ligament attachment.

2. **Radius**: Long bone that is thin at its proximal end and wide at its distal end; lies laterally in the forearm when the body is in anatomical position.
   - **Head**: Wheel-shaped proximal end of radius; articulates with capitulum of humerus and radial notch of ulna.
   - **Radial tuberosity**: Rough projection just inferior to the head of the radius; site of muscle attachment.
   - **Ulnar notch**: Medial shallow depression on the distal end of the radius; articulates with the ulna.
   - **Styloid process**: Pointed process lateral to the ulnar notch; site of ligament attachment.

HAND

- The skeleton of the hand includes the bones of the carpus (wrist); the bones of the metacarpus (palm), and the bones of the phalanges
- **Carpals (wrist):** Eight (8) marble-size short bones closely united by ligaments; quite flexible due to gliding movements between bones.
- **Metacarpals:** Five (5) small long bones radiating from the wrist like spokes; numbered 1 – 5 from the thumb to the little finger.
- **Phalanges:** Fourteen (14) miniature long bones that form the fingers; numbered 1 – 5 from the thumb (pollex) to the little finger.
- Proximal phalange (1 – 5), Middle phalange (2 – 5), Distal phalange (1 – 5)

B| LOWER LIMB

Like the upper limb, the lower limb is divided into three regions. The **thigh, leg** and **foot**. The lower limb contains 30 bones.

FEMUR

- The femur, or thigh bone, is the single bone of the thigh region. It is the longest and strongest bone of the body, and accounts for approximately one-quarter of a person's total height.
- The head of the femur, which articulates with the hip bone to form the hip joint. The fovea capitis is the site of attachment for the ligament of the head of the femur.
- The greater trochanter [the large, upward, bony] and lesser trochanter [is a small,] are the bony prominence.
- The trochanters are also connected on the posterior side of the femur by the larger intertrochanteric crest.
- The roughened area on the outer, lateral side of the condyle is the lateral epicondyle of the femur. The adductor tubercle is a small bump located at the superior margin of the medial epicondyle.

PATELLA

- The patella (kneecap) is largest sesamoid bone of the body. A sesamoid bone is a bone that is incorporated into the tendon of a muscle where that tendon crosses a joint.
- The patella is found in the tendon of the quadriceps femoris muscle.
- The patella articulates with the patellar surface of the femur and thus prevents rubbing of the muscle tendon against the distal femur.The patella does not articulate with the tibia.

TIBIA

- The tibia (shin bone) is the medial bone of the leg and is larger than the fibula, with which it is paired.
- The tibia is the main weight-bearing bone of the lower leg and the second longest bone of the body, after the femur
- The proximal end of the tibia is greatly expanded. The two sides of this expansion form the medial condyle of the tibia and the lateral condyle of the tibia. These areas articulate with the medial and lateral condyles of the femur to form the knee joint. The shaft of the tibia becomes triangular in shape. The anterior apex of this triangle forms the anterior border of the tibia.
- The large expansion found on the medial side of the distal tibia is the medial malleolus ("little hammer").
- On the lateral side of the distal tibia is a wide groove called the fibular notch, forming the distal tibiofibular joint.

FIBULA

- The fibula is the slender bone located on the lateral side of the leg. The fibula does not bear weight.
- The head of the fibula is the small, knob-like, proximal end of the fibula. It articulates with the inferior aspect of the lateral tibial condyle, forming the proximal tibiofibular joint. The distal fibula also articulates with the fibular notch of the tibia. The distal end form ankle joint with tallus

FOOT

1. **TARSAL BONES**

- The posterior half of the foot is formed by seven tarsal bones. The most superior bone is the talus.
- This has a relatively square-shaped, upper surface that articulates with the tibia and fibula to form the ankle joint. The cuboid bone and metatarsal Bones

2. **METATARSAL**

- The anterior half of the foot is formed by the five metatarsal bones, which are located between the tarsal bones of the posterior foot and the phalanges of the toes.
- These elongated bones are numbered 1–5, starting with the medial side of the foot. The first metatarsal bone is shorter and thicker than the others. The second metatarsal is the longest.
- Each metatarsal bone articulates with the proximal phalanx of a toe to form a metatarsophalangeal joint.

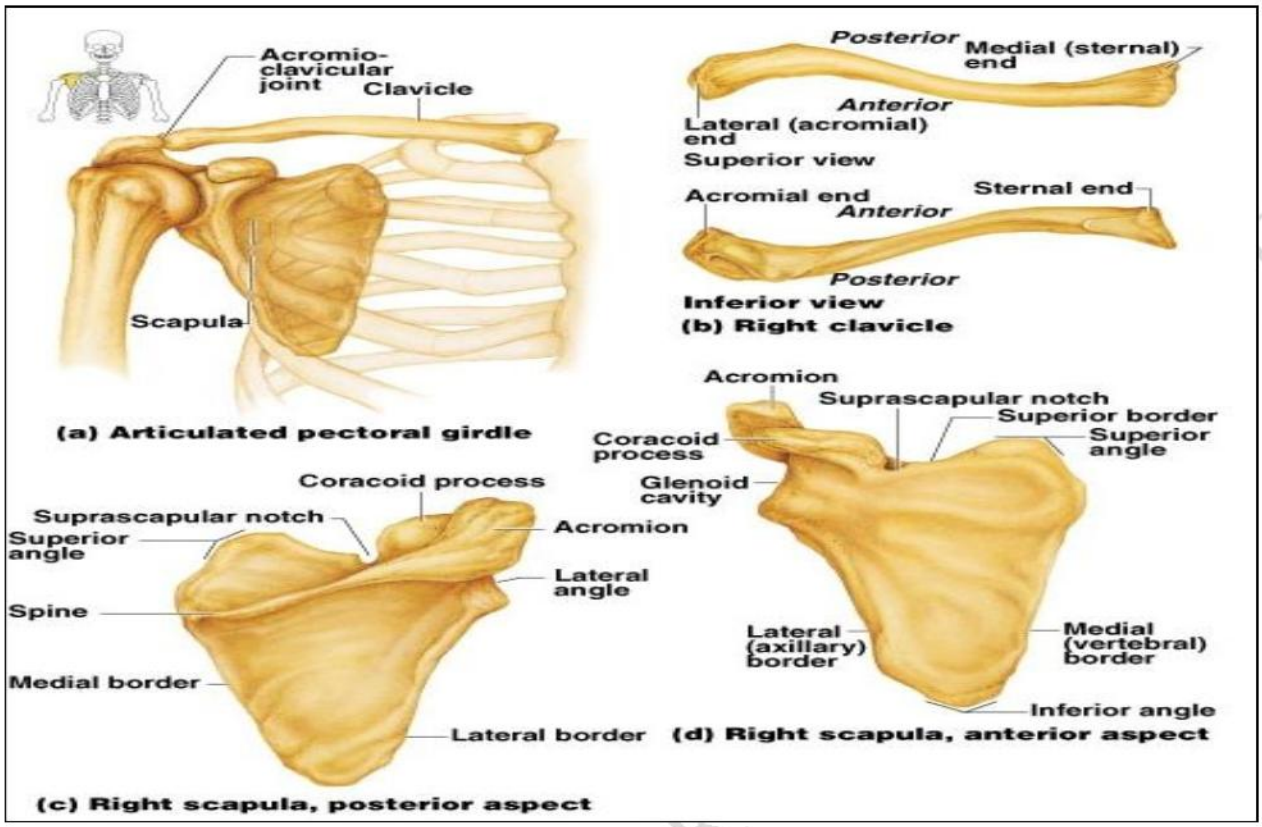
3. **PHALANGES**

- The toes contain a total of 14 phalanx bones (phalanges), arranged in a similar manner as the phalanges of the fingers.
- A joint between adjacent phalanx bones is called an interphalangeal joint.

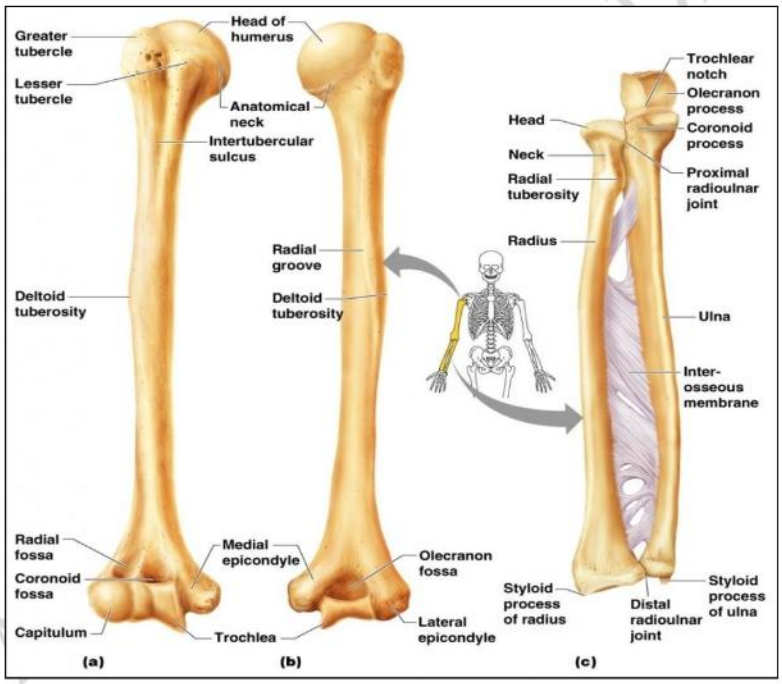
The table below lists the location and function of the major bones of the appendicular skeleton:

Bone(s)	Location	Function	Grouping
Scapula	Flat, triangular bone located on the posterior side of each shoulder	Articulates with the clavicle and humerus	Pectoral girdle
Clavicle	Located in each shoulder at the base of the neck	Helps to keep the shoulders in place; connects upper arm to the body	Pectoral girdle
Humerus	Extends from the scapula to the elbow	Provides attachments for muscles that move the shoulder and upper	Upper limbs

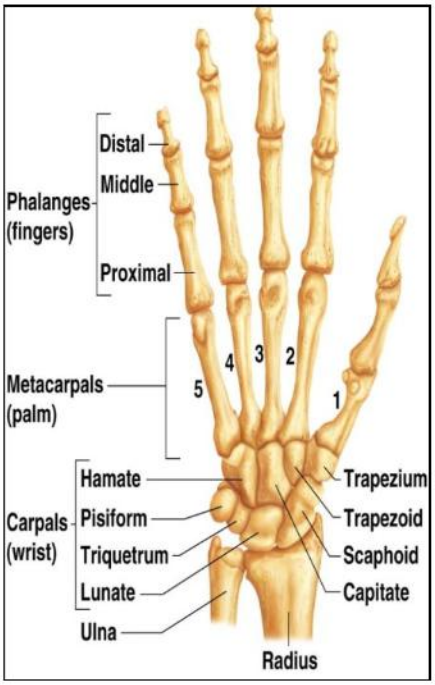
Bone(s)	Location	Function	Grouping
		arm at the proximal end; articulates with the radius and ulna at the distal end	
Radius	Located on the lateral side of the forearm between the elbow and wrist	Provides attachment for muscles that bend the arm at the elbow and muscles that allow movement of the wrist	Upper limbs
Ulna	Located on the medial side of the forearm between the elbow and wrist	Provides attachment for muscles that bend and straighten the arm at the elbow and muscles that allow movement of the wrist	Upper limbs
Ilium	Located on the superior portion of the coxal bone	Connects the bones of the lower limbs to the axial skeleton	Pelvic girdle
Femur	Extends from the hip to the knee	Provides attachment for muscles of the lower limbs and buttocks; distal end articulates with the tibia and patella	Lower limbs
Tibia	Located on the medial side of the leg between the knee and the ankle	Articulates with the femur, on its superior side, to form the knee joint; articulates with the fibula on the lateral side; articulates with the patella on the anterior side; and the tarsels to form the ankle joint	Lower limbs
Fibula	Located on the lateral side of the tibia between the knee and ankle	Forms the lateral part of the ankle joint	Lower limbs
Patella	Located on the anterior surface of the articulation between the femur and tibia	Supports movement of the knee joint	



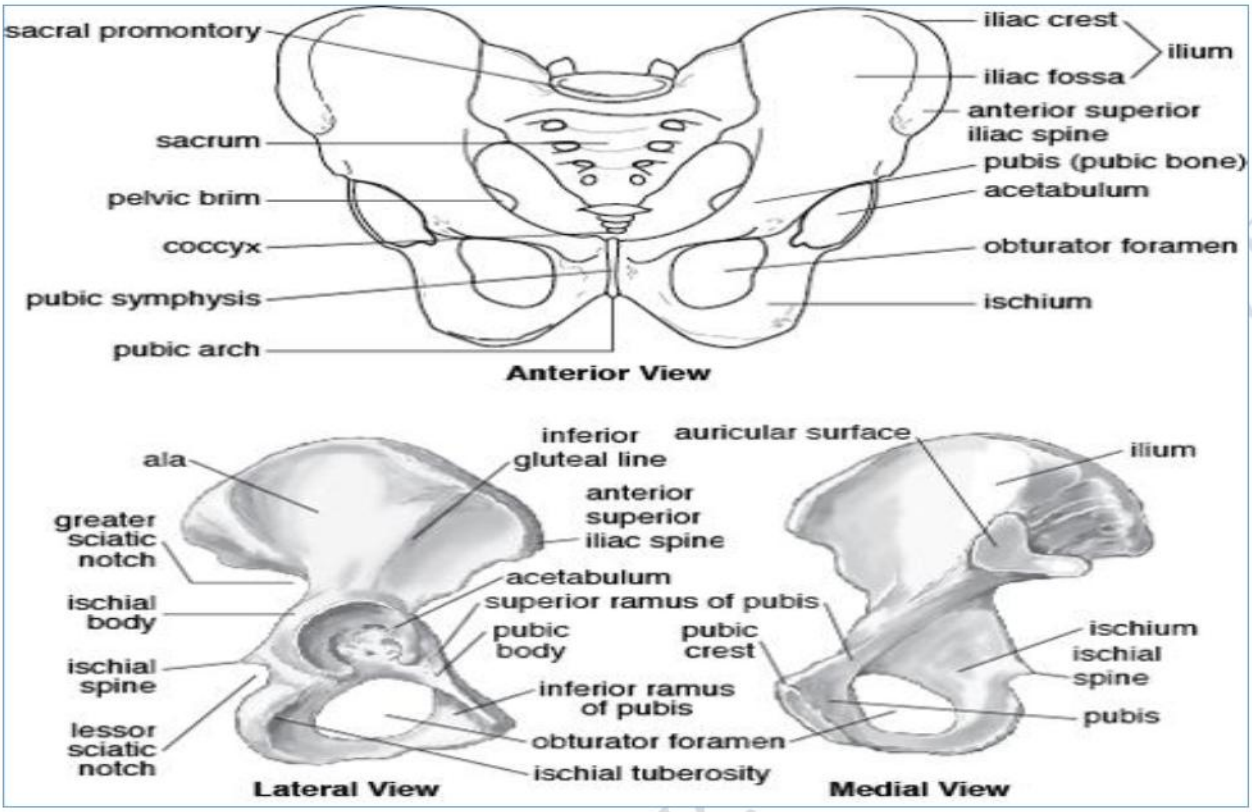
PECTORIAL GIRDLE



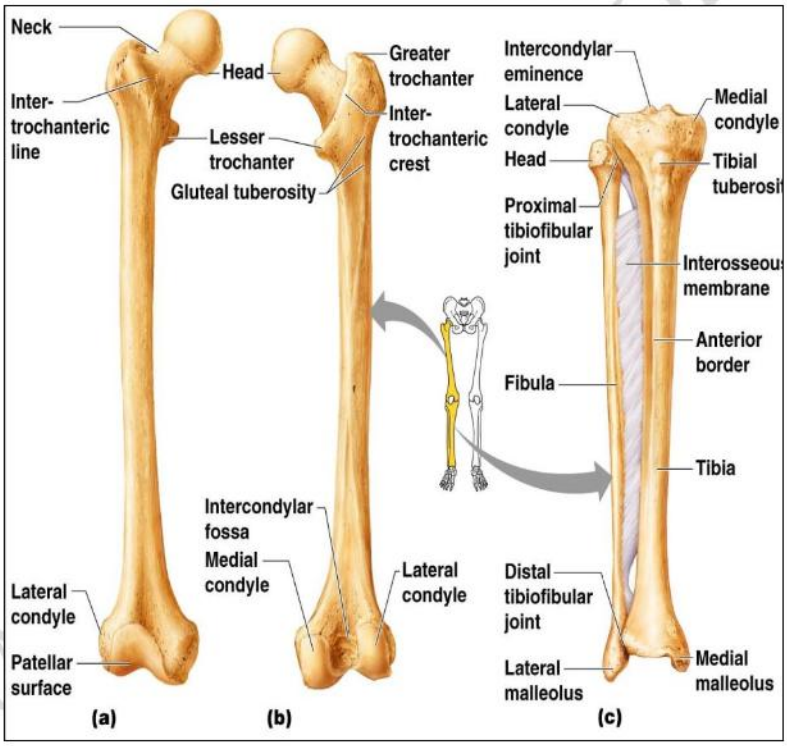
RADIOUS AND ULNA



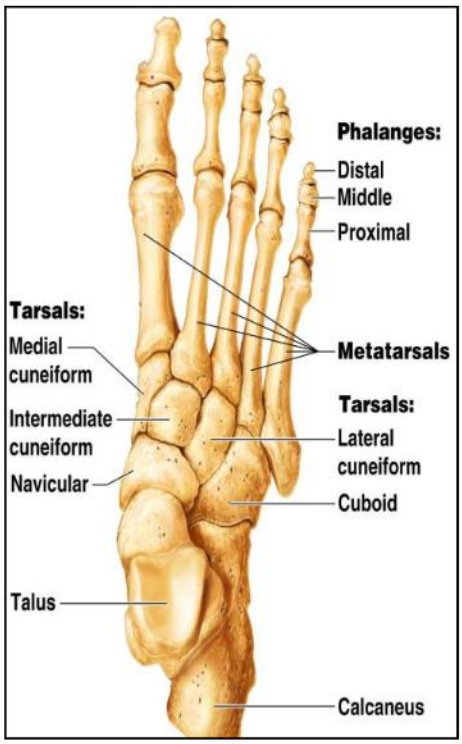
BONES OF HAND



PELVIC GIRDLE



TIBIA AND FIBULA



BONES OF FOOT

SIGNATURE OF TEACHER