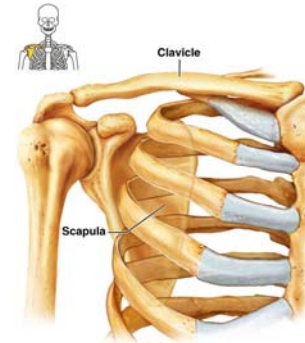


## The Appendicular Skeleton

- 3 Parts
  - Pectoral girdle
    - Attaches the upper limbs to the trunk
  - Pelvic girdle
    - Attaches the lower limbs to the trunk
  - Upper & Lower limbs differ in function
    - Share the same structural plan

1

## Pectoral Girdle



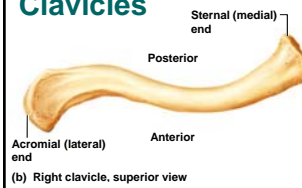
(a) Articulated pectoral girdle

## Clavicles

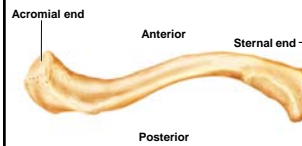
- Extend horizontally across the superior thorax
- Sternal end articulates with the **manubrium**
- **Acromial** end articulates with **scapula**

3

## Clavicles



(b) Right clavicle, superior view



(c) Right clavicle, inferior view

- Provide attachment for muscles
- Hold the scapulae and arms laterally
- Transmit compression forces from the upper limbs to the axial skeleton

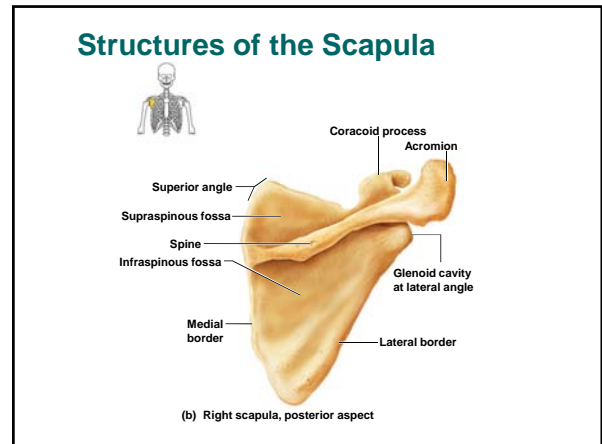
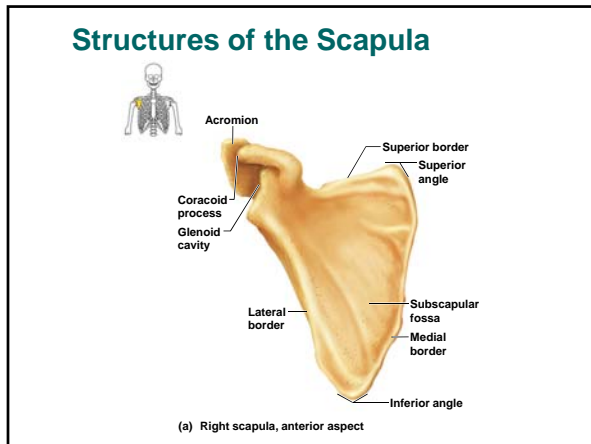
## Clavicles

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## Scapulae

- Scapula (singular)
- Lie on the dorsal surface of the rib cage
- Located between ribs 2 – 7
- Have three borders
  - Superior
  - Medial (vertebral)
  - Lateral (axillary)
- Have three angles
  - Lateral, superior, and inferior

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## The Upper Limb

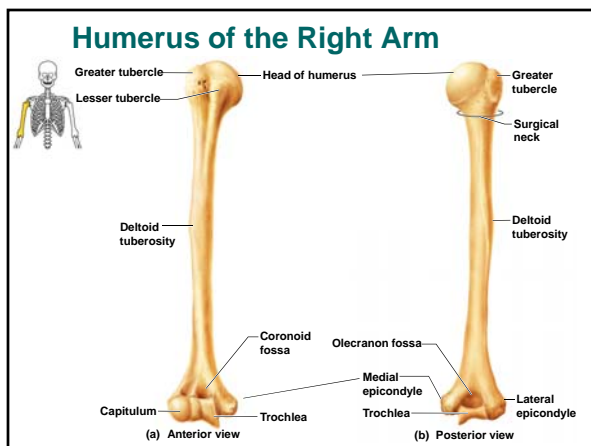
- 30 bones form each upper limb
- Grouped into bones of the
  - Arm
  - Forearm
  - Hand

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## Arm

- Region of the upper limb between the shoulder and elbow
- **Humerus**
  - The only bone of the arm
  - Longest and strongest bone of the upper limb
  - Articulates with the scapula at the shoulder
  - Articulates with the radius and ulna at the elbow

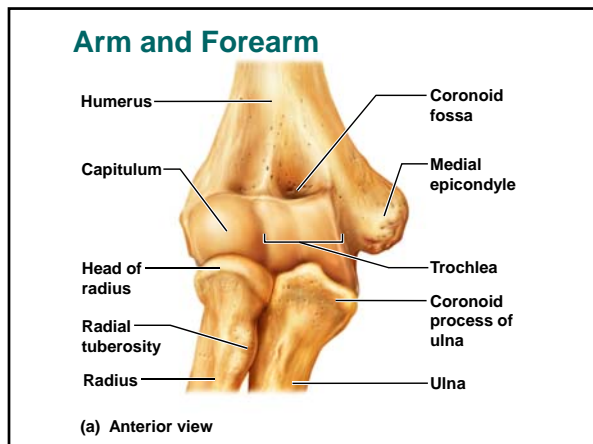
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## Forearm

- Formed from the radius and ulna
- Proximal ends articulate with the humerus
- Distal ends articulate with **carpals**
- In anatomical position
  - The radius is lateral and the ulna is medial

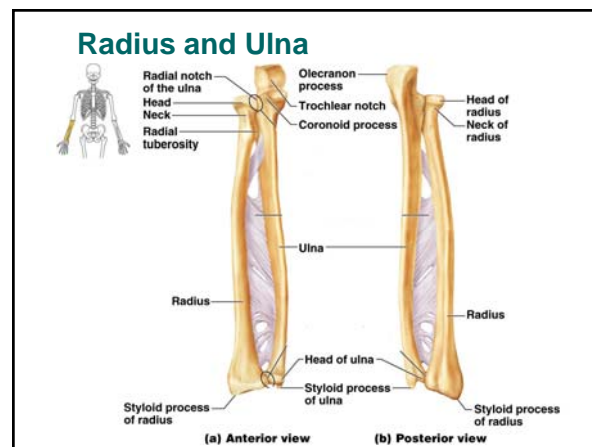
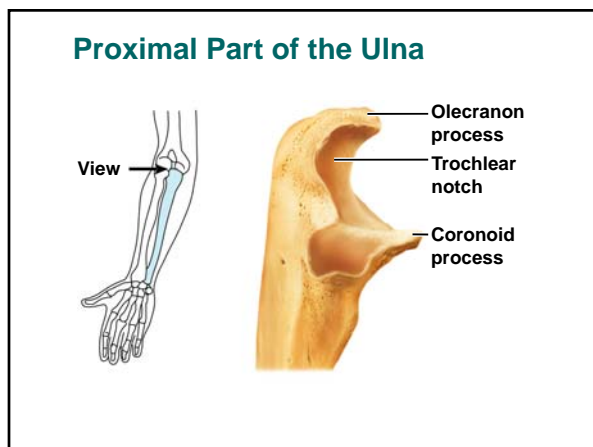
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### Ulna

- Main bone responsible for forming the elbow joint with the humerus
- **Hinge joint** allows forearm to bend on arm
- Plays little to no role in hand movement

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### Radius

- Superior surface of the head of the radius articulates with the **capitulum**
- Contributes heavily to the wrist joint
  - Distal radius articulates with carpal bones
  - When radius moves, the hand moves with it

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### Hand

- Includes the following bones
  - **Carpals** – wrist
  - **Metacarpals** – palm
  - **Phalanges** – fingers

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## Carpal Bones

- Forms the true wrist – the proximal region of the hand
- Gliding movements occur between carpals
- Composed of eight marble-sized bones

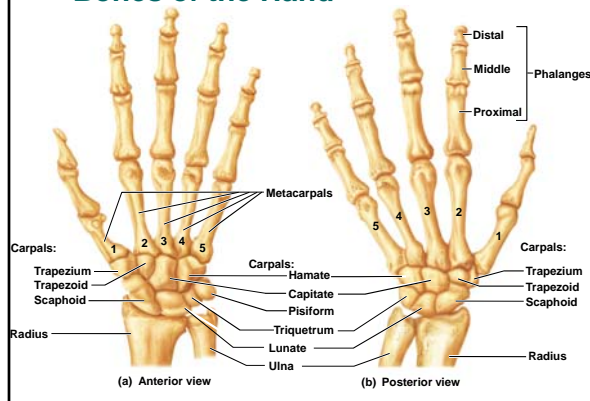
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## Carpal Bones

- Carpal bones
  - Are arranged in two irregular rows
  - Proximal row from lateral to medial
    - Scaphoid, lunate, triquetral, and pisiform
  - Distal row from lateral to medial
    - Trapezium, trapezoid, capitate, and hamate
  - A mnemonic to help remember carpals
    - Some lovers try positions that they can't handle

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## Bones of the Hand



## Metacarpus

- Five metacarpals radiate distally from the wrist
- Metacarpals form the palm
  - Numbered 1–5, beginning with the **pollex** (thumb)
  - Articulate proximally with the distal row of carpals
  - Articulate distally with the proximal phalanges

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## Phalanges

- Numbered 1–5, beginning with the **pollex (thumb)**
- Except for the thumb, each finger has three phalanges
  - Proximal, middle, and distal
  - Thumb only has a proximal and distal

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## Pelvis

- Attaches lower limbs to the spine
- Supports visceral organs
- Acetabulum is a deep cup that holds the head of the femur
  - Lower limbs have less freedom of movement but they are more stable than the arm

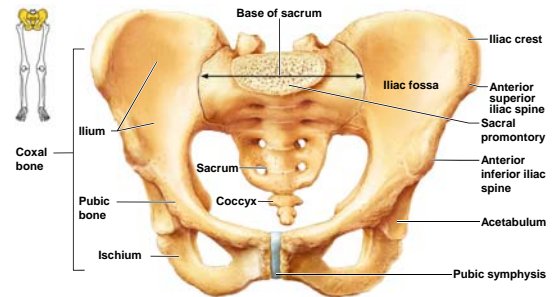
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## Pelvis

- Consists of paired hip bones (**coxal bones**)
- Hip bones unite anteriorly with each other
  - Forming the **pubic symphysis**
- Articulates posteriorly with the sacrum

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## Pelvis



## Coxal Bones

- Consist of 3 separate bones in childhood
  - **Ilium, ischium, and pubis**
- Bones fuse – retain separate names to identify regions of the coxal bones
- **Acetabulum**
  - A deep hemispherical socket on lateral pelvic surface

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## Ilium

- Large, flaring bone
- Forms the superior region of the coxal bone
- Site of attachment for many muscles
- Articulation with the sacrum forms sacroiliac joint (SI Joint)

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## Ischium

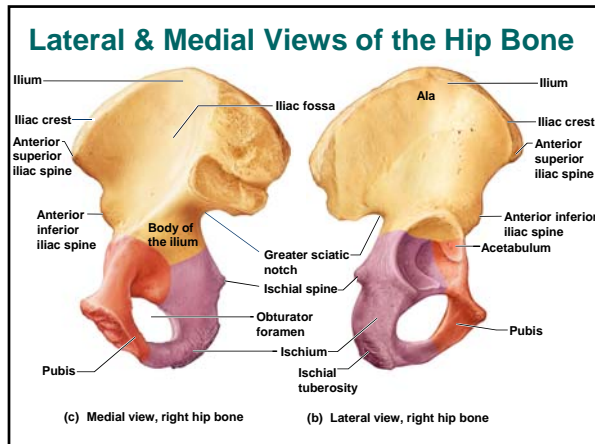
- Forms posteroinferior region of the coxal bone
- Anteriorly – joins the pubis
- **Ischial tuberosities**
  - Are the strongest part of the hip bone
- Known as “Sit bones”

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## Pubis

- Forms the anterior region of the coxal bone
- Lies horizontally in anatomical position
- Pubic symphysis
  - The two pubic bones are joined by fibrocartilage at the midline

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## The Lower Limb

- Carries the entire weight of the erect body
- Bones of lower limb are thicker and stronger than those of upper limb
- Divided into three segments
  - Thigh, leg, and foot

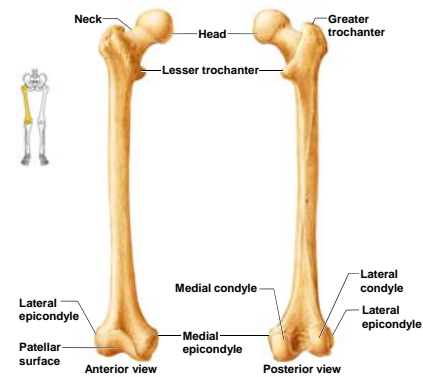
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## Thigh

- The region of the lower limb between the hip and the knee
- **Femur** – the single bone of the thigh
  - Longest and strongest bone of the body
  - Ball-shaped head articulates with the acetabulum

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## Structures of the Femur



## Patella

- Triangular **sesamoid bone**
- Imbedded in the tendon that secures the quadriceps muscles
- Protects the knee anteriorly
- Improves leverage of the thigh muscles across the knee
- Articulates with femur and tibia only

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## Leg

- Refers to the region of the lower limb between the knee and the ankle
- Composed of the tibia and fibula
  - **Tibia** – more massive medial bone of the leg
    - Receives weight of the body from the femur
  - **Fibula** – stick-like lateral bone of the leg

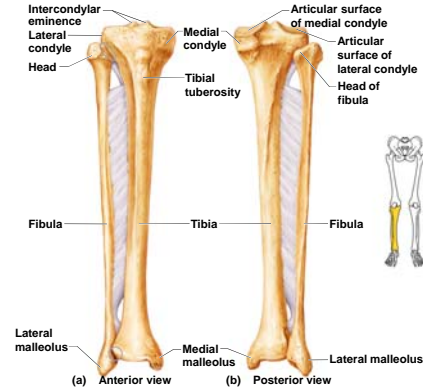
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## Leg

- Tibia articulates with femur at superior end
  - Forms the knee joint
- Tibia articulates with talus at the inferior end
  - Forms the ankle joint
- Fibula does not contribute to the knee joint
  - Stabilizes the ankle joint

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## Structures of the Tibia and Fibula



## The Foot

- Foot is composed of
  - **Tarsus, metatarsus, and the phalanges**
- Important functions
  - Supports body weight
  - Acts as a lever to propel body forward when walking
  - Segmentation makes foot pliable and adapted to uneven ground

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## Tarsals

- Makes up the posterior half of the foot
- Contains seven bones called **tarsals**
  - **Talus, Calcaneous, Cuboid, Navicular, Lateral, Intermediate and Medial Cuneiforms**
- Body weight is primarily borne by the talus and calcaneus

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## Metatarsus

- Consists of five small long bones called metatarsals
- Numbered 1–5 beginning with the hallux (great toe)
- First metatarsal supports body weight

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## Phalanges of the Toes

- 14 phalanges of the toes
  - Smaller and less nimble than those of the fingers
  - Structure and arrangement are similar to phalanges of fingers
  - Except for the great toe, each toe has three phalanges
    - Proximal, middle and distal
    - Great toe has a proximal and distal

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Lecture 6 - Bones Part 2 - Appendicular Skeleton

