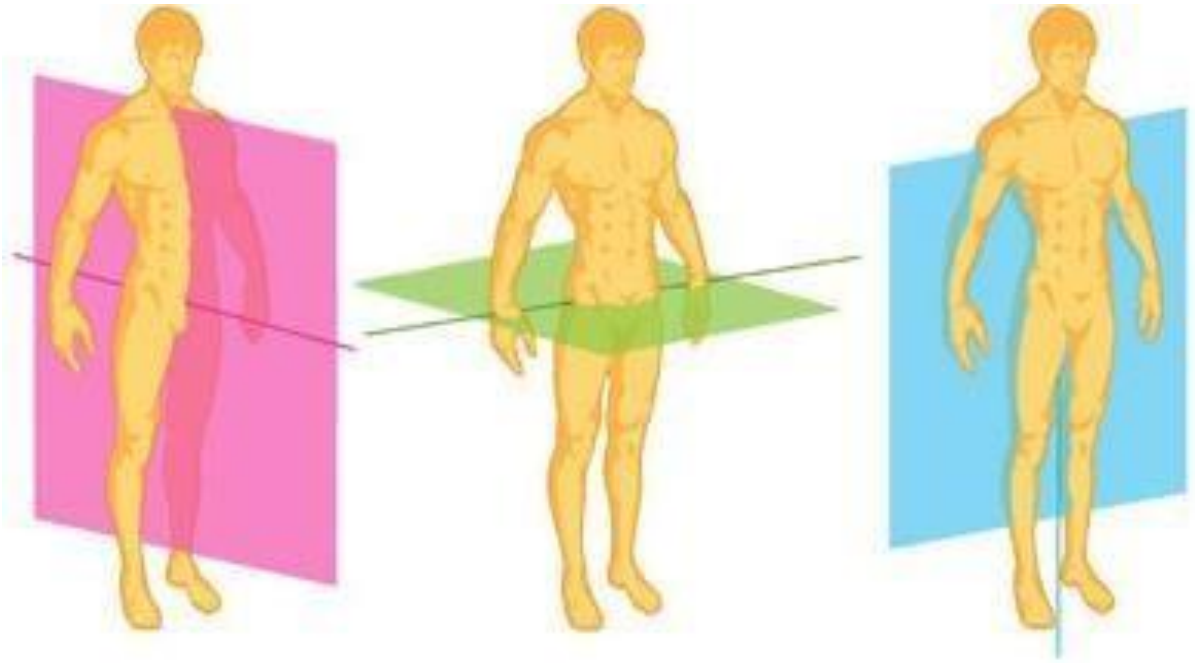
RU RMT 02 Skeletal
Lecture 08
Introduction to Skeletal System

Anatomical Planes

- These planes are imaginary sectioning of the body for descriptive purposes.
- Imaginary flat surfaces that pass through the body parts



Sagittal plane (Median plane)

Transverse plane (Horizontal plane)

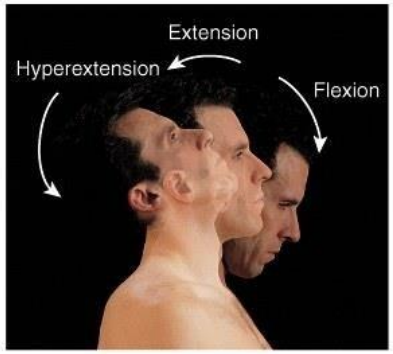
Coronal plane (Frontal Plane)

Anatomical Planes

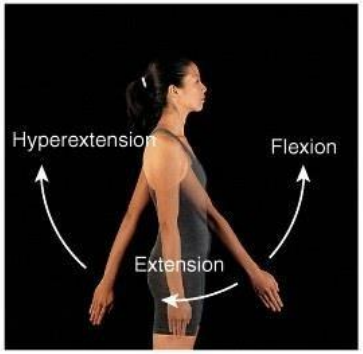
- **Sagittal plane** (midsagittal, parasagittal)
  - A vertical plane that divides the body or organ into right and left sides
- **Frontal or coronal plane**
  - Divides the body or an organ into anterior (front) and posterior (back) portions
- **Transverse or Horizontal plane**
  - Divides the body or an organ into superior (upper) and inferior (lower) portions
- **Oblique Plane**
  - This plane passes through the structure at an oblique angle.

Terms of Movement

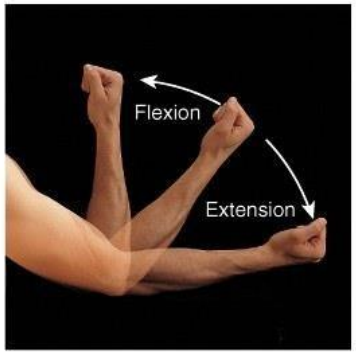
- **Flexion**: Bending the body part or decreasing the angle between the body parts
- **Lateral Flexion:** Side bending of the spine laterally
- **Extension**: Straightening the body part or increasing the angle between body parts
- **Abduction**: Moving away from the median plane (in reference to the foot, abduction would be toes 3-5 going away from the 2nd toe and for the hand it would be the 2nd finger going away from the 3rd finger)
- **Adduction**: Moving towards the median plane (in reference to the hand, the 2nd finger is approaching the 3rd finger and for the foot, toes 3-5 are approaching the 2nd toe)



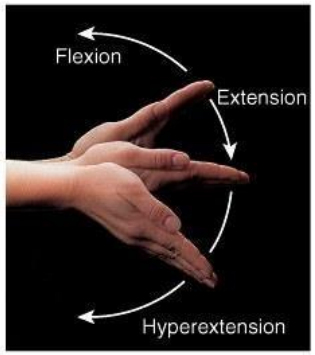
(a) Atlanto-occipital and cervical intervertebral joints



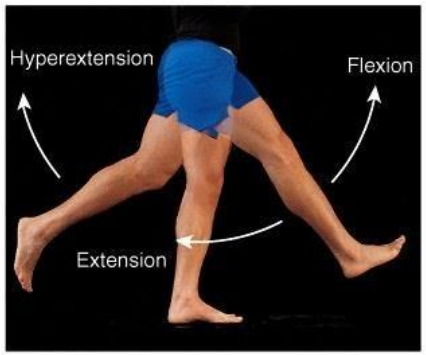
(b) Shoulder joint



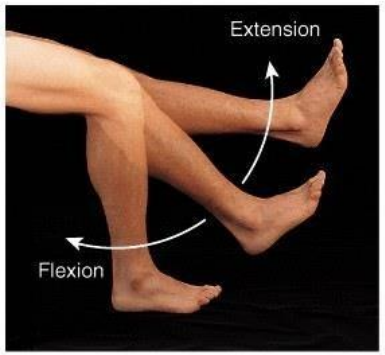
(c) Elbow joint



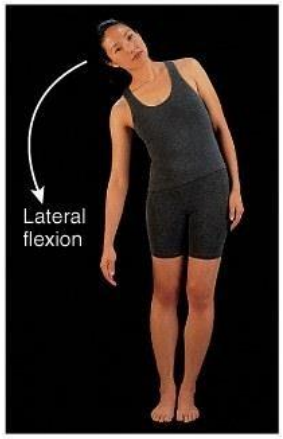
(d) Wrist joint



(e) Hip joint



(f) Knee joint



(g) Intervertebral joints

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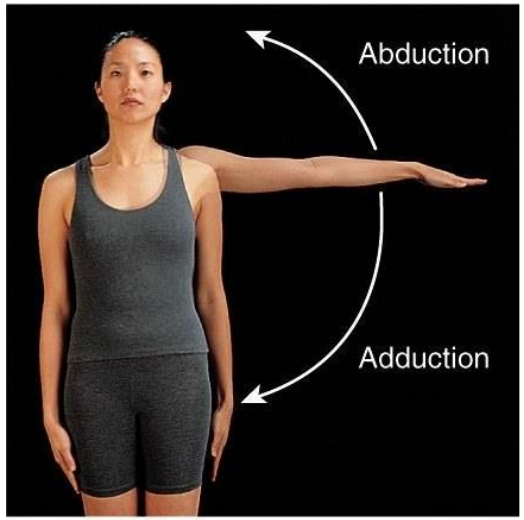
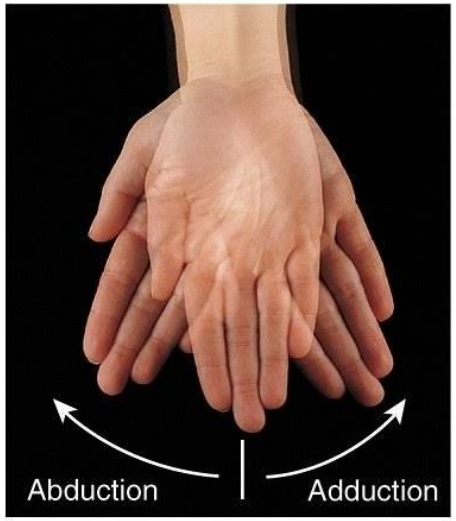
FLEXION
EXTENSION
HYPEREXTENSION
LATERAL FLEXION

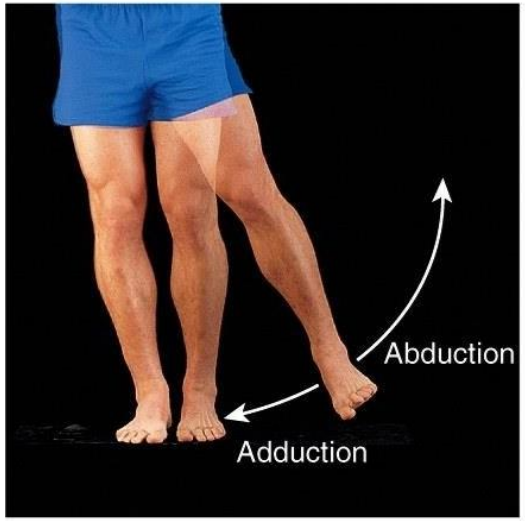
ABDUCTION / ADDUCTION



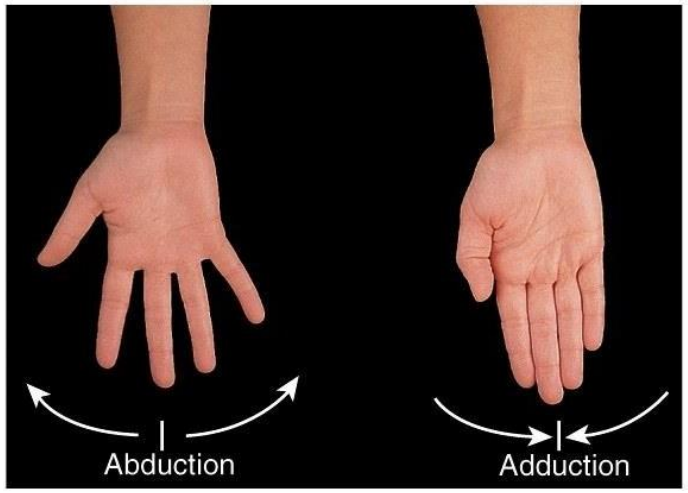
(a) Shoulder joint



(b) Wrist joint



(c) Hip joint



(d) Metacarpophalangeal joints of the fingers (not the thumb)

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Terms of Movement

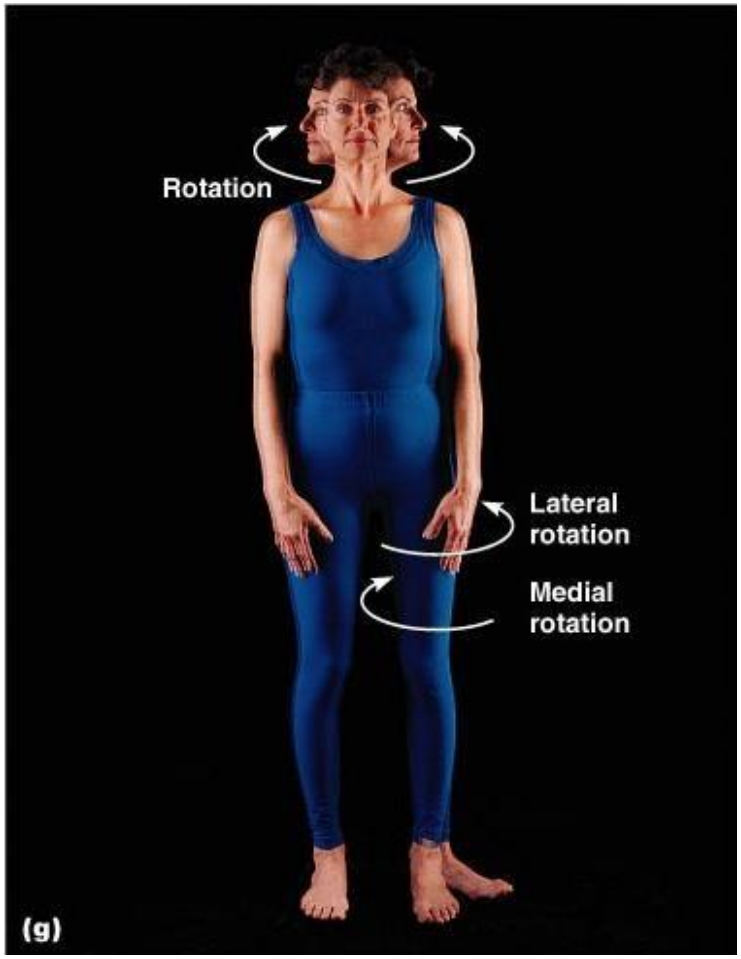
- **Rotation**: Movement around the long axis
  - medial/ internal or lateral/external

- **Circumduction**: Combination of movements which includes: flexion, extension, adduction and abduction

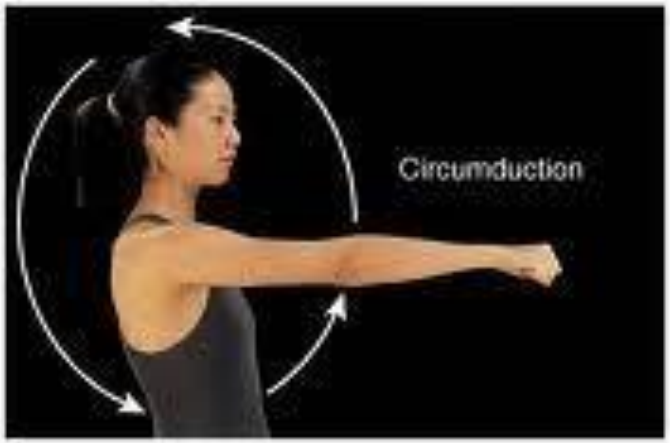
This first group of movements are referred to as ‘angular motion’

For every joint that we discuss, there will be a specific combination of angular motion found at that joint.

Rotation



Circumduction



(a) Shoulder joint

(b) Hip joint

Special Movements

- Elevation
- Depression
- Lateral deviation
- Protraction/Protrusion
- Retraction/Retrusion
- Inversion
- Eversion
- Dorsiflexion
- Plantar flexion
- Supination
- Pronation
- Opposition

(a) Temporomandibular joint (b)

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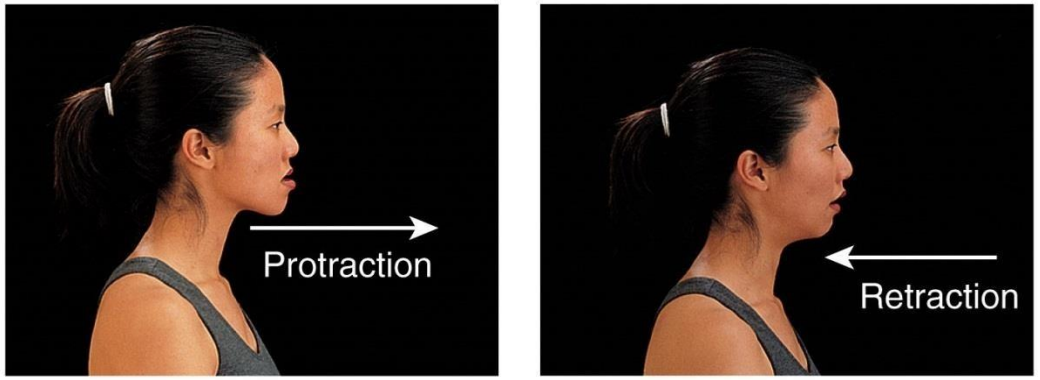

(c) Temporomandibular joint (d)

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Special Movements

- **Protraction**: Moving the structure anteriorly/forward
- **Retraction**: Moving the structure posteriorly/backward

- **Elevation**: Raising the structure superiorly (cephalad)
- **Depression**: Lowering the structure inferiorly (caudally)

Special Movements

(e) Intertarsal joints (f)

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Ankle joint

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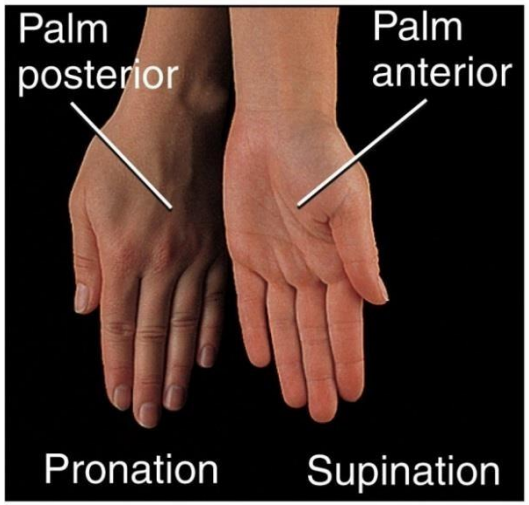

Radioulnar joint

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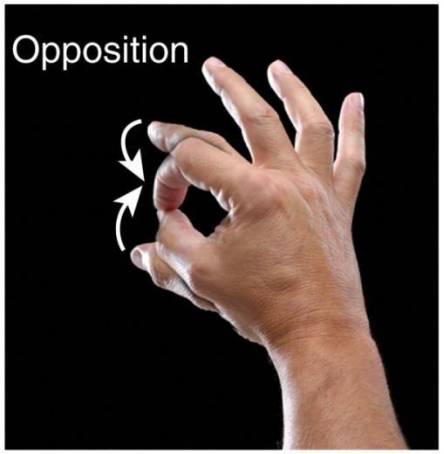

Carpometacarpal joint

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Special Movements

- **Supination**: The forearm is rotated laterally (palm up)
- **Pronation**: The forearm is rotated medially (palm down)

- **Ulnar deviation:** Adduction of the wrist
- **Radial deviation:** Abduction of the wrist

- **Opposition**: Thumb moves medially to meet the other fingers
- **Reposition**: Put the thumb back to a neutral position

- **Eversion:** Plantar surface of the foot moves laterally
- **Inversion:** Plantar surface of the foot moves medially

- **Dorsiflexion**: Bending the ankle towards the shin
- **Plantar flexion**: Bending the ankle towards the posterior/back of the body

The Skeletal System

- Includes both bone and cartilage
- Made up of 2 basic divisions:

  - **Axial =** Central core of the skeletal system (includes 8 cranial bones, 14 facial bones, auditory bones, hyoid bone, vertebrae of the spinal column, 12 pairs of ribs and the sternum)

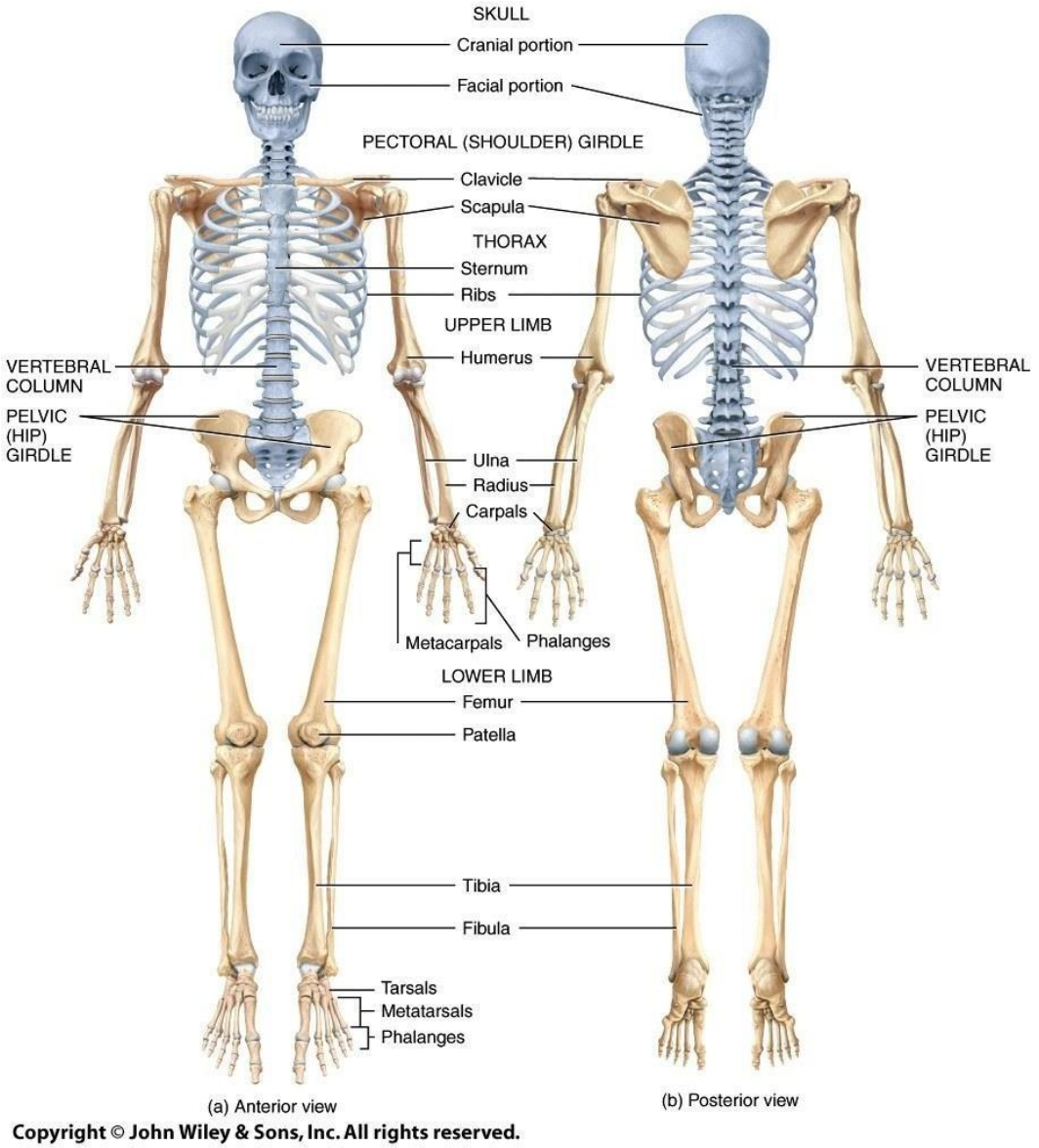
  - **Appendicular =** Includes the bones of the upper and lower limbs and bones that attach the limbs to the axial skeleton (scapula, clavicle, humerus, radius, ulna, carpal bones, metacarpal bones, phalanges of the hand, innominate bones, femur, tibia, fibula, patella, tarsal bones, metatarsal bones and phalanges of the foot)

The Skeleton

<u>Divided into 2 sections:</u>

Axial

Appendicular



The Skeletal System:

- **Functions of the skeletal system:**
  - Protection for vital structures
  - Support the body and its vital cavities
  - Movement
  - Mineral deposition (storage for salts)
  - Blood element production
  - Energy storage(yellow marrow has adipose cells (fat)-can be used for energy)

- **Cartilage and its role (costal and articular):**
  - The skeletal system is composed of cartilage and bones
  - Cartilage is semi rigid and is found where flexibility is required (i.e. costal cartilage and ribs)

- **Types of Cartilage:**
  - Hyaline (joints)
  - Elastic (ear)
  - Fibrocartilage (discs of spinal column)

The Skeletal System:

Bone

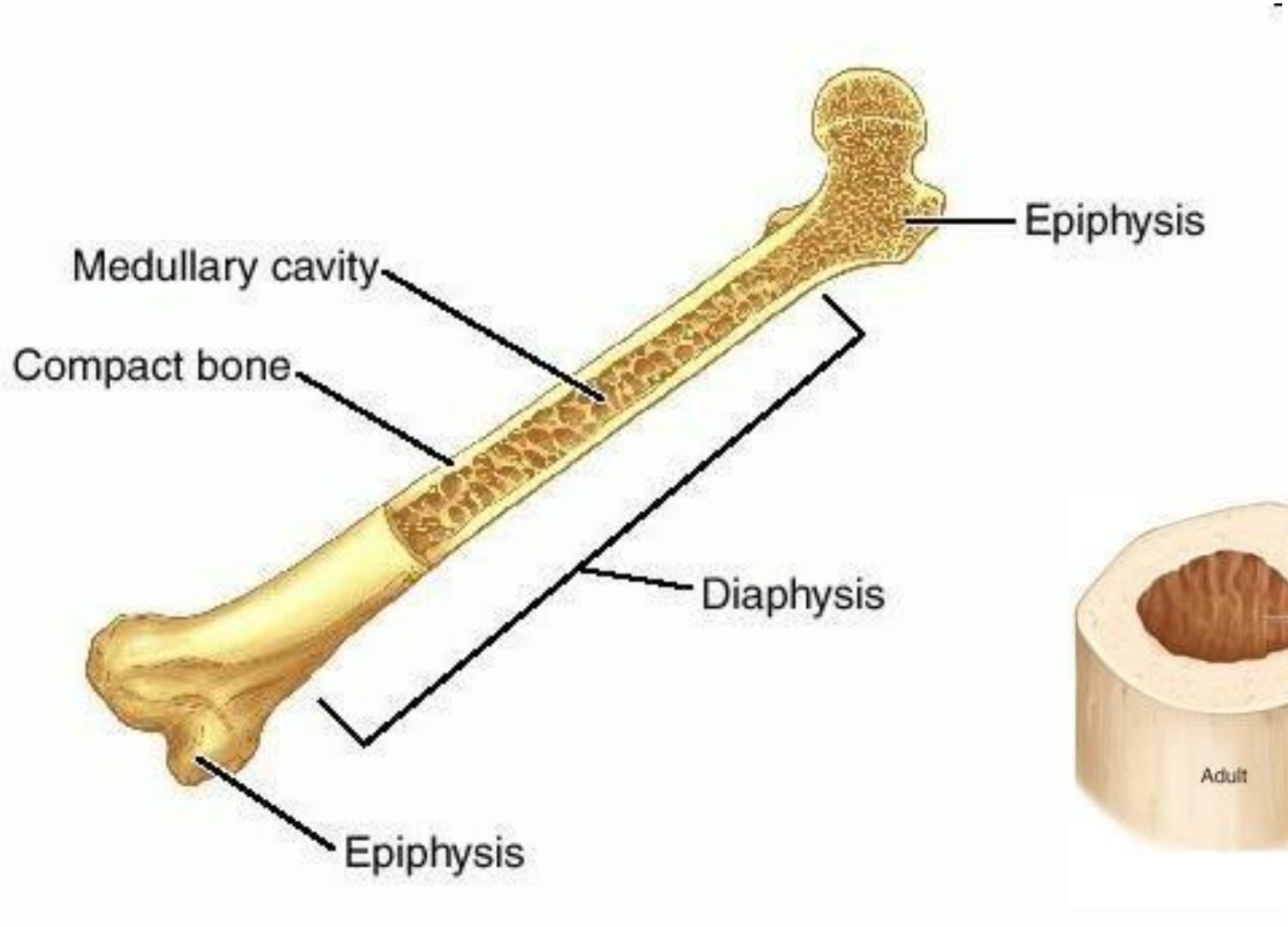
- Bone is living tissue that is hard and makes up most of the skeleton
- Bone is subject to constant rebuilding, the same as any other living tissue

2 Types of Bone

- **Compact bone**: Superficial thin layer provides the strength to bones for weight bearing; larger proportion of compact bone is found at the ends of the bones

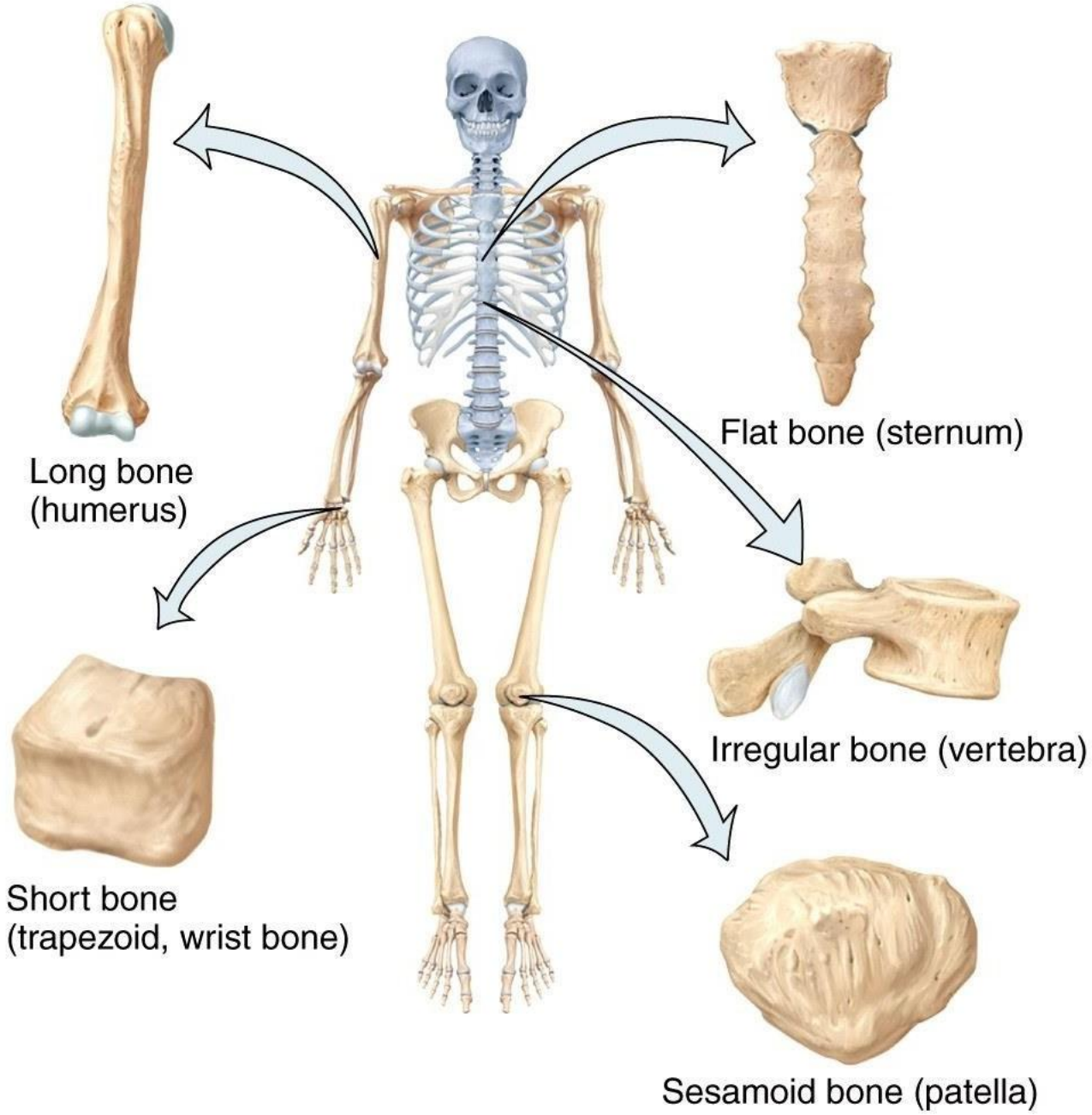
- **Spongy/cancellous/trabecular bone**: Found deep to compact bone and superficial to the marrow cavity if present, contains many small spaces

Bone Structure



Skeletal System

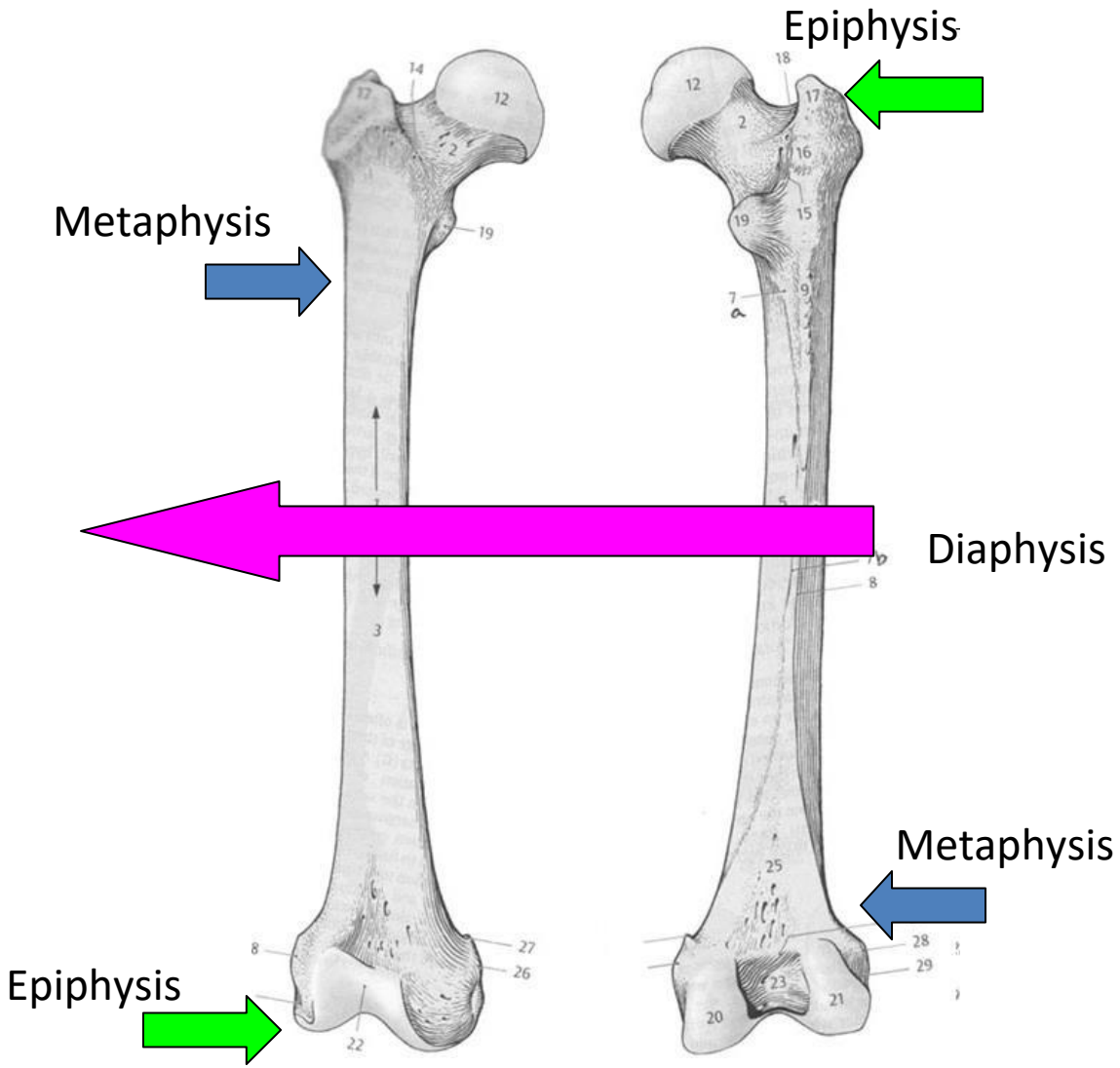
- **Classifications of Bones:**
  - **Long:** Are tubular in shape (i.e. humerus and femur)
  - **Short:** Are cuboidal in shape and found in the wrist (i.e.carpal bones)
  - **Flat:** Protective function (i.e. skull bones, scapula)
  - **Irregular:** Various shapes (i.e. bones of the face, vertebrae)
  - **Sesamoid**: Develop in certain tendons (i.e. patella and sesamoid bones of the 1st toe)
- **Accessory bones:**
  - Extra bones which are small, irregular in shape and often found in the sutures of the skull bones. These are also commonly seen in the foot



Long Bones

- Parts of a Typical Long Bone:
  - **Epiphysis**: The end of a long bone
  - **Metaphysis**: The region between the epiphysis and the diaphysis
  - **Diaphysis**: The shaft of the long bone
  - **Epiphyseal line**: In adults this is a remnant line where the epiphyseal plate (growth plate) was in the child or developing bone

Bone Structure



Bone Terminology

- Descriptive terms for bone surface markings

  Depressions and Openings allow passage of materials, form joints

  Processes and Projections provide attachment for muscles and ligaments

Fossa

Shallow depression in bone, houses opposing bone during flexion

Sulcus or Groove

Furrow along bone, holds tendon or blood vessel

Foramen

Opening in bone, nerves and blood vessels pass through

Fissure

Narrow slit between 2 adjacent bones, nerves and blood vessels pass through

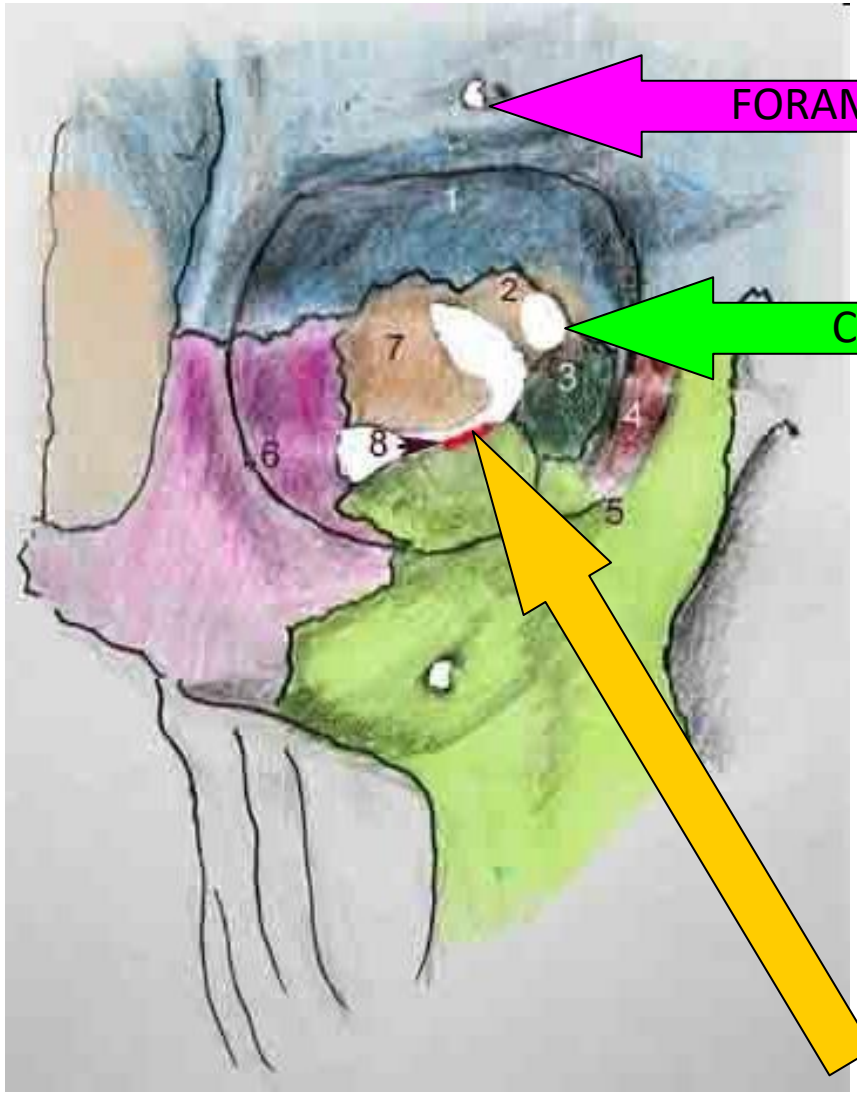
Canal

Large opening in center of bone

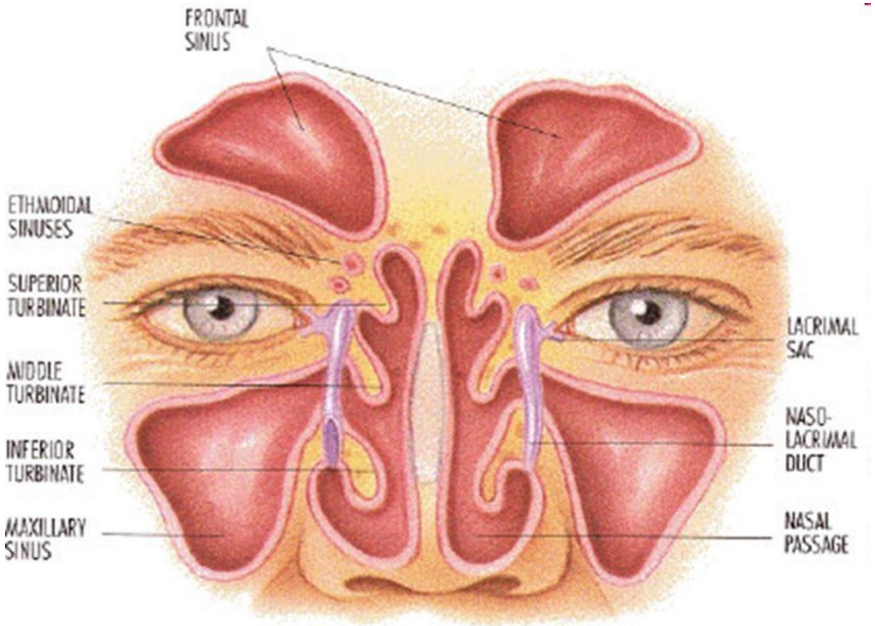
Sinus (or Antrum)

Cavity or chamber within bone

Openings



Sinus/Antrum



Bone Terminology - Projections

- **Trochanter** – large projection off bone
- **Tuberosity** – small projection off bone
- **Tubercle** – small rounded projection
- **Crest** – prominent ridge or elongated projection
- **Line** – long narrow ridge, less prominent than crest
- **Spine** – small pointy projection

Bone Terminology - Processes

- **Head** – rounded projection at end of bone, articulates with base of adjacent bone
- **Neck** – supports head in articulation
- **Condyle** – large rounded protuberance at end of bone
- **Trochlea** – groove at the end of bone – houses moveable tendon
- **Facet** – smooth flat articular surface