بسم الله الرحمن الرحيم

Anatomical Terminology & Skeletal System

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OBJECTIVES

At the end of the lecture, students should be able to:

- Define the word “Anatomy”
- Enumerate the different anatomical fields
- Describe the anatomical position
- Describe different anatomical terms of position & movements as well different anatomical planes
- Classify bones according to shape, structure & development
- Enumerate bones of axial & appendicular skeleton

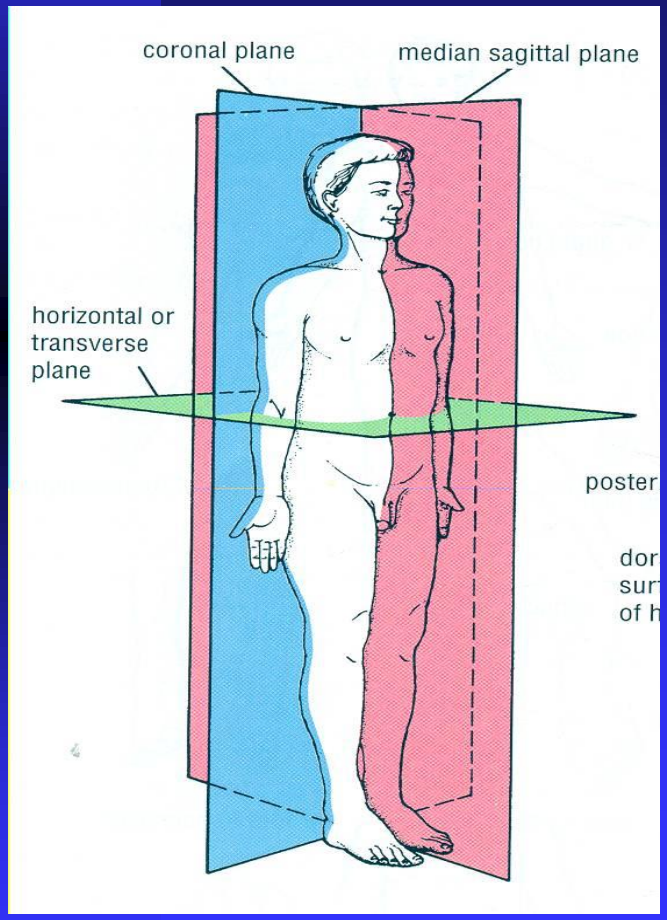
ANATOMY (to Cut)

- The science which deals with the study of the **structure** and **shape** of the body & body parts, and their relationships to one another
- It is divided into:
- **Gross Anatomy**: Study of human body with **naked eye**
- **Microscopic Anatomy (Histology)**: Study of fine structures (cells & tissues) of the human body with the help of microscope
- **Developmental Anatomy (Embryology)**
- **Radiological Anatomy**
- **Cross-sectional Anatomy**
- **Applied Anatomy**
- **Surgical Anatomy**

The Language of Anatomy (Anatomical Terminology)

- To prevent **misunderstanding**, a special set of terms are used to describe the identification and location of body structures
- To accurately describe body parts, the body is in a standard position called the **Anatomical Position**, in which:
  - **Body is erect**
  - **Arms hanging by the side**
  - **Palms facing forward**
  - **Feet are parallel**

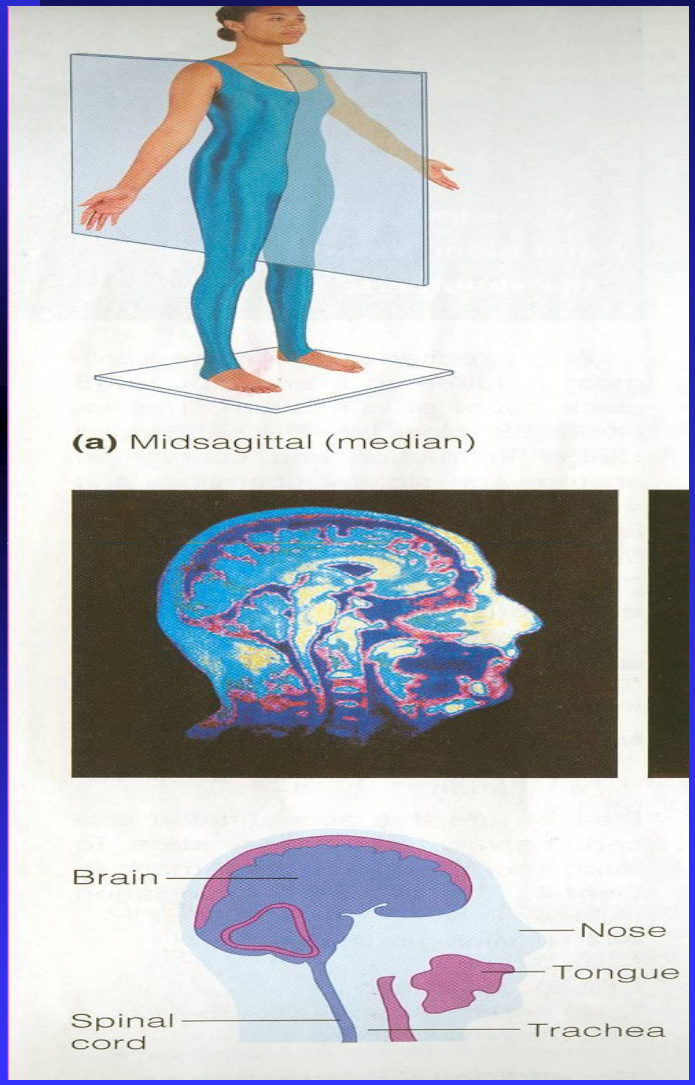
PLANES OF THE BODY



To do a Section (cut) through the body wall or an organ, it is made along

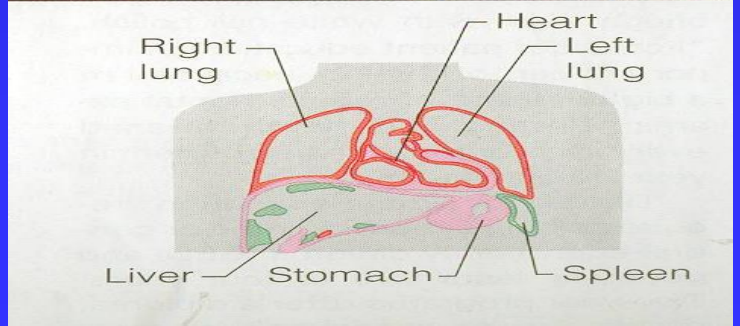
- *an* ***Imaginary Line (PLANE).***
- ***The body has Three Imaginary Planes (sections)***
- ***that lie at right angles to one another (in the anatomical position).***
- ***1. Median sagittal.***
- ***2. Coronal.***
- ***3.Horizontal (Transverse).***

MEDIAN (MidSagittal)PLANE



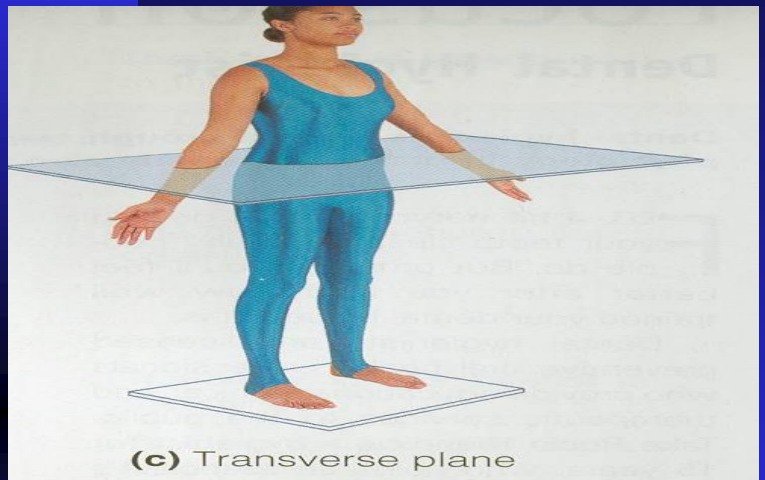
- ***It is a Vertical plane.***
- ***It passes through the Center (Midline) of the body.***
- ***It divides the body into Right and Left halves.***

CORONAL (FRONTAL) PLANE

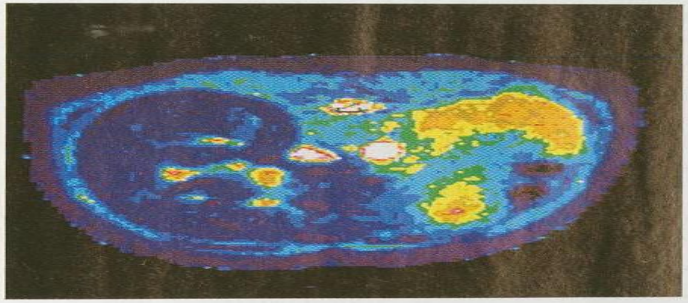


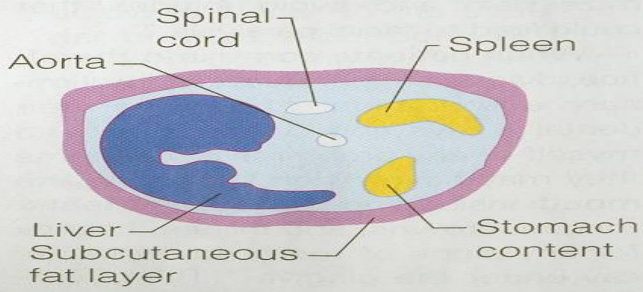
- *It is a Vertical plane.*
- *It divides the body into :*
- *Anterior and Posterior parts.*

HORIZONTAL (TRANSVERSE) PLANE



(c) Transverse plane

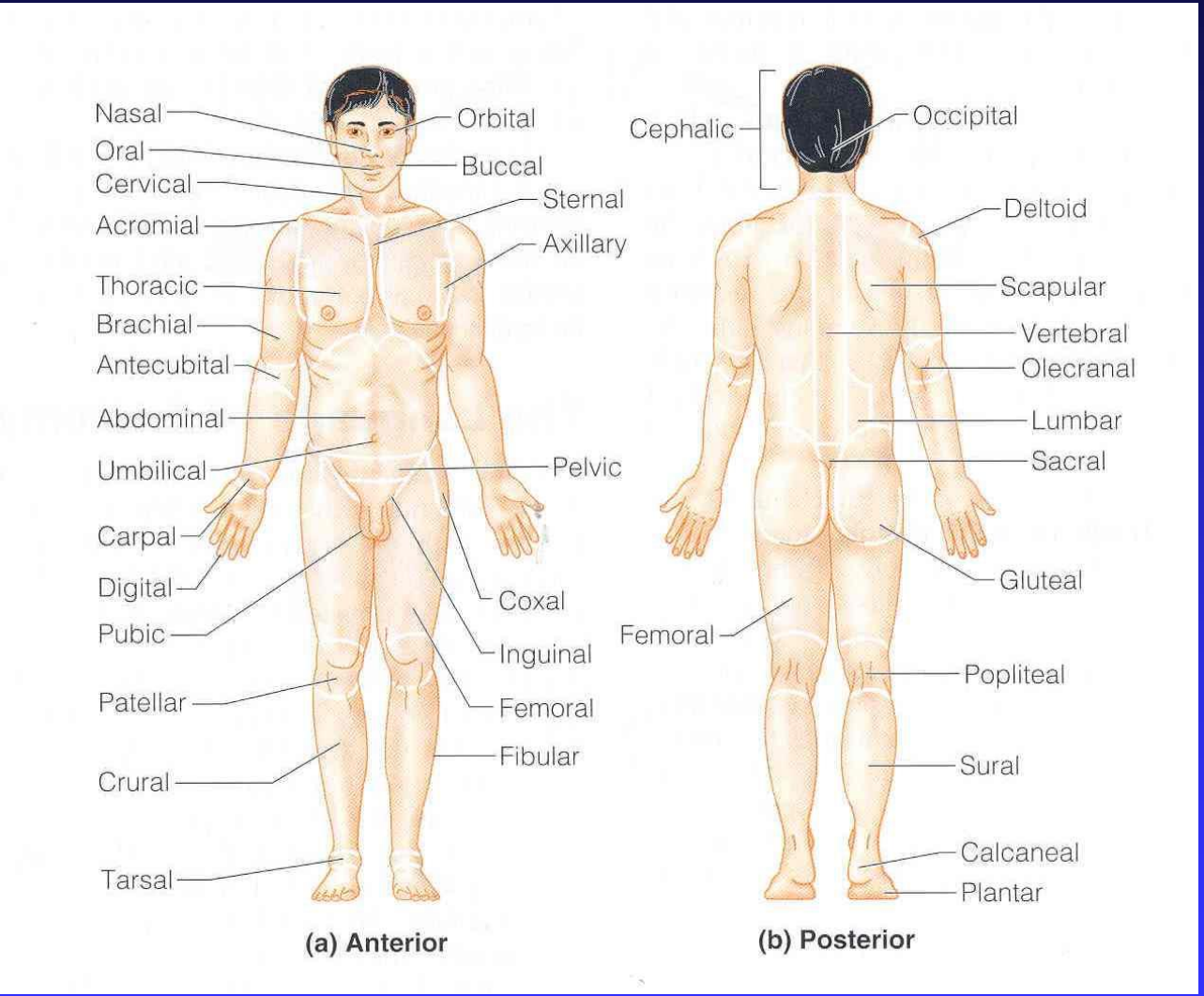




- It is also called Cross Section.
- It divides the body into :
- Upper and Lower parts.

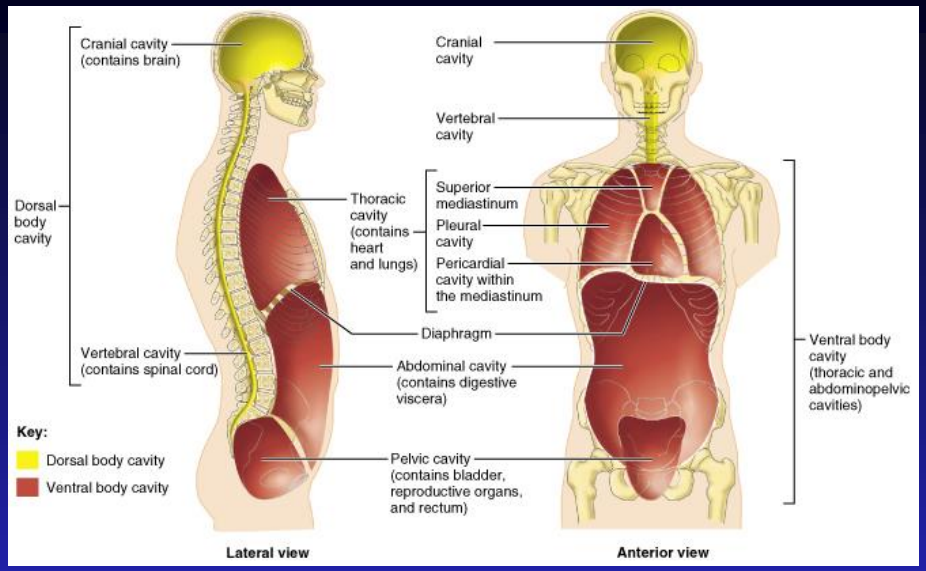
TERMS OF REGIONS

- Cranial (Cephalic)
- Cervical
- Thoracic
- Abdominal
- Pelvic
- Planter
- Palmer



Body Cavities

The body has two sets of internal cavities that lodge and protect the organs. These are Dorsal & Ventral.



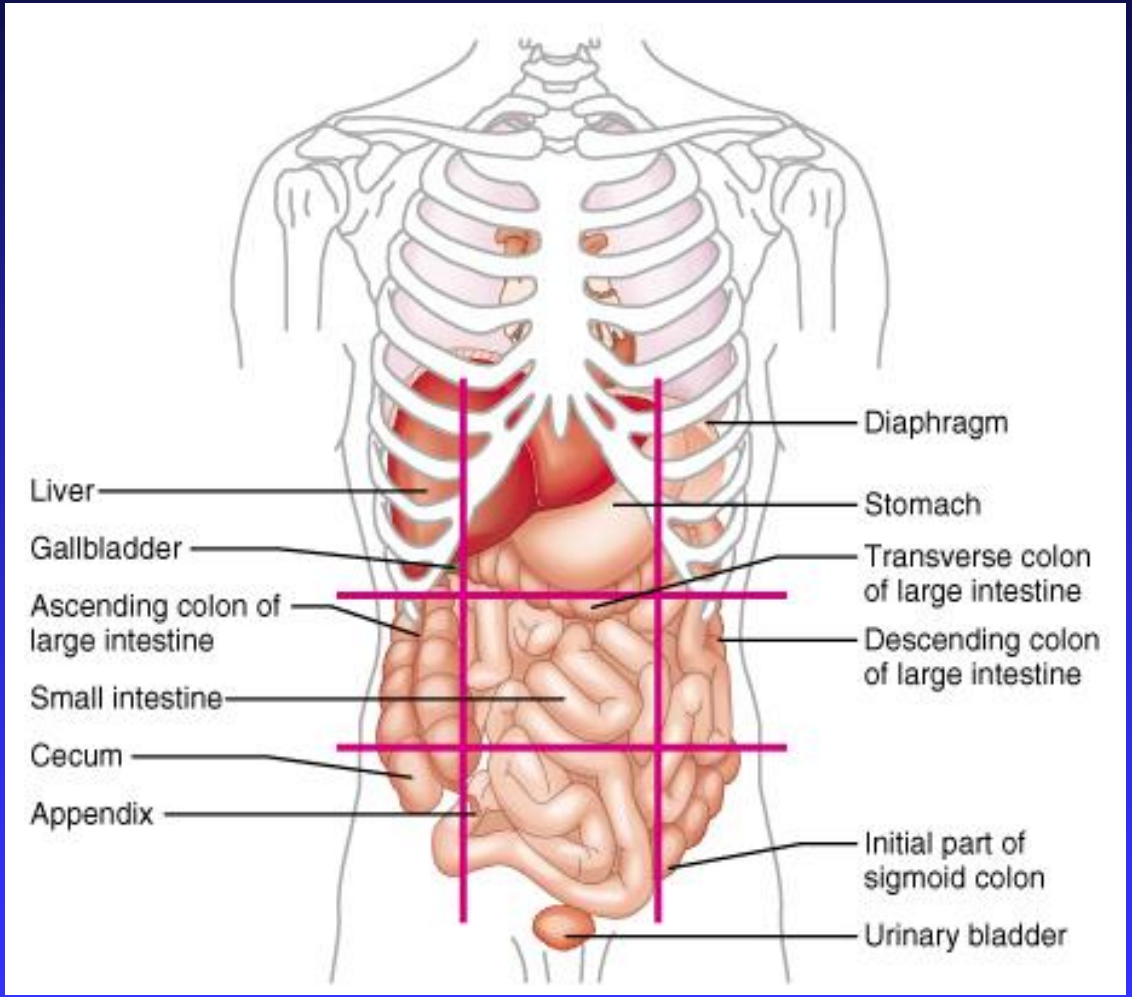
- **Dorsal body cavity has two subdivisions, which are continuous with each other:**
  - **Cranial cavity**: space inside the bony skull, contains brain
  - **Spinal cavity**: space inside the vertebral column, contains spinal cord

- **Ventral body cavity** has two subdivisions, which are separated from each other by the diaphragm.
  - **Thoracic cavity**: lies superior to diaphragm, contains heart and lungs
  - **Abdominopelvic cavity**: lies below the diaphragm, contains stomach, intestine, urinary bladder, liver, reproductive organs, rectum, etc.

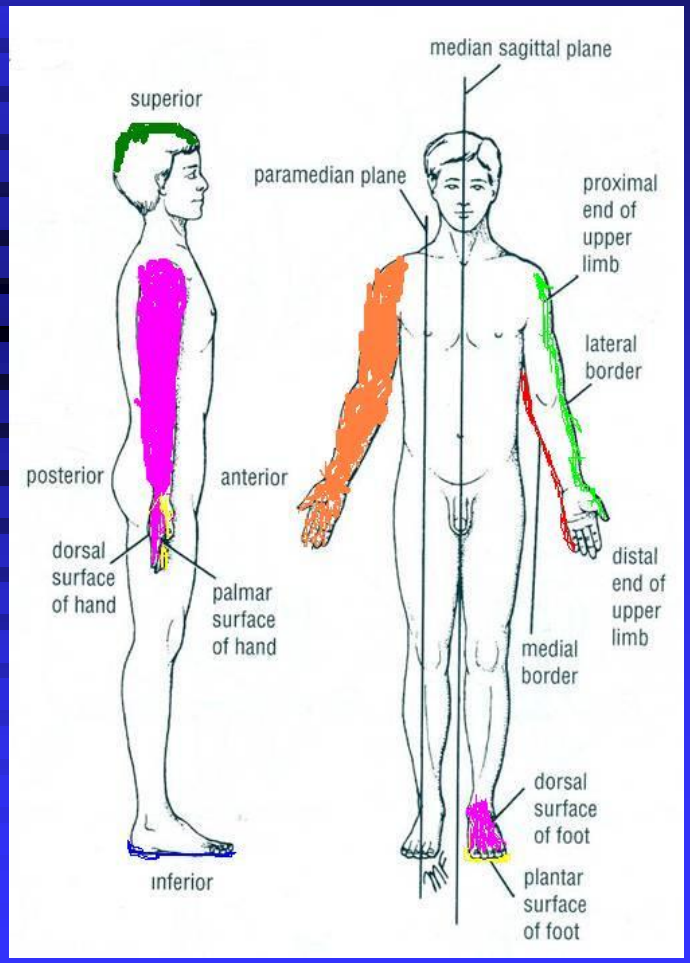
Abdominopelvic regions

The **Abdominopelvic** area is divided into 9 regions by 2 vertical & 2 horizontal lines or planes

Objective: To locate the different organs in each region



TERMS OF POSITION

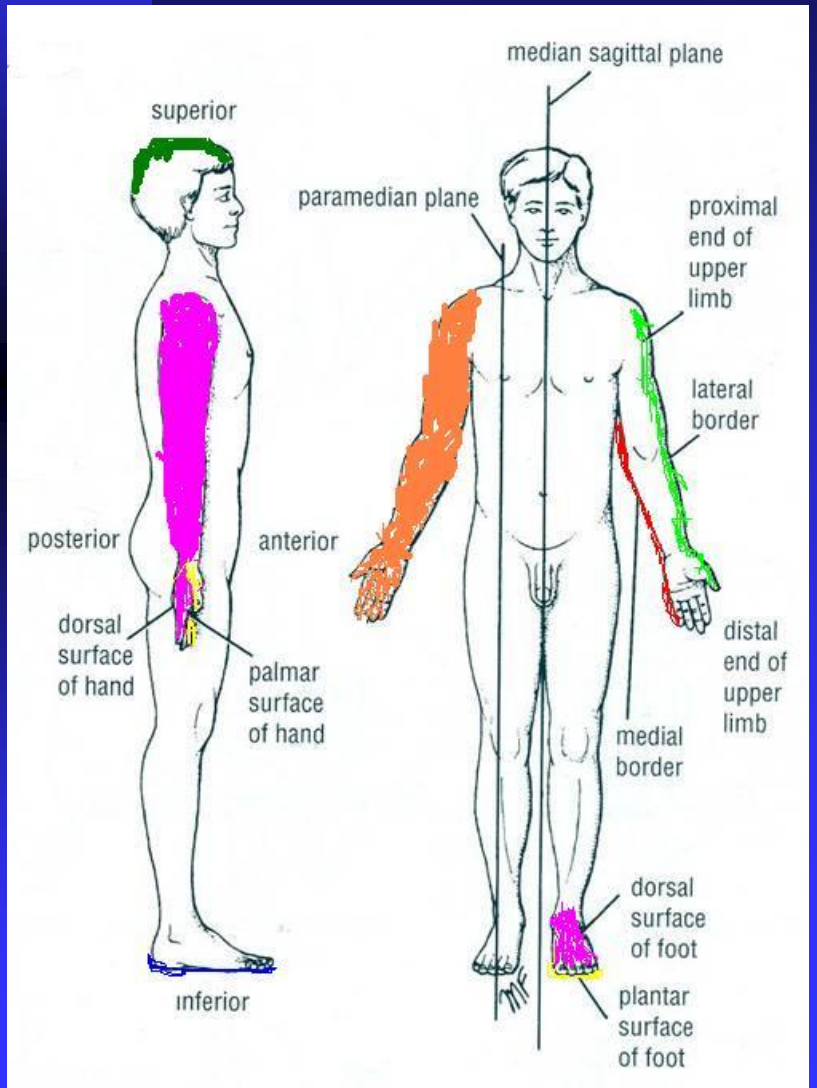


- ***Anterior* : *Front of the body.***
- ***Posterior* : *Back of* the *body.***
- ***(HAND) :***
- ***Anterior: Palmar.***

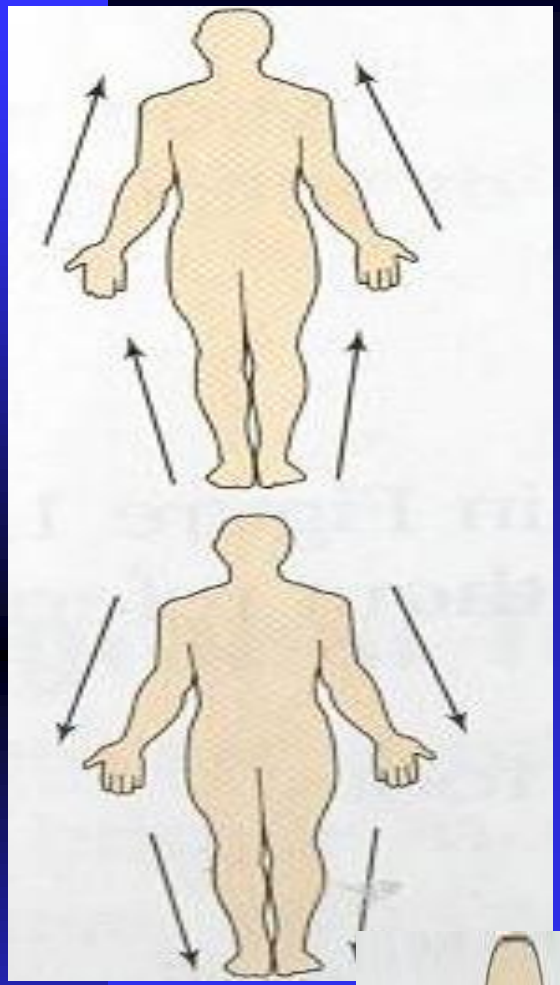
Posterior: Dorsal .

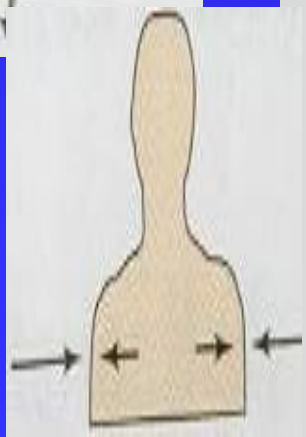
- **(FOOT) :**
- ***Anterior: Planter .***
- **Posterior: Dorsal.**
- ***Medial : Nearer to the median plane of the body.***
- ***Lateral : Away from the median plane.***

TERMS OF POSITION

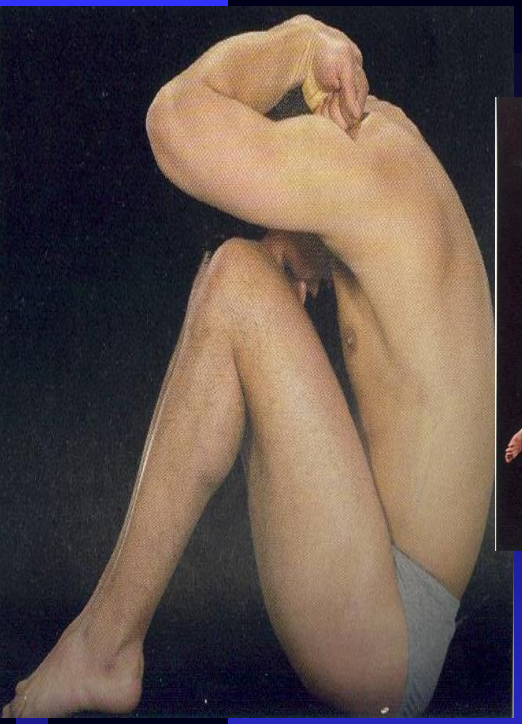


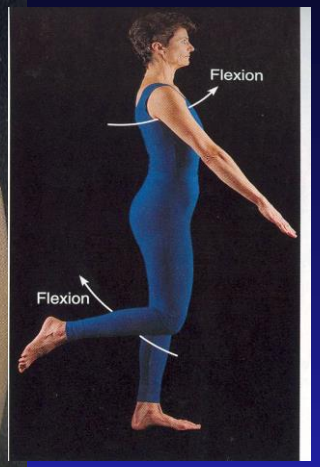
- ***Superior (Above):*** *Toward the head end (upper) part of the body.*
- ***Inferior (Caudal) :*** *Toward the lower part of the body.*
- ***Supine :***
- *The body lies on the back.*
- ***Prone :***
- *The face is downwards.*
-



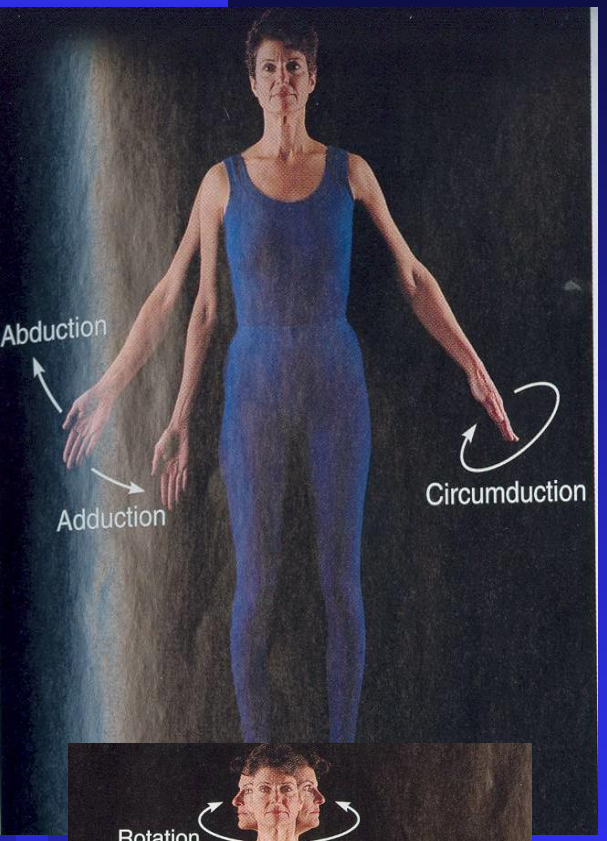


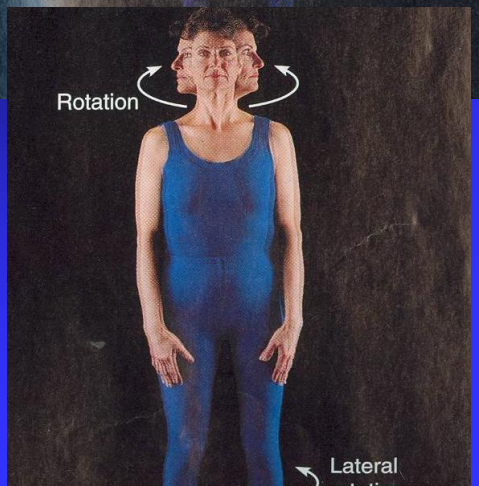
- ***Proximal :*** ***Close to the point of attachment of a limb to the body trunk.***
- ***Distal :*** ***Farther from the the point of attachment of a limb to the body trunk.***
- ***Superficial (External) :*** ***Toward or at the body surface.***
- ***Deep (Internal):*** ***Away from the body surface or the center of a cavity.***
- .





- ***TERMS OF MOVEMENT.***
- ***A. Flexion:***
- ***Usually an Anterior movement (Except.***
- ***in the knee joint).***
- ***It Decreases the angle of the joint (brings two***
- ***bones closer together).***
- ***B. Extension:***
- ***Usually a Posterior movement.***
- ***Straightening of the joint.***
- ***It Increases the angle or distance between two bones.***





- ***Movements In the Coronal (frontal) plane:***
- ***1. Abduction:***
- ***Movement of a limb Away from the midline of the body***
- ***2. Adduction:***
- ***Movement of a limb Toward the midline of the body.***

3. Lateral flexion:

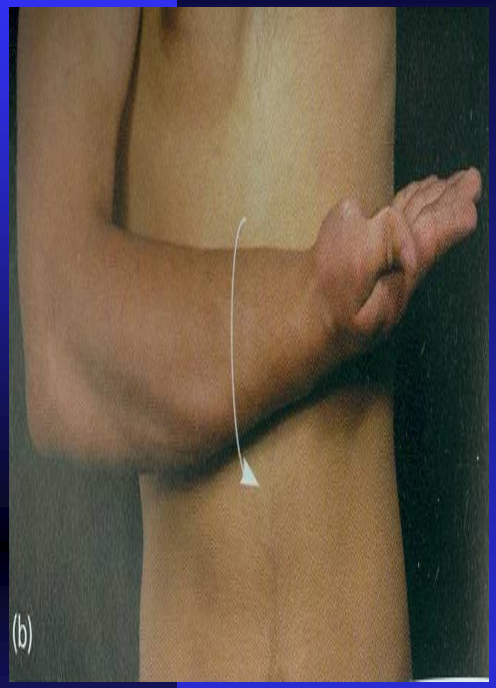
Side Movement of the trunk

Circumduction

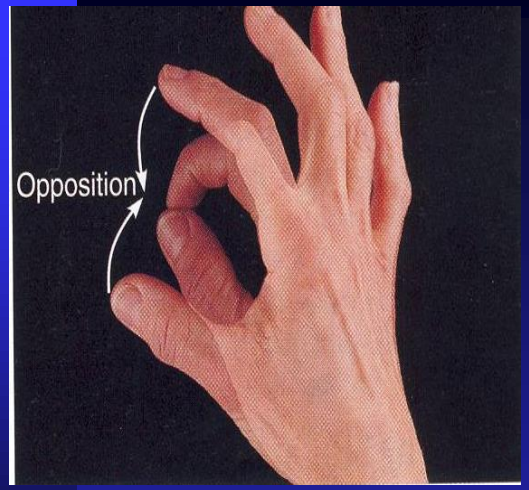
(d) Abduction, adduction, and circumduction

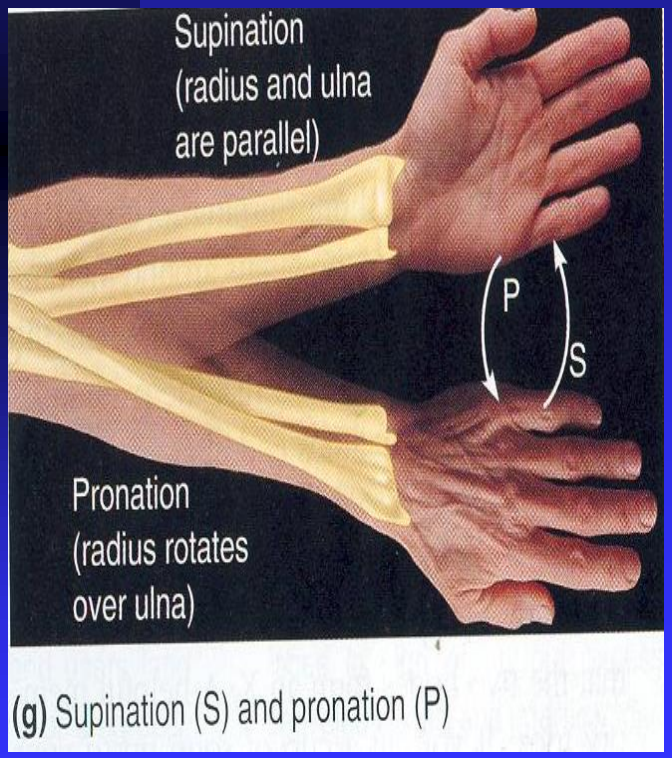
- *It is Combination of:*
- *Flexion.*
- *Extension.*
- *Abduction.*
- *Adduction*

ROTATION



- ***Medial:***
- ***The anterior surface of the part faces medially.***
- ***Lateral :***
- ***The anterior surface of the part faces laterally.***





(g) Supination (S) and pronation (P)

- **Opposition:** bringing tips of fingers and thumb together as in picking something up

Supination:

- *Lateral rotation of the forearm.*
- *The palm faces Anteriorly.*
- *The radius and ulna are Parallel.*

Pronation:

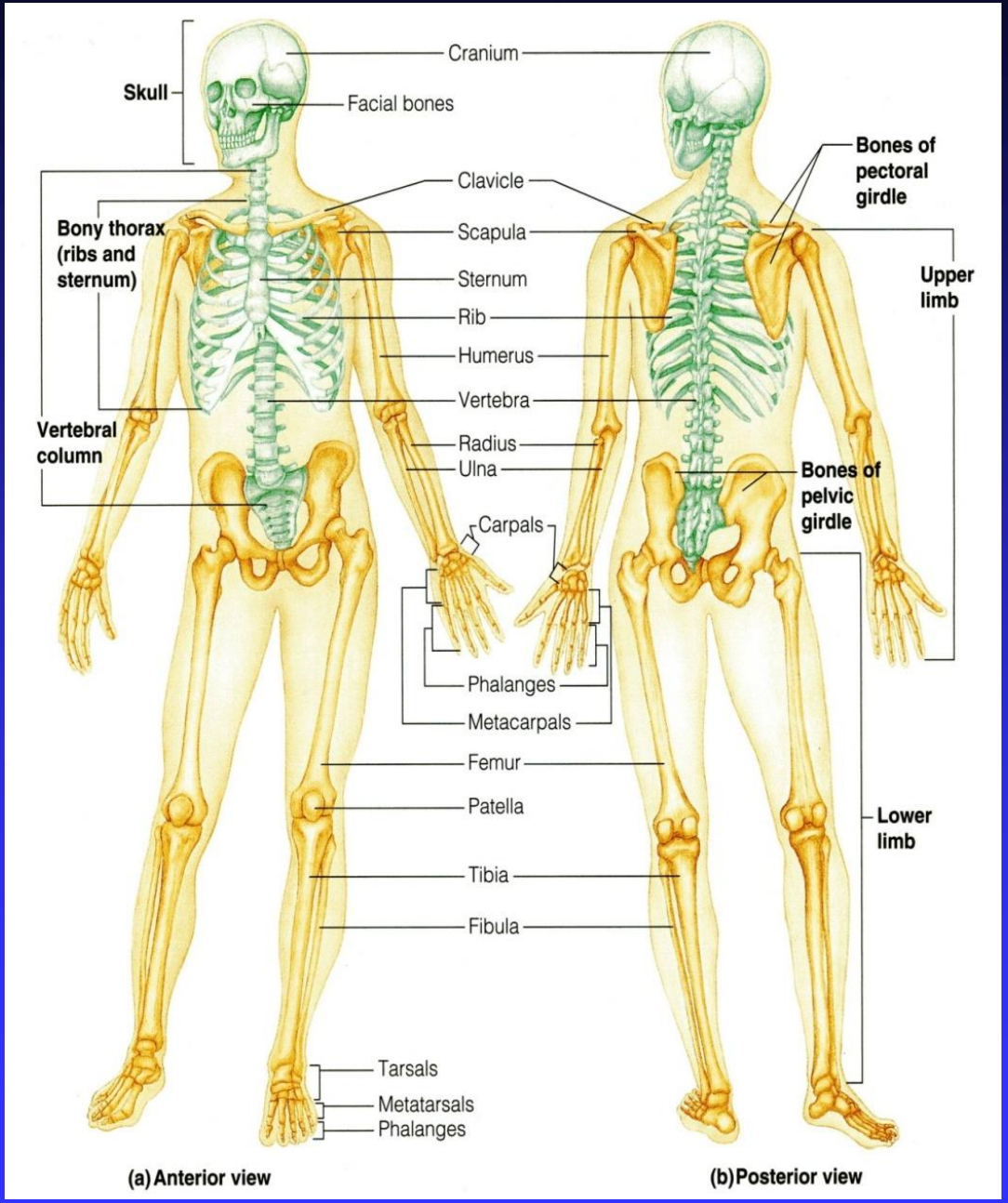
- *Medial rotation of the forearm.*
- *The palm faces Posteriorly*
- *The radius Crosses the ulna and the two bones form an X.*

- ***Planter Flexion:***
- *Depressing the foot (down).*
- *Movement with pointing the toes.*
- ***Dorsiflexion***
- *Up movement of the foot*
- *(Standing on the heels)*
- ***Inversion :***
- *The sole faces in a Medial direction.*
- ***Eversion :***
- *The sole faces in a Lateral direction.*

Skeletal System

Includes:

- Bones
- Joints (articulations)



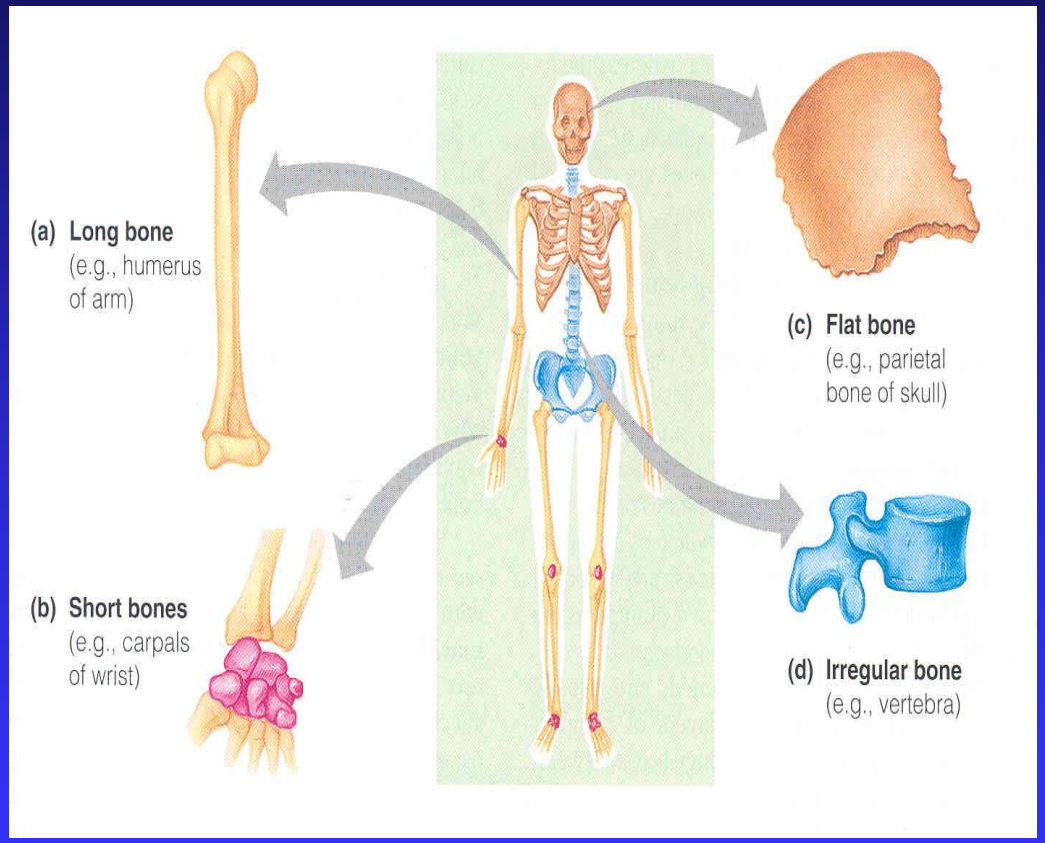
Functions of Bones

1. Support of the body organs
2. Protection of soft body organs
3. Attachment of muscles
4. Movement of the body as a whole, or of the body parts
5. Storage of fat and minerals e.g. calcium and phosphorus
6. Blood cell formation

Classification of Bones

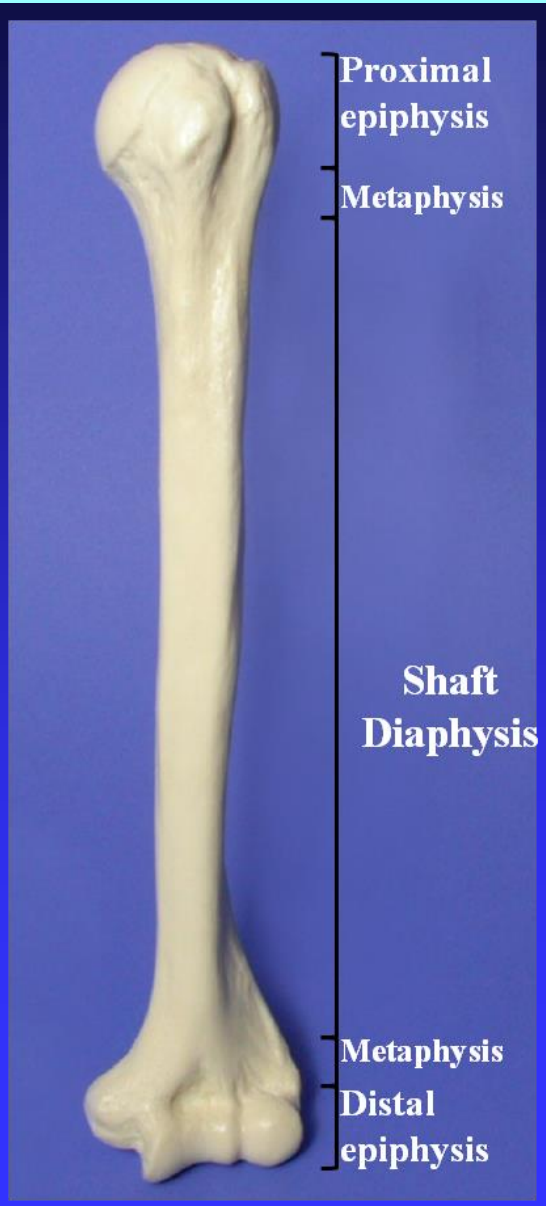
Bones are classified on the bases of their:

- **1. Shape**:
- Long, Short, Flat, Irregular
- **2. Structure**: **Compact & Spongy**
- **3. Development**: Membranous & Cartilagenous



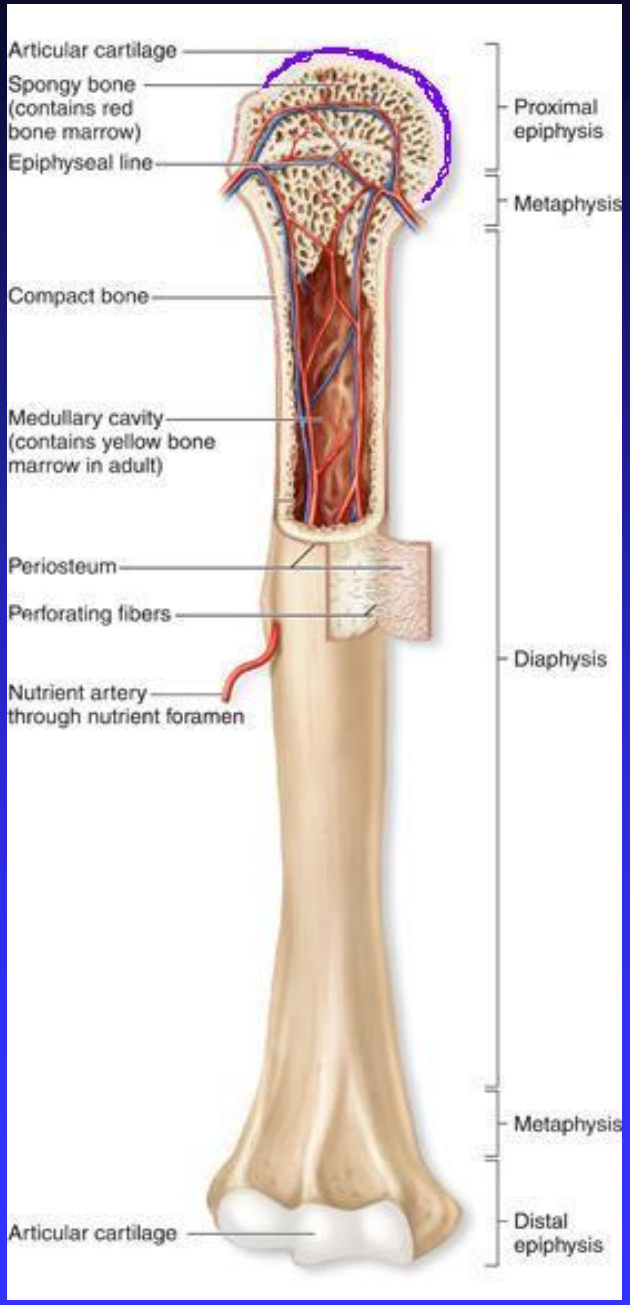
Gross Structure of a Long Bone

- Each long bone has:
  - A long cylindrical **shaft** called the **'diaphysis'.**
  - Two **ends** called the **'epiphyses'**
  - The region at the junction of diaphysis and epiphysis is called **'metaphysis'**



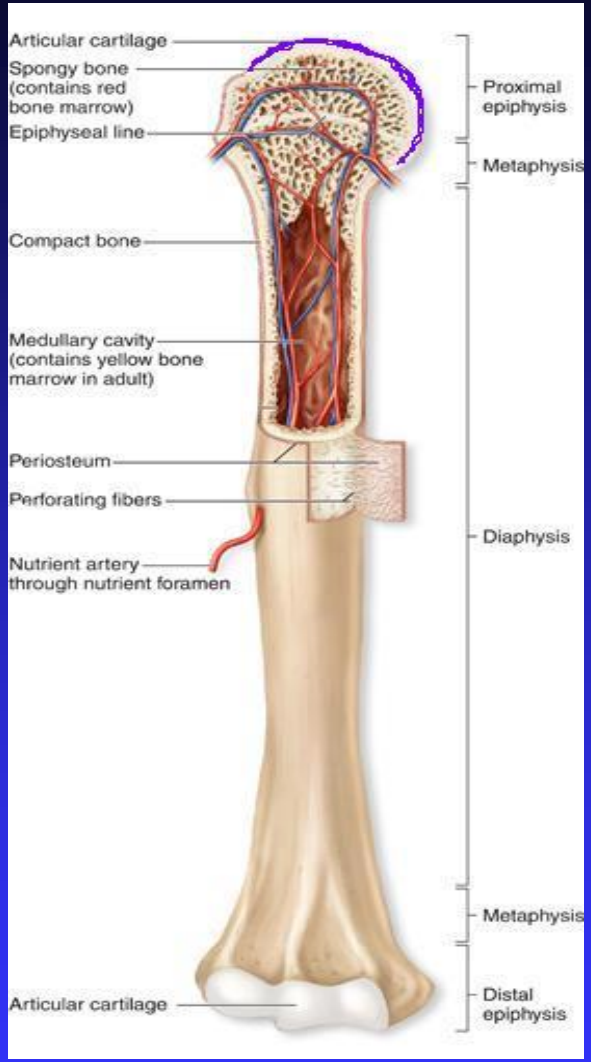
Diaphysis (Shaft)

- Composed of **compact bone**
- Covered on its external surface by a fibrous connective tissue membrane called the periosteum.
- Has a cavity called the marrow cavity. In adults, the marrow cavity is a storage area for fat and contains yellow marrow. In infants, it contains red marrow and is the site of blood cells formation



Epiphyses

- Each epiphysis is composed of **spongy bone**, lined by a thin layer of compact bone.
- Its external surface is covered by a layer of hyaline cartilage called the **articular cartilage**
- Articular cartilage provides smooth slippery surface that decreases friction at joint surfaces



Metaphysis

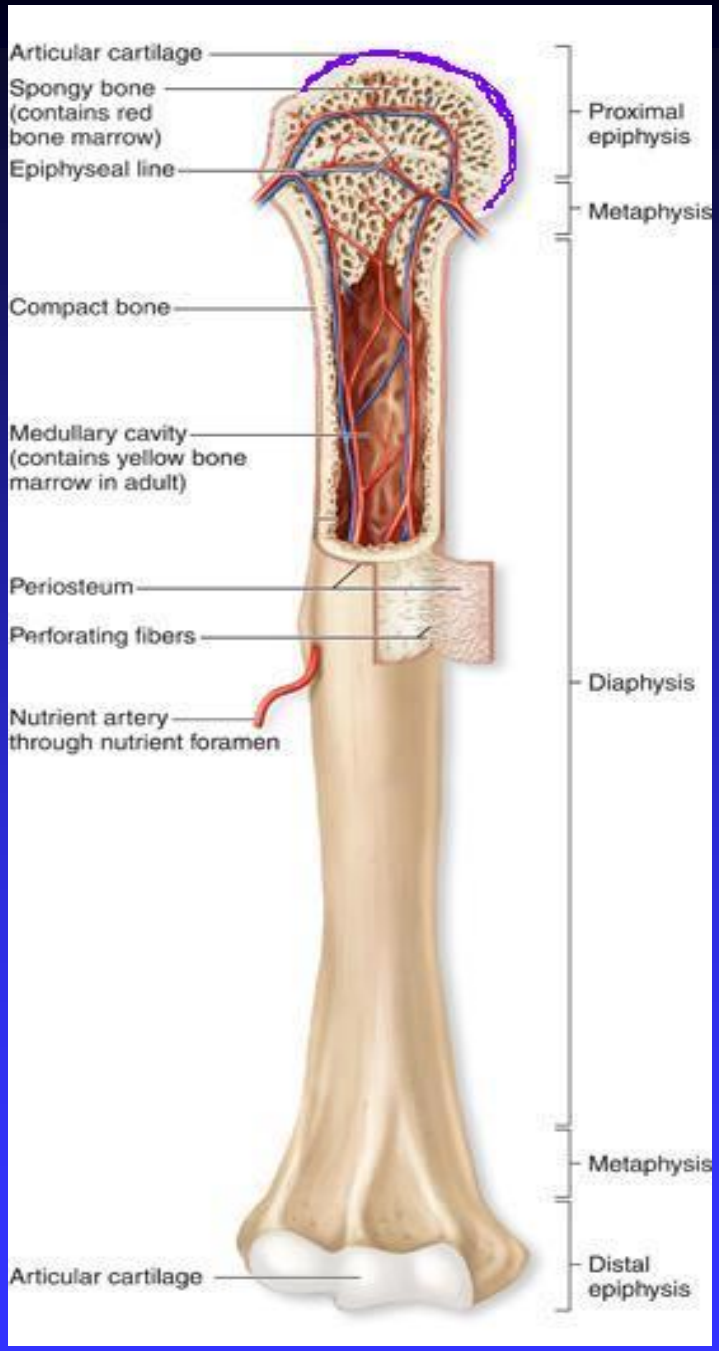
- It contains a thin plate of cartilage called the epipyseal plate, that is responsible for the lengthwise growth of the long bones.

Role of Periosteum

- Protects the bone
- Gives attachment to muscles
- Carries blood vessels and nerves to bone
- Deposits new bone on the surface thus increases the girth of bone

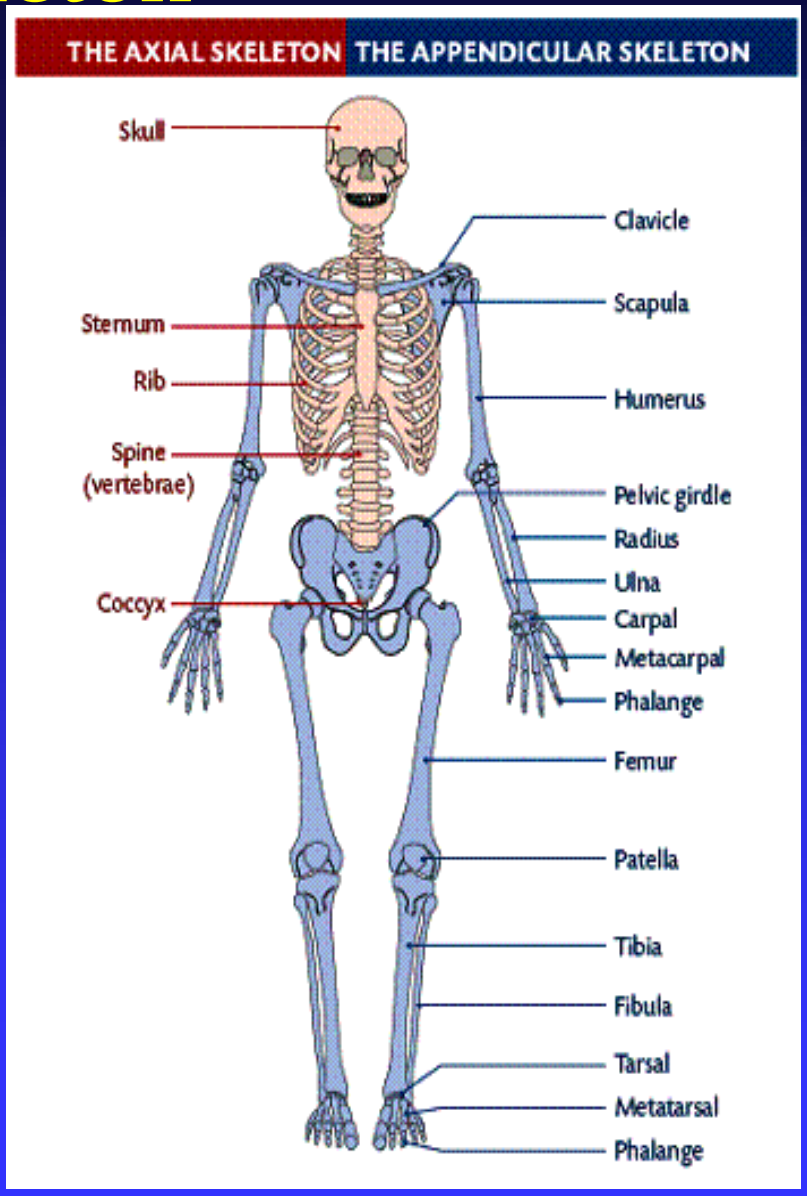
Growth of bone

- Increase in length: epiphyseal plates
- Increase in girth: periosteum

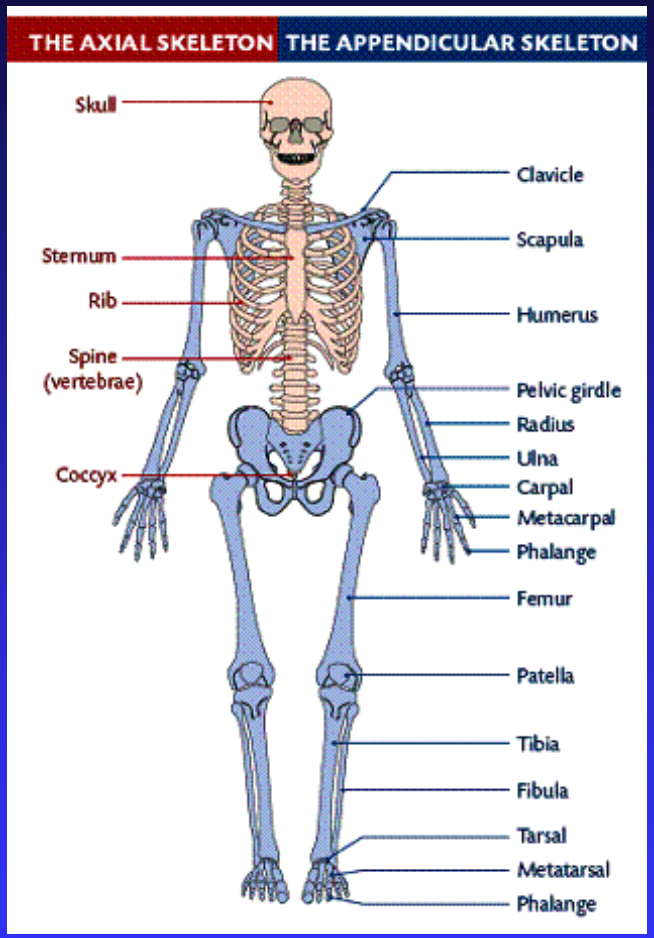


The Skeleton

- There are 206 bones in our body, arranged to form the body framework called, the skeleton
- The skeleton is perfectly adapted to the functions of body protection and motion
- It is subdivided into two divisions:
  - The **Axial skeleton**, the bones that form the longitudinal axis of the body
  - The **Appendicular skeleton**, the bones of limbs and girdles



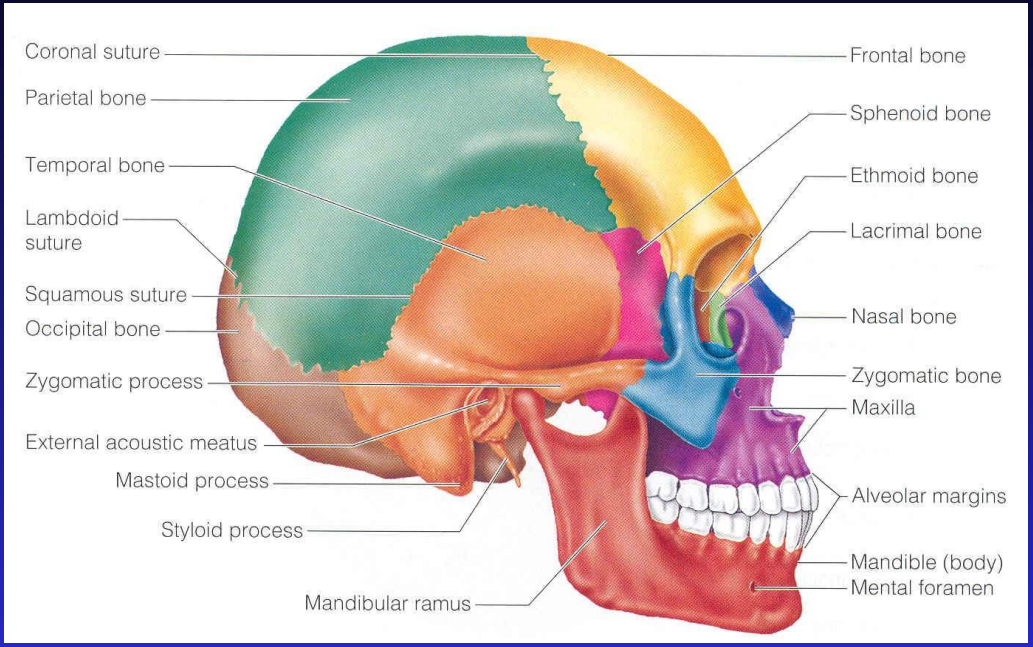
- **The Axial Skeleton** consists of the:
  - Skull bones
  - Vertebral column
  - Sternum
  - Ribs



- The Appendicular Skeleton consists of the bones of the :
  - Pectoral & Pelvic Girdles, connect the bones of the limbs to the axial skeleton
  - Upper Limb
  - Lower Limb

Skull bones

- Formed of two sets of bones:

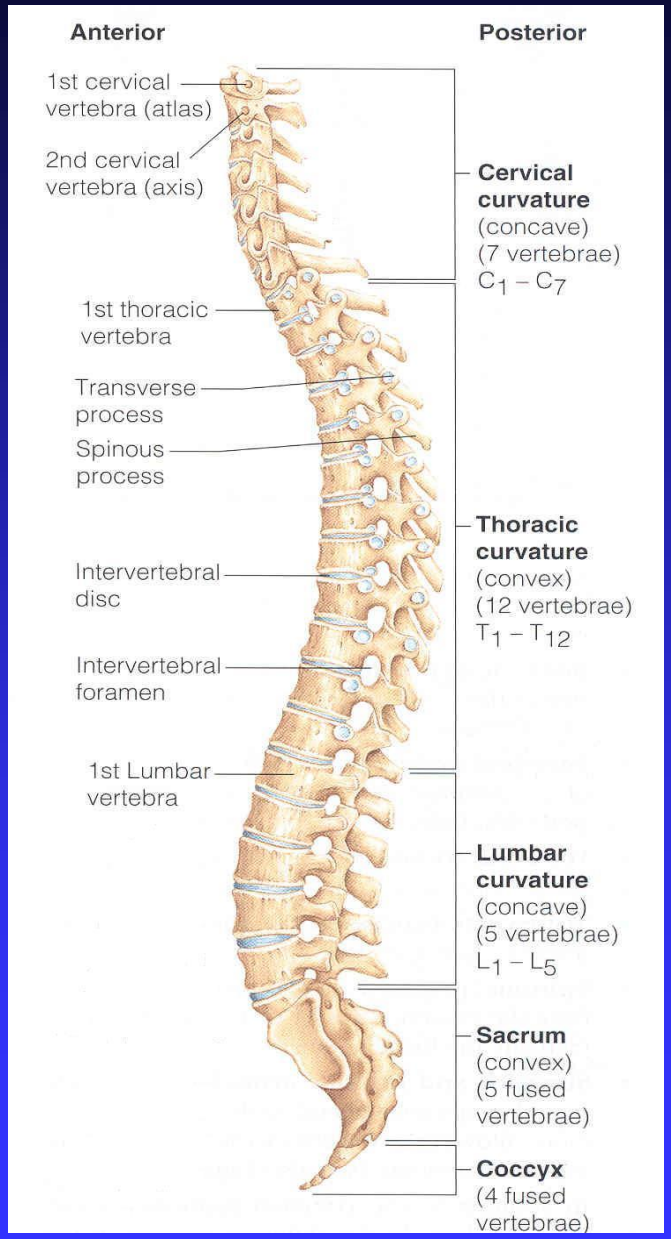


- **Cranium:**
  - **Encloses and protects the brain.**
  - **Consists of the following bones:**
    - **Frontal**
    - **Parietal**
    - **Temporal**
    - **Sphenoid**
    - **Occipital**

- **Facial bones:**
  - Form the skeleton of the face
  - Consists of the following bones:
    - Maxilla
    - Mandible
    - Zygomatic
    - Nasal

Vertebral column

- Forms the axial support of the body
- Is a flexible curved structure, formed of **33 irregular bones**, the (vertebrae)
- Running through its cavity is the spinal cord
- Is divided into 5 regions:
  - Cervical: 7 vertebrae
  - Thoracic: 12 vertebrae
  - Lumbar: 5 vertebrae
  - Sacral: 5 vertebrae fused to from a triangular bone called sacrum
  - Coccygeal: 4 vertebrae fused to form a small bone called coccyx

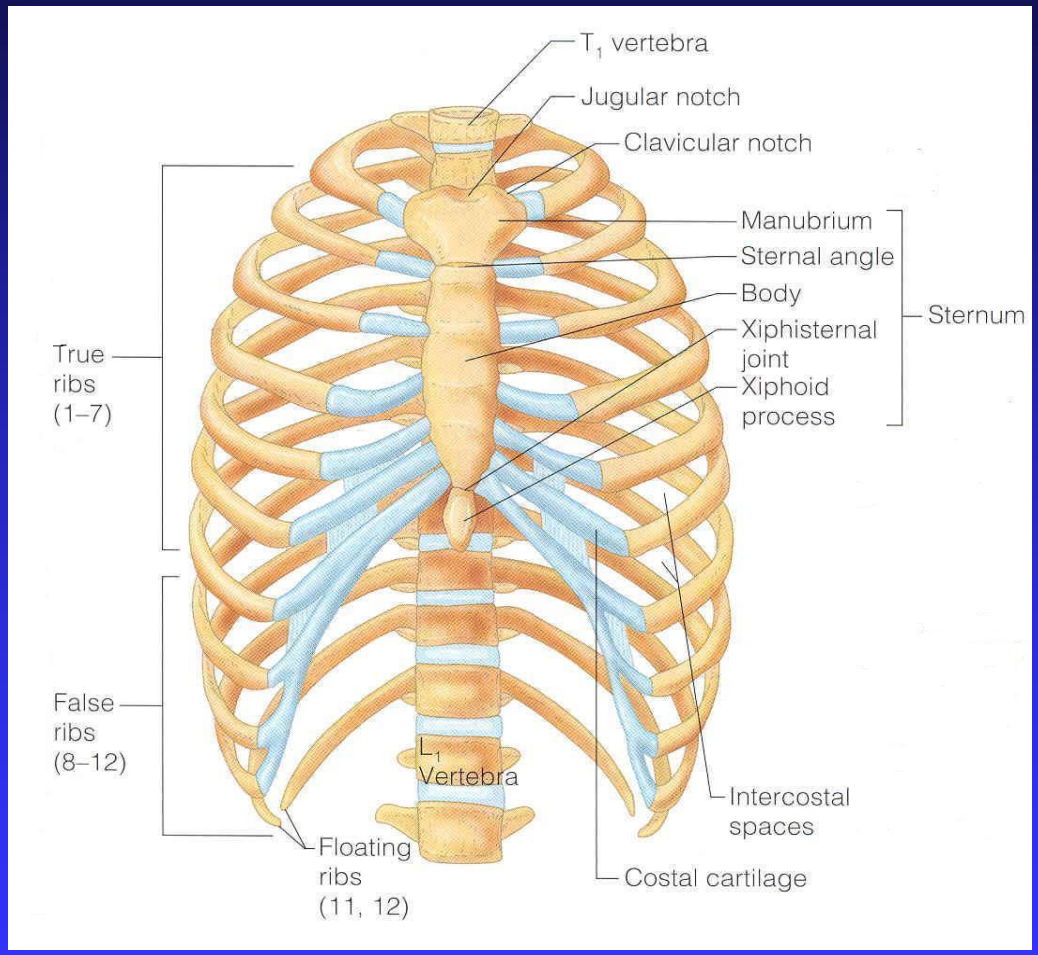


Sternum

- Flat bone
- Has three parts: manubrium, body and xiphoid process

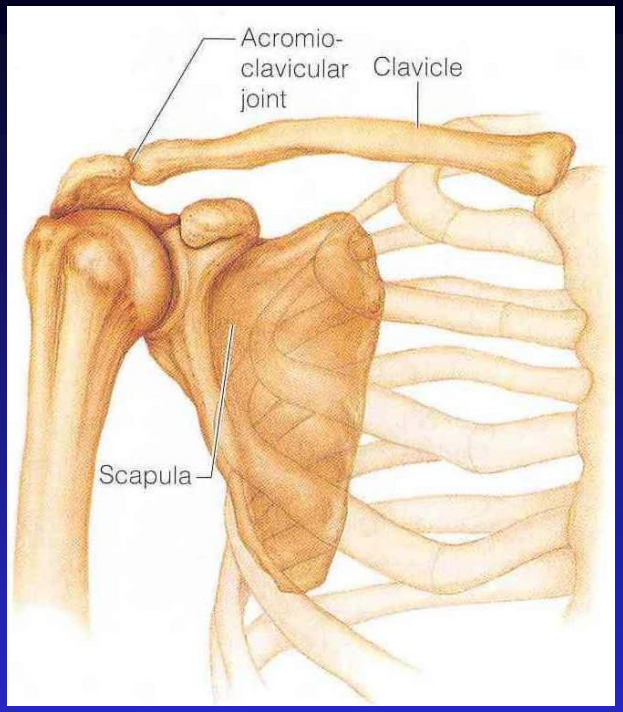
Ribs

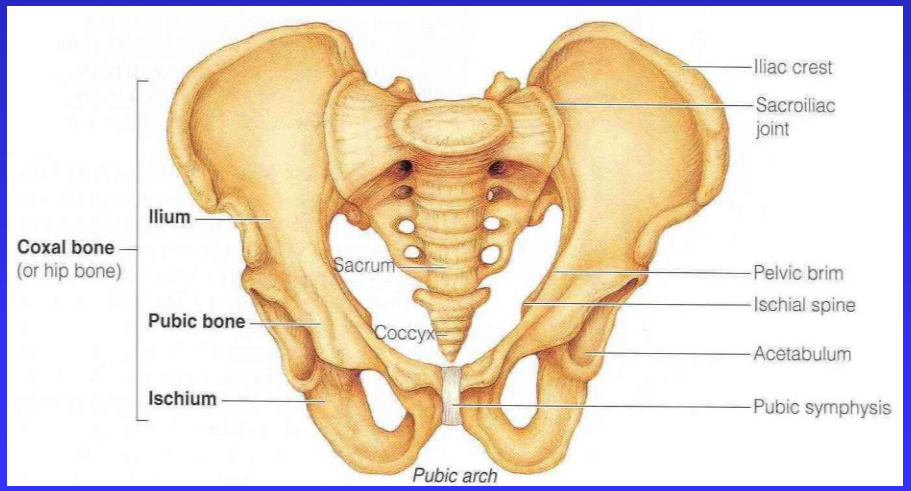
- Number: 12 pairs
- All ribs articulate with vertebrae
- Only upper 7 pairs articulate with sternum



Bones of the Girdles

- Pectoral Girdle: Bones connecting the upper limb with the axial skeleton
  - Clavicle
  - Scapula
- Pelvic Girdle: Bones connecting the lower limb with the axial skeleton
  - Two hip bones

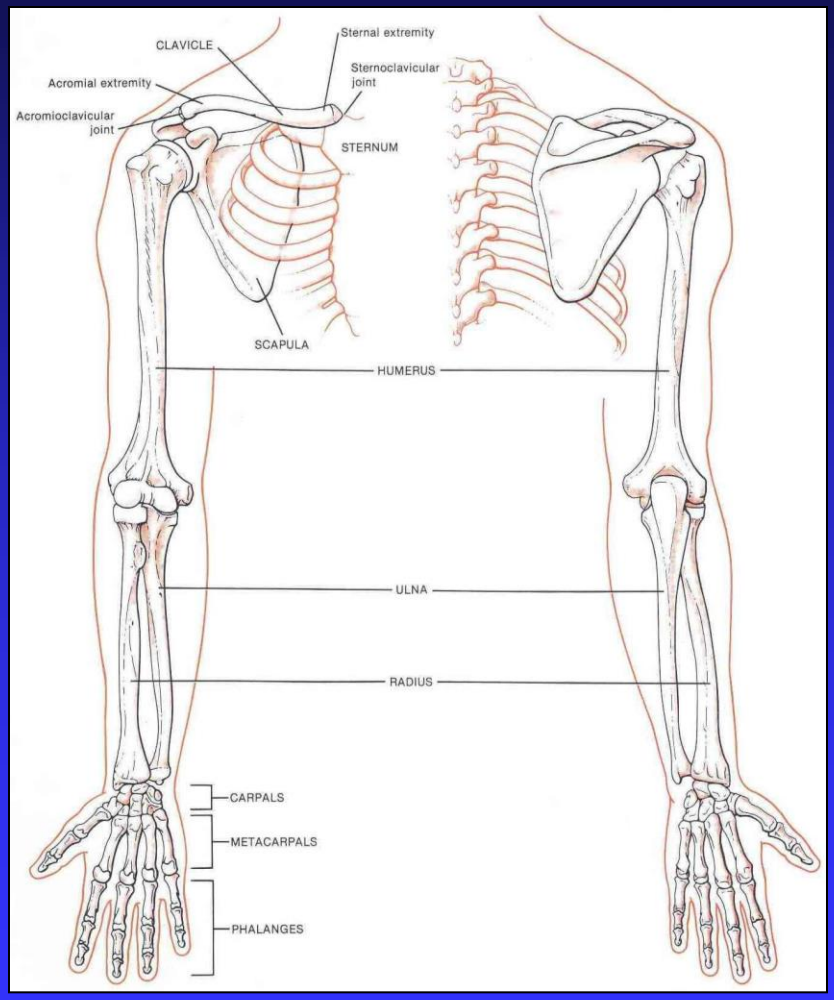




Bones of the Upper Limb

- Bone of arm: ***humerus***
- Bones of forearm: ***radius*** (lateral) & ***ulna*** (medial)
- Bones of hand:

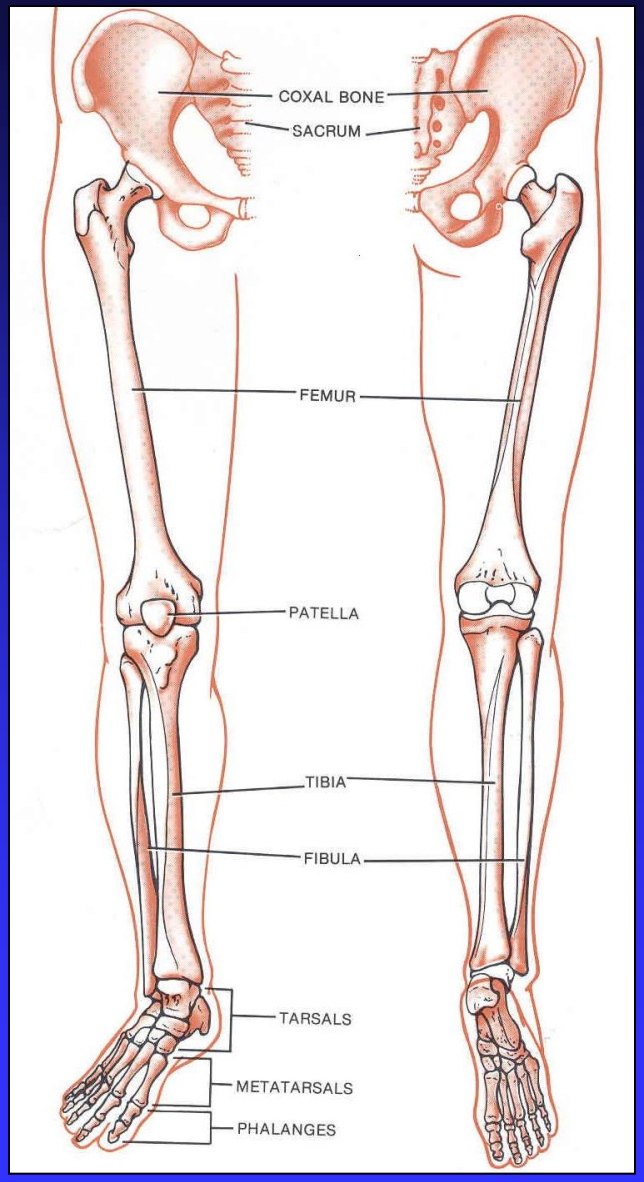
1. 8 ***carpal*** bones
2. 5 ***metacarpal*** bones
3. 14 ***phalanges***: 2 for thumb & 3 for each of medial 4 fingers



Bones of the Lower Limb

- Bone of thigh: ***femur***
- Bones of leg: ***fibula*** (lateral) & ***tibia*** (medial)
- ***Patella***
- Bones of foot:

1. 8 ***tarsal*** bones
2. 5 ***metatarsal*** bones
3. 14 ***phalanges***: 2 for big toe & 3 for each of lateral 4 toes



Thank You & Good Luck