

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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

- 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**

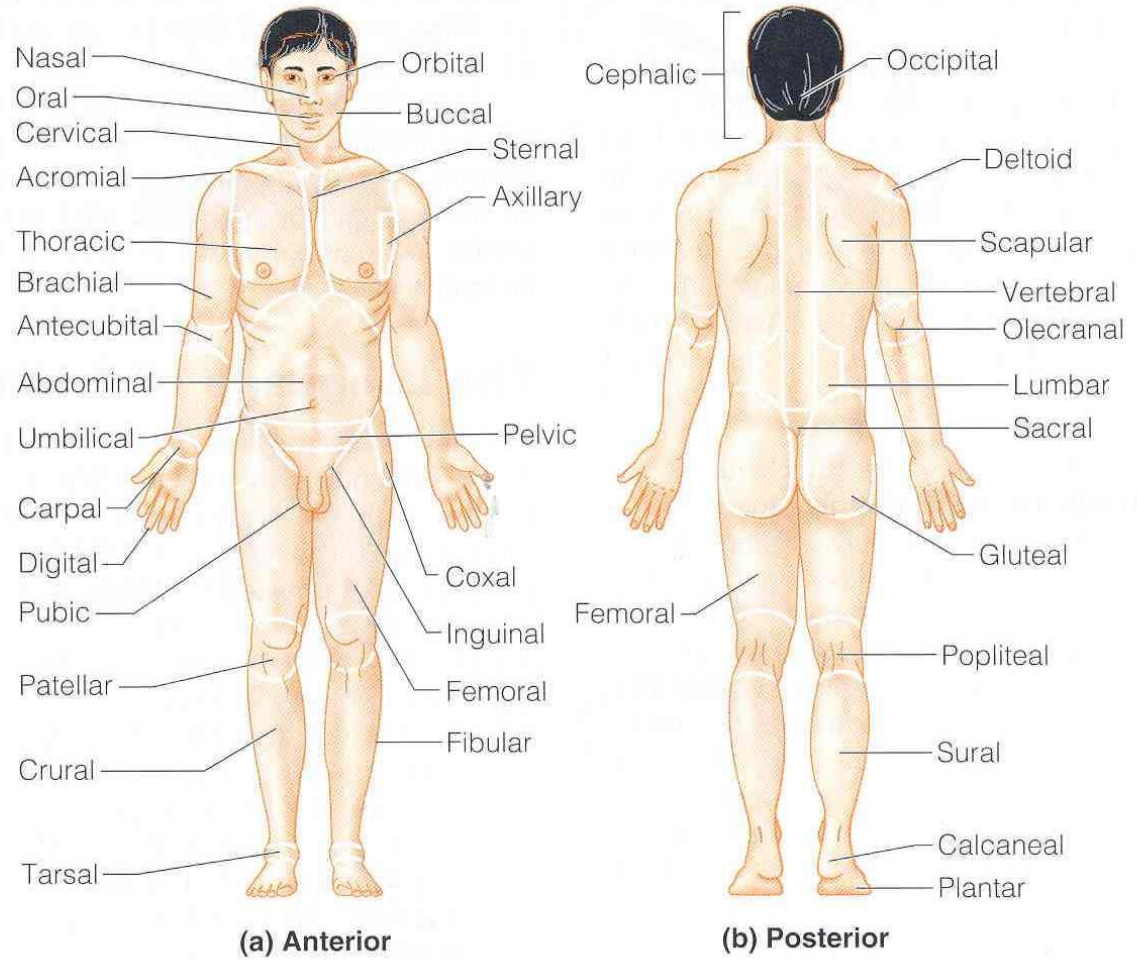
The Language of Anatomy (Anatomical Terminology)

- 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



TERMS OF REGIONS

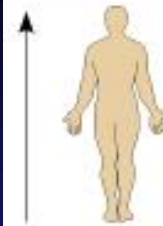
- Cranial (Cephalic)
- Cervical
- Thoracic
- Abdominal
- Pelvic
- Planter
- Palmer



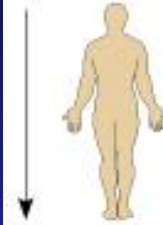
TERMS OF POSITION

- ❑ **Superior (cranial, rostral):** nearer to the head
- Inferior (caudal):** away from the head
- ❑ **Anterior (ventral):** nearer to the front
- Posterior (dorsal):** nearer to the back
- ❑ **Medial:** nearer to the median plane
- Lateral:** away from the median plane
- ❑ **Proximal:** nearer to the trunk
- Distal:** away from the trunk
- ❑ **Superficial:** nearer to the skin (surface)
- Deep:** away from the skin

Example



The head is superior to the abdomen



The navel is inferior to the chin



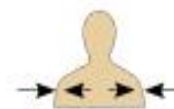
The breastbone is anterior to the spine



The elbow is proximal to the wrist



The knee is distal to the thigh



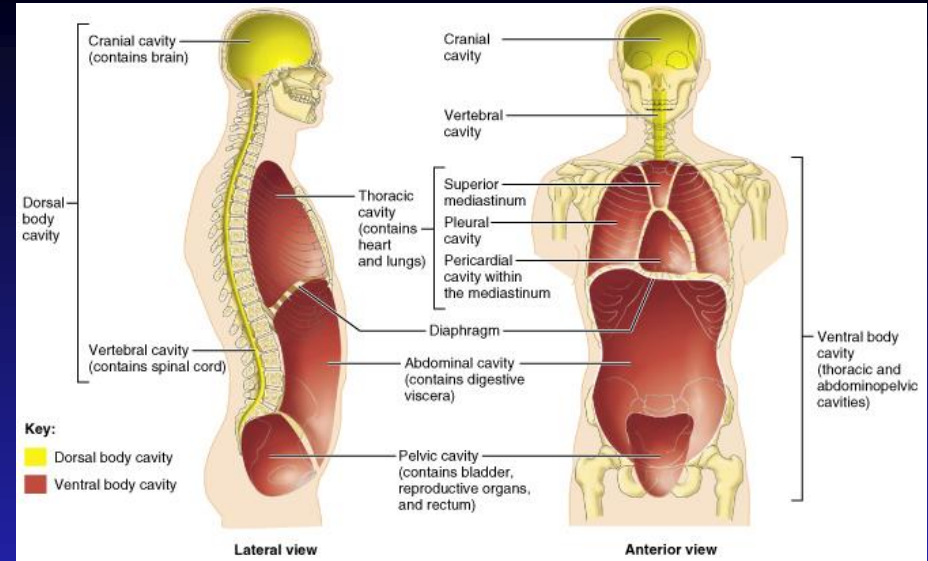
The skin is superficial to the skeletal muscles



The lungs are deep to the skin

Body Cavities

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

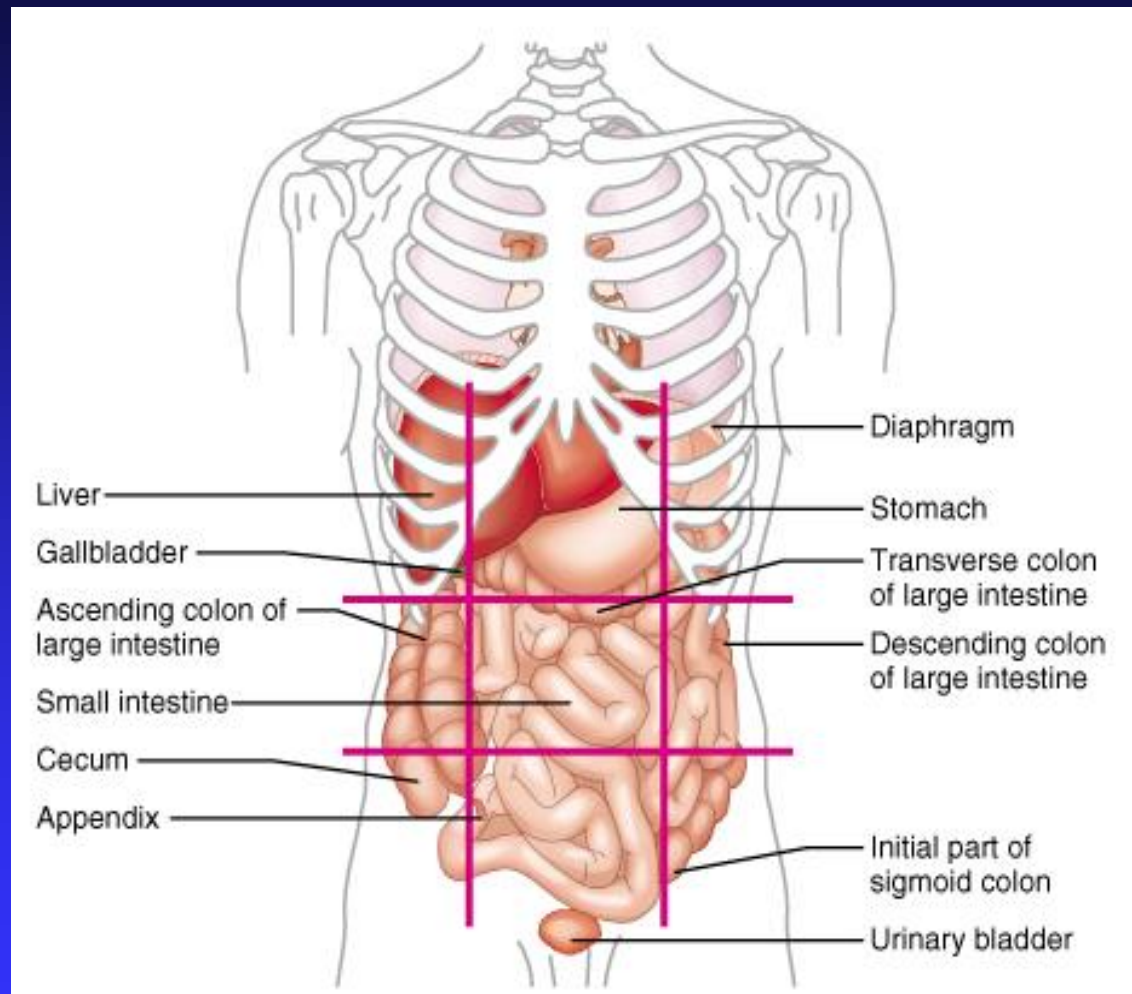


- **Dorsal body cavity** has two subdivisions, which are continuous with each other:
 - **Cranial cavity**: space inside the bony skull, contains brain
 - **Spinal cavity**: space inside the vertebral column, contains spinal cord

- **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

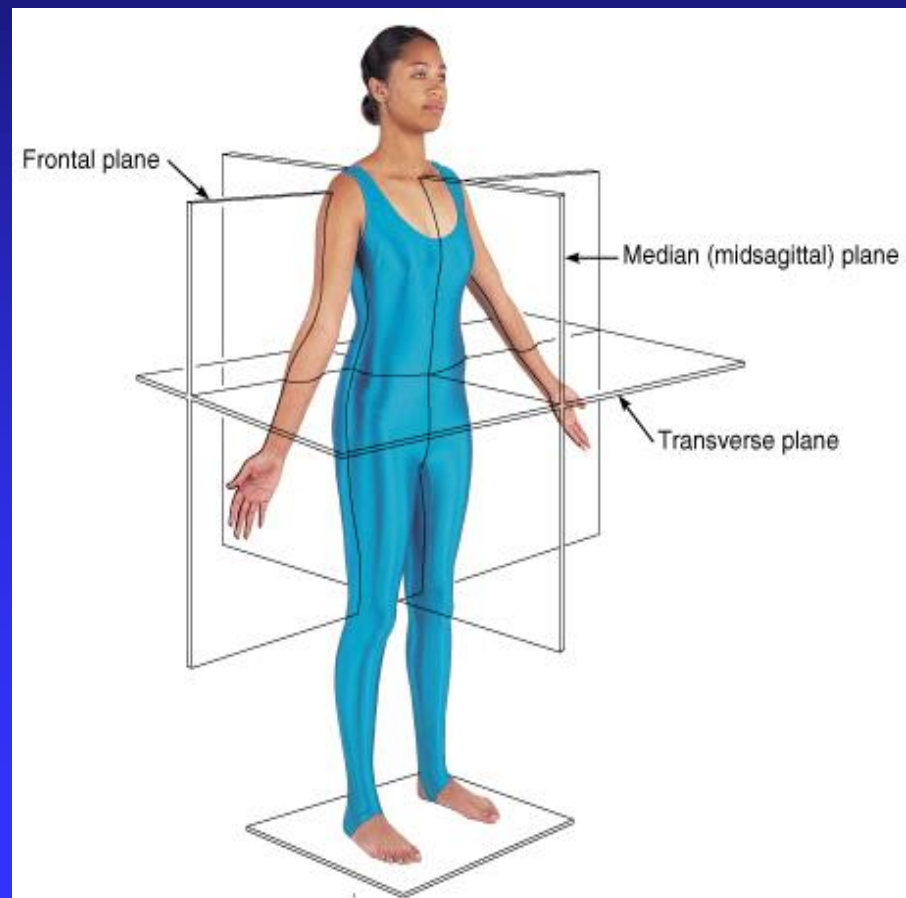


Body Planes & Sections

- To look at the internal structures, the body is cut into sections along imaginary lines called **planes**
- There are three type of sections or planes that lie at right angle to one another: **Sagittal, Frontal & Transverse**

Sagittal Section:

- A cut made along a **longitudinal plane**, dividing the body into **right** and **left** parts.
- The plane passing through the midline of the body, cutting the body into the right and left equal halves is called a **midsagittal** or **median** plane.

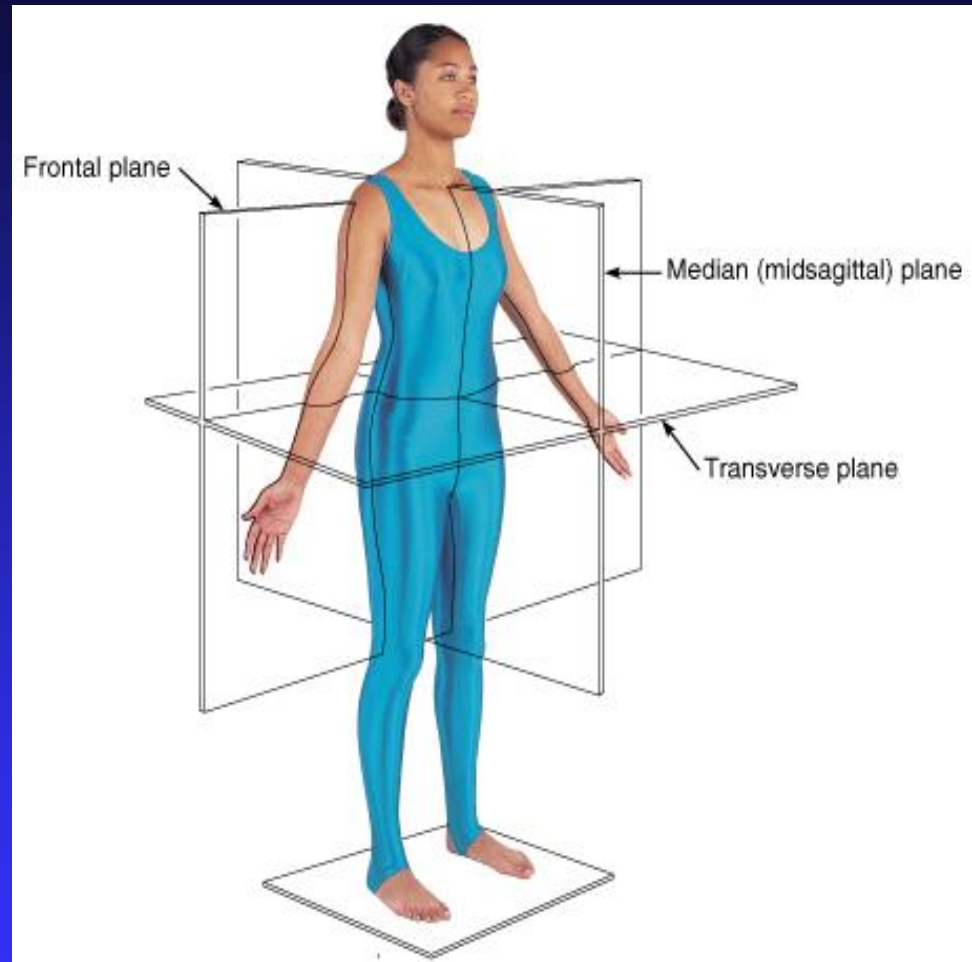


Frontal (coronal) Section:

- A cut made along a **longitudinal** plane dividing the body into **anterior** and **posterior** parts

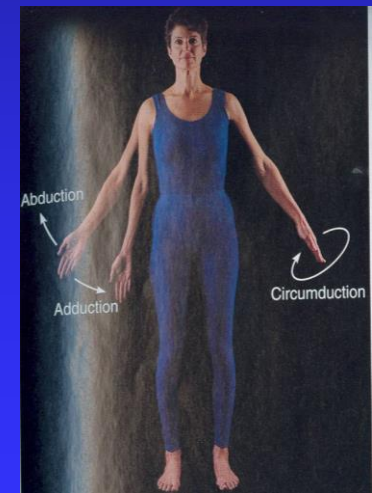
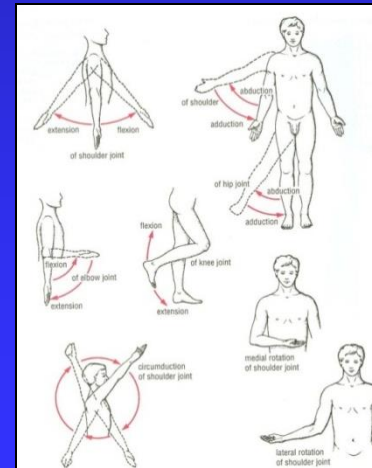
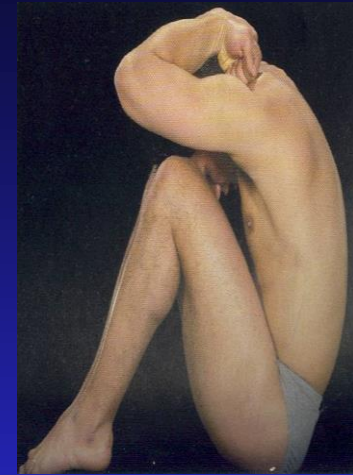
Transverse (cross) Section:

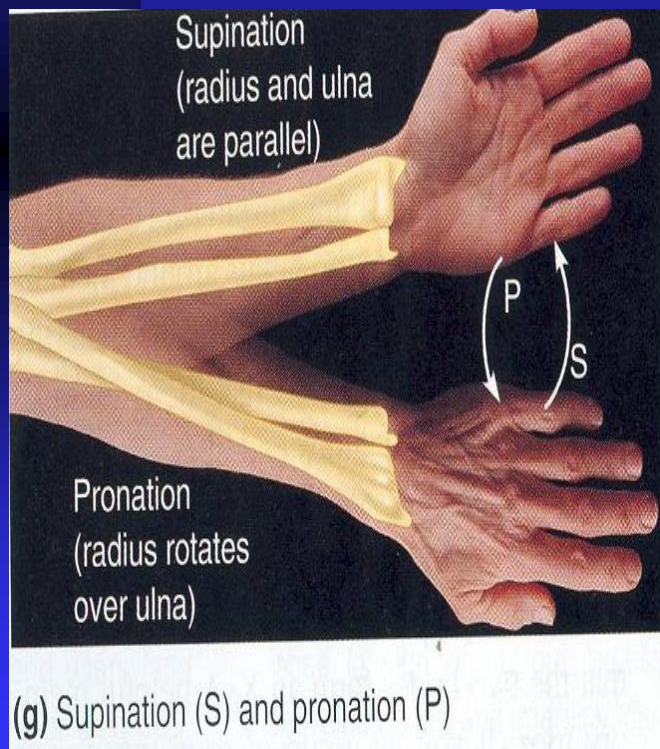
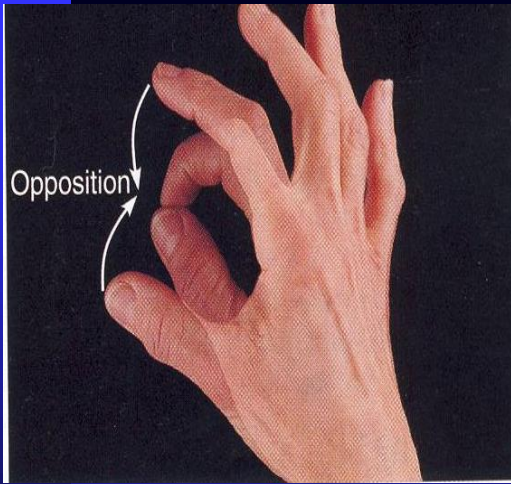
- A cut made along a **horizontal** plane dividing the body into **superior** and **inferior** parts



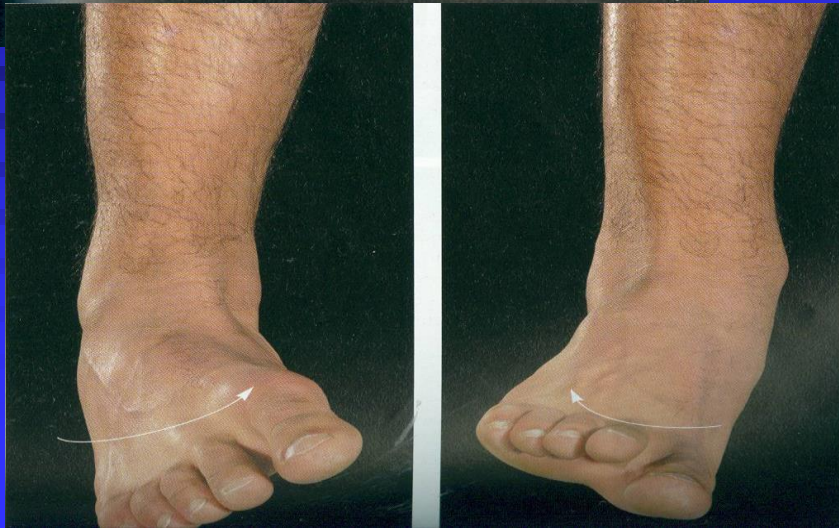
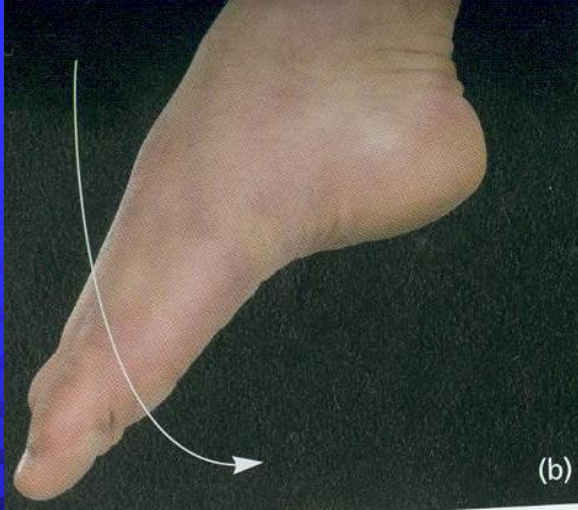
TERMS OF MOVEMENT

- ❑ **Flexion:** approximation of 2 parts (decreasing the angle between 2 parts)
- Extension:** straightening (increasing the angle between 2 parts)
- ❑ **Abduction:** away from median plane
- Adduction:** toward median plane
- ❑ **Lateral rotation:** rotation away from median plane
- Medial rotation:** rotation toward median plane
- ❑ **Circumduction:** combined movements of flexion, extension, abduction & adduction





- **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.*

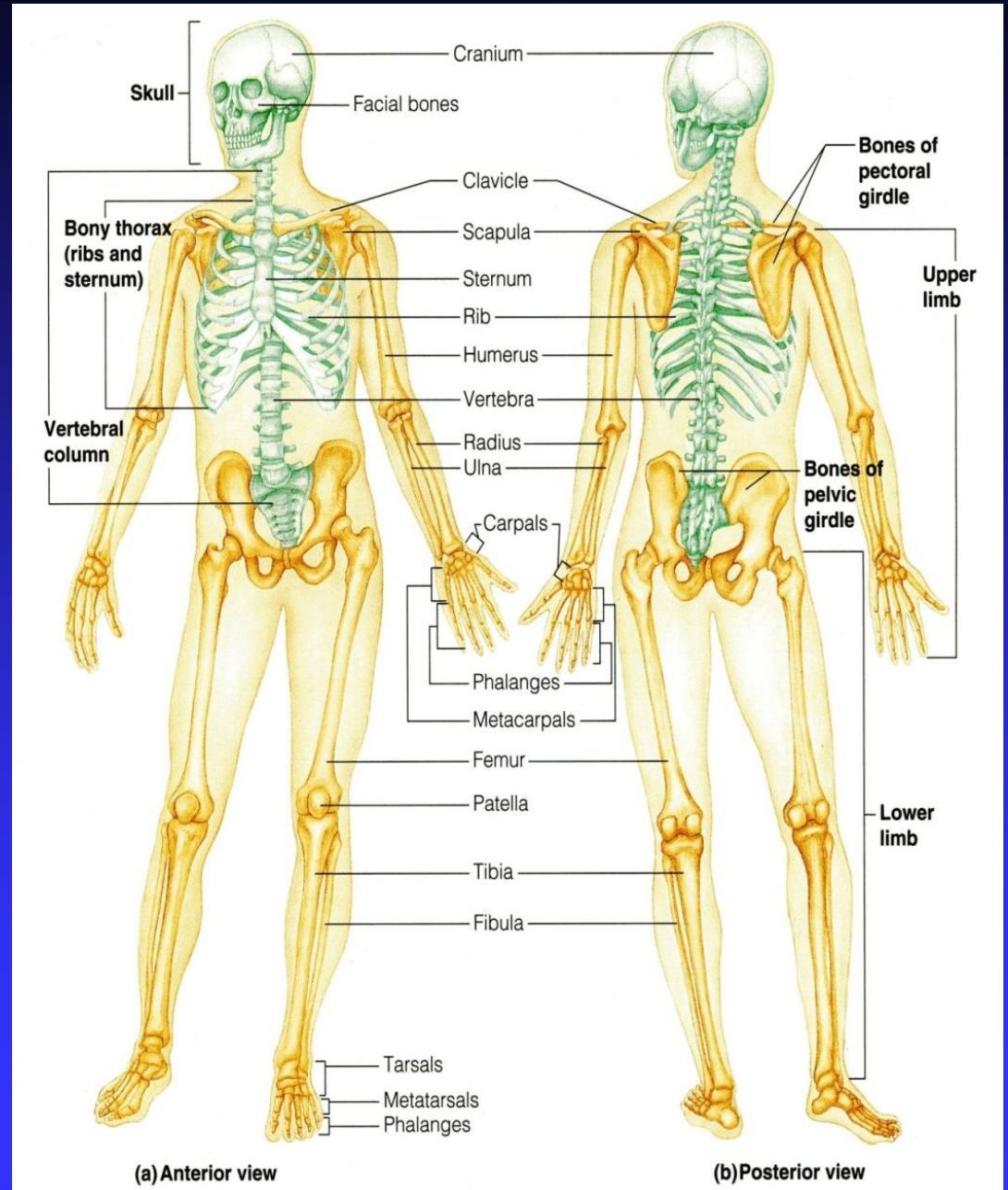


- **Planter Flexion:**
- *Depressing the foot (down).*
- *Movement with pointing the toes.*
- **Dorsiflexion**
- *Up movement of the foot*
- *(Standing on the heels)*
- **Inversion :**
- *The sole faces in a Medial direction.*
- **Eversion :**
- *The sole faces in a Lateral direction.*

Skeletal System

Includes:

- Bones
- Joints (articulations)



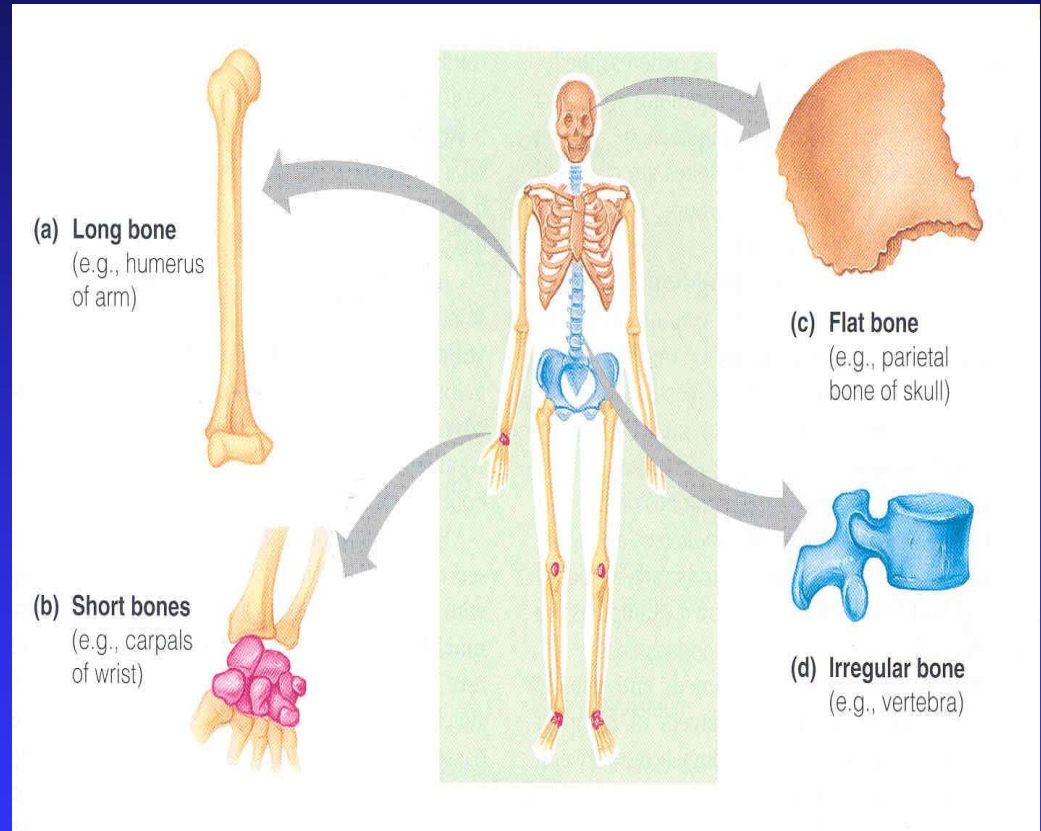
Functions of Bones

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

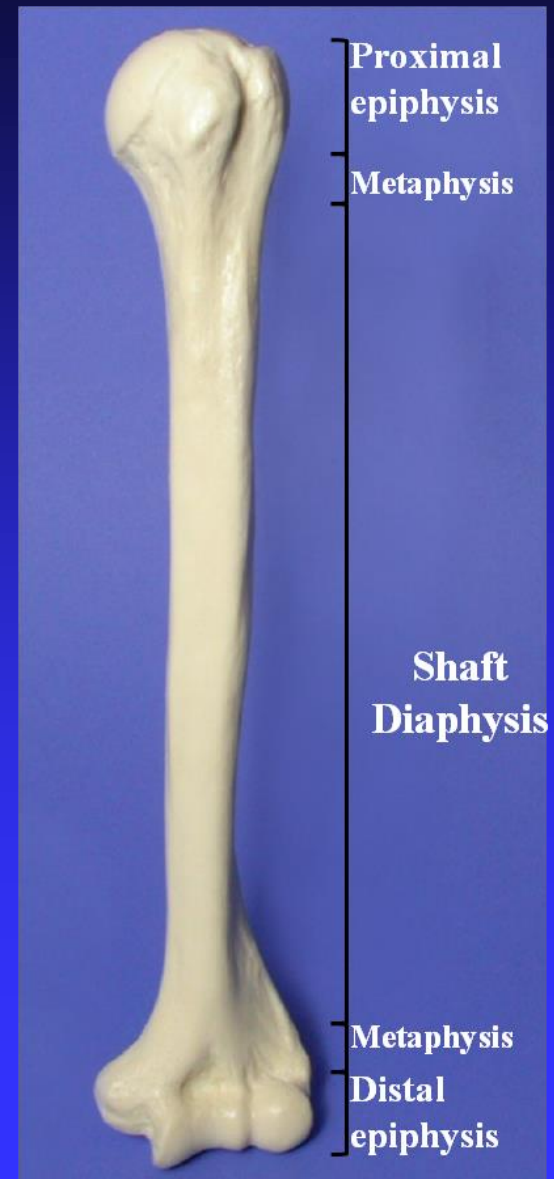
Bones are classified on the bases of their:

- **1. Shape:** as long, short, flat, irregular
- **2. Structure:** as compact & spongy bones
- **3. Development:** as membranous & cartilagenous bones



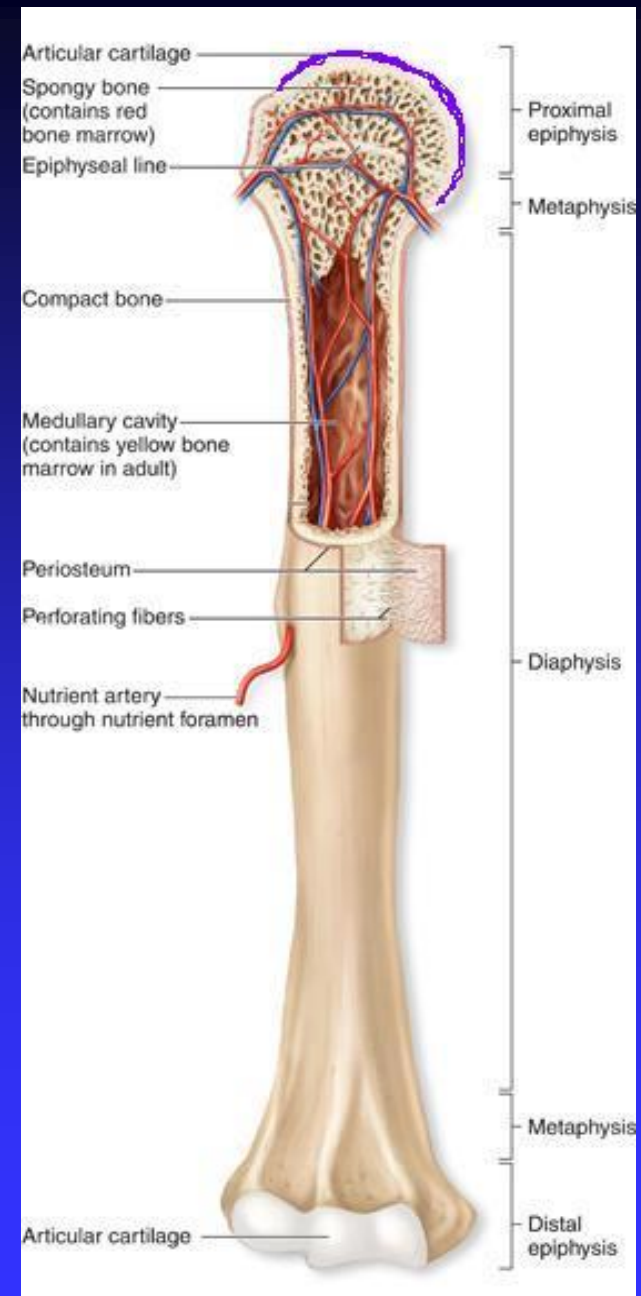
Gross Structure of a Long Bone

- ❖ 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'



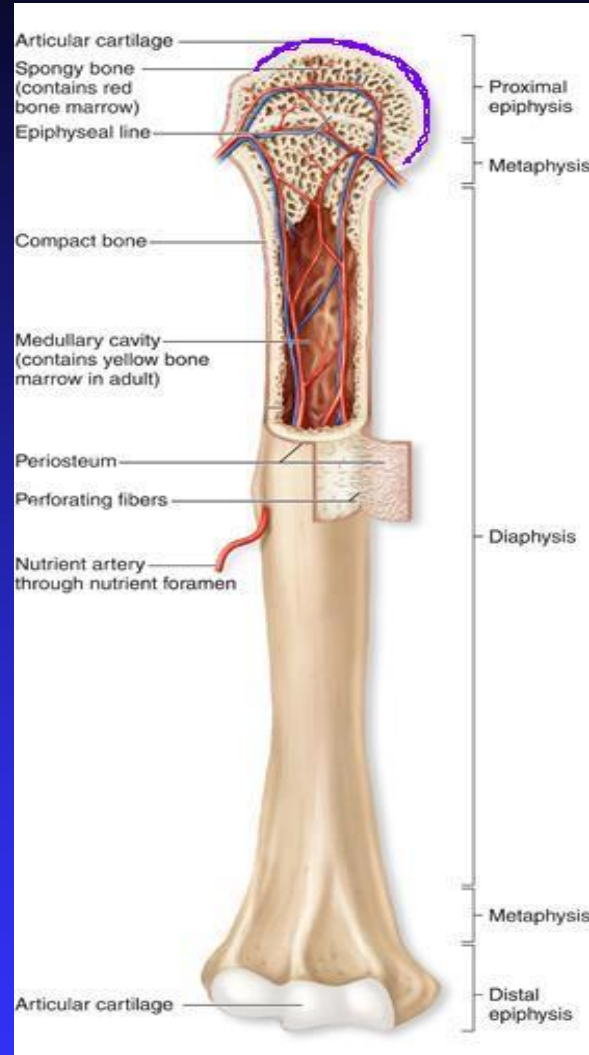
Diaphysis (Shaft)

- 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

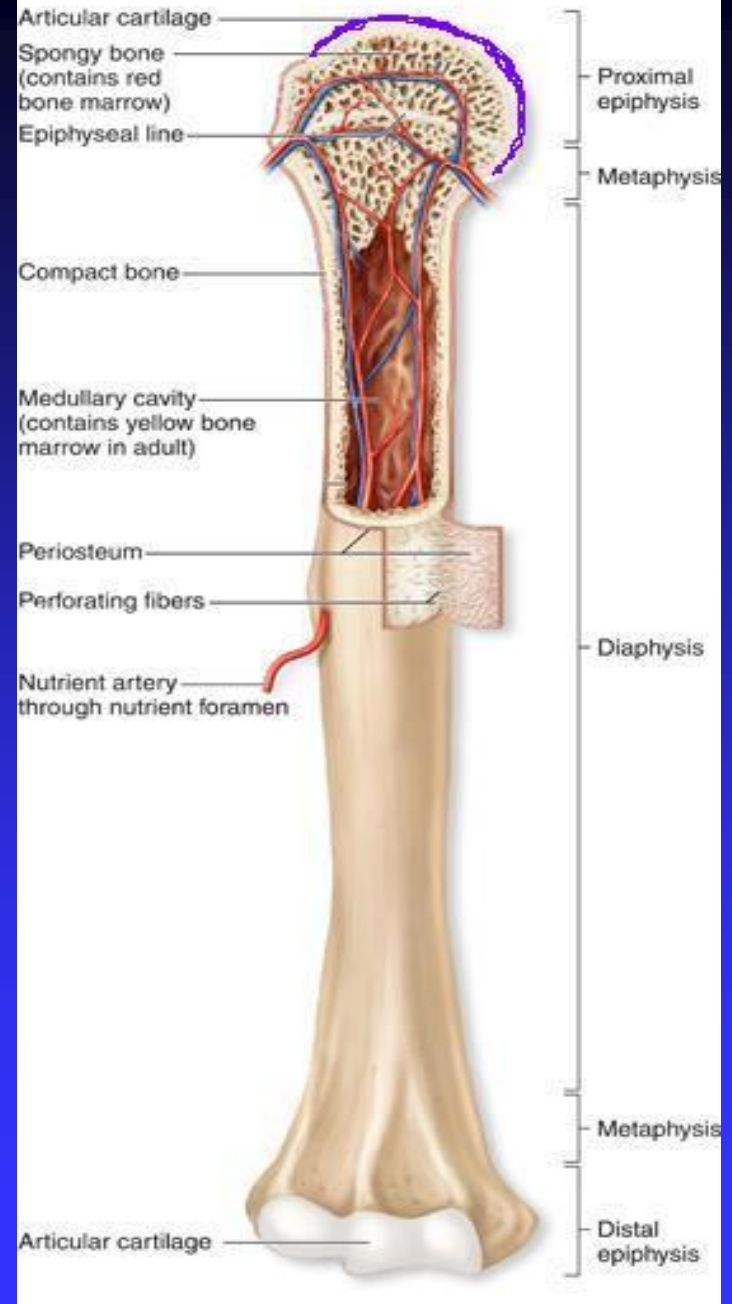
- It contains a thin plate of cartilage called the **epiphyseal plate**, that is responsible for the **lengthwise growth** of the long bones.

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

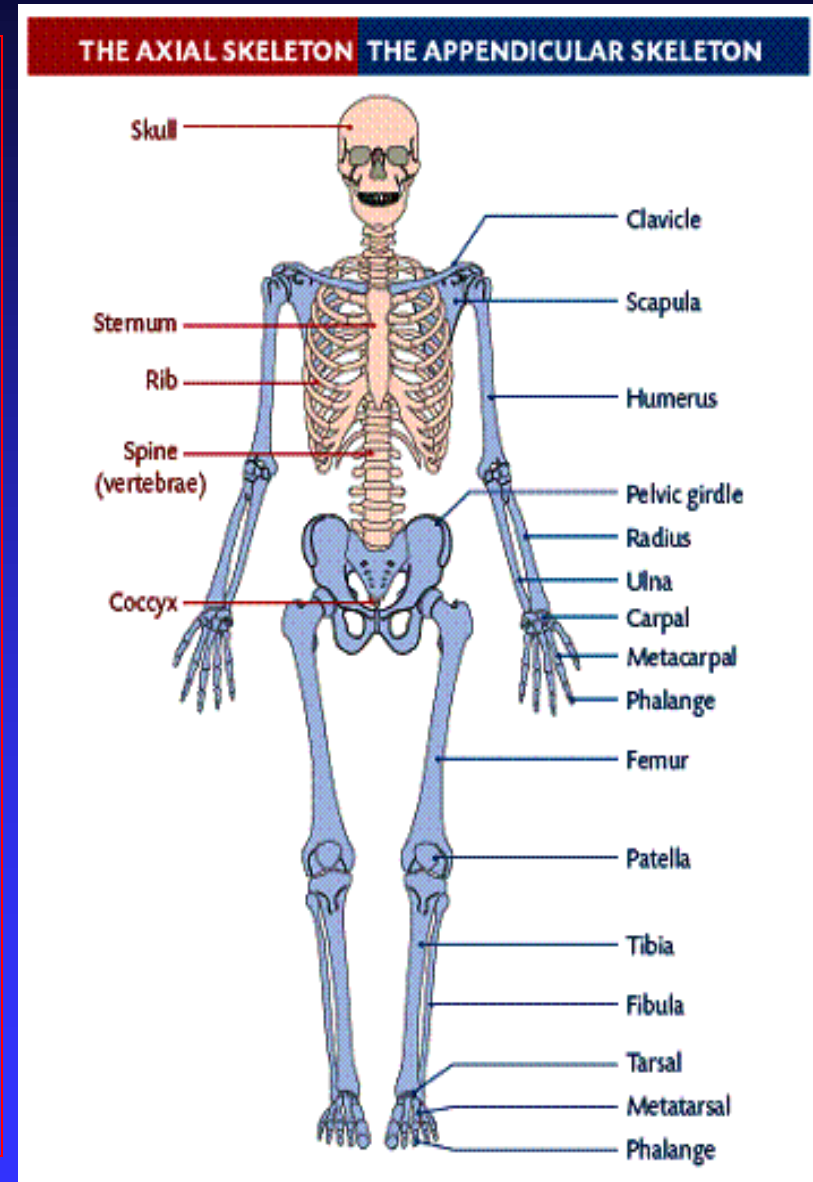
Growth of bone

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



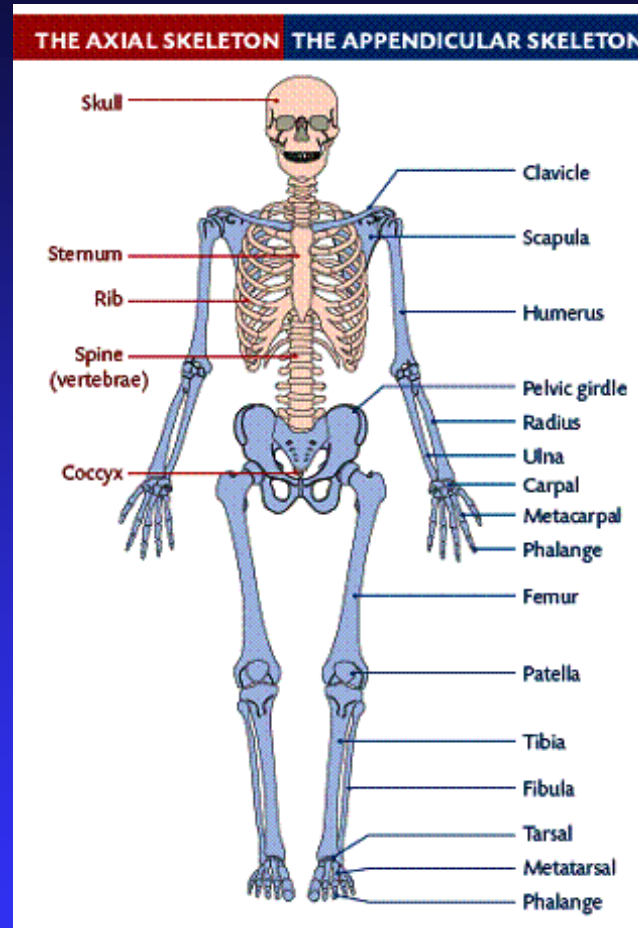
The Skeleton

- 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 :

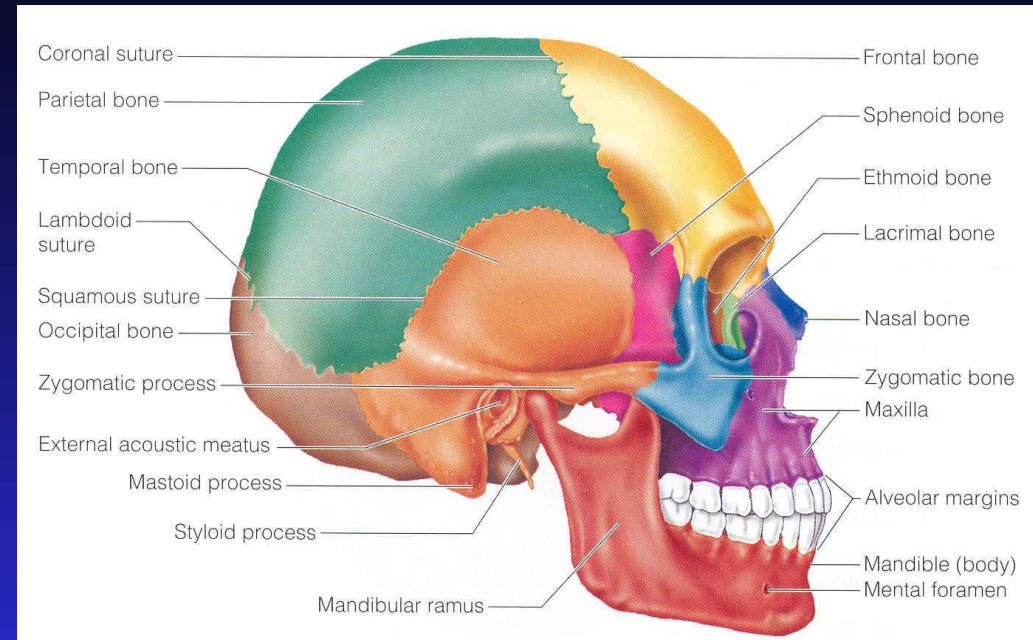
- Pectoral & Pelvic Girdles, connect the bones of the limbs to the axial skeleton
- Upper Limb
- Lower Limb

Skull bones

■ Formed of two sets of bones:

➤ **Cranium:**

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

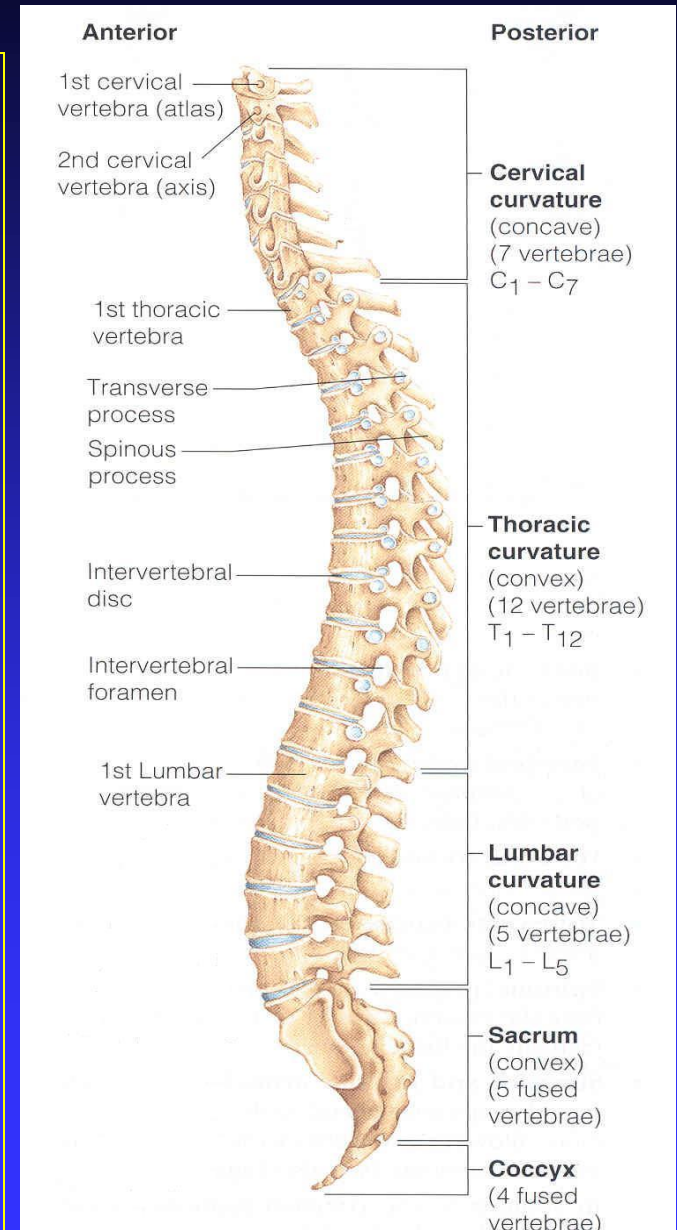


➤ **Facial bones:**

- ◆ 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 form a triangular bone called **sacrum**
 - ◆ **Coccygeal**: 4 vertebrae fused to form a small bone called **coccyx**

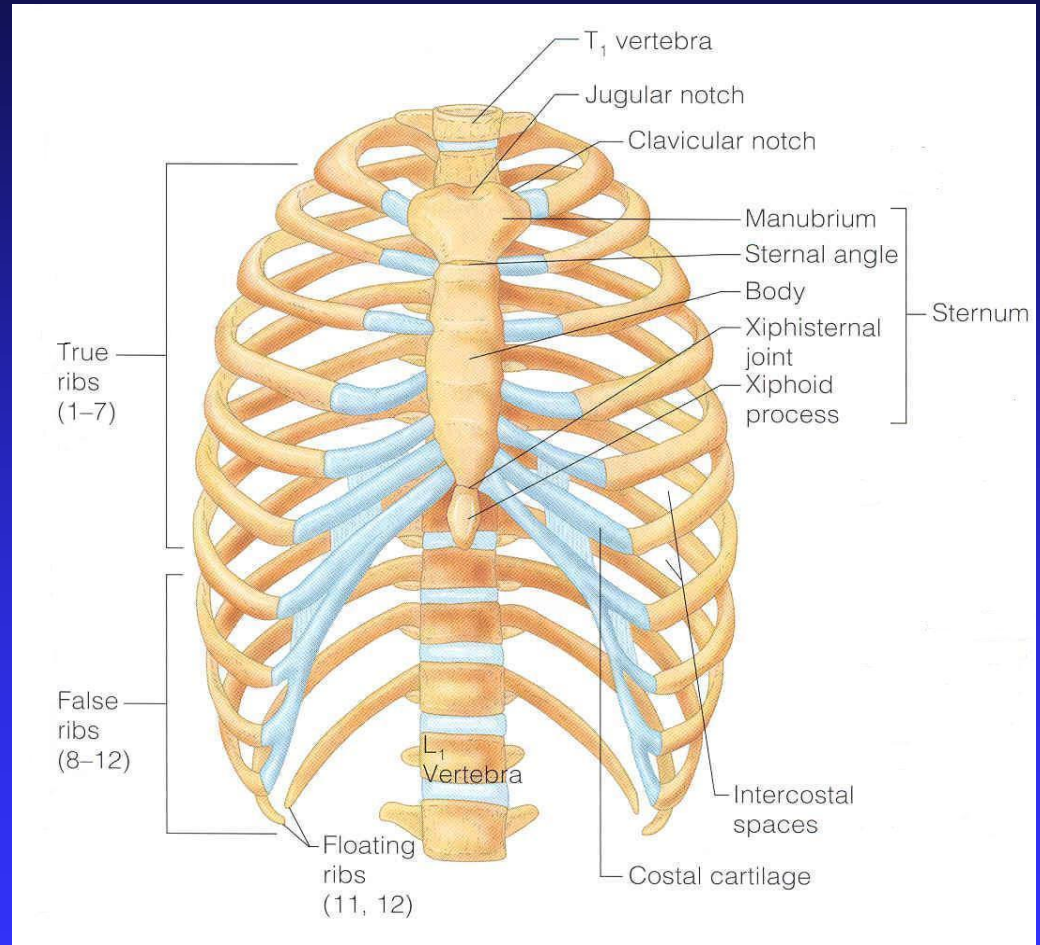


Sternum

- 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

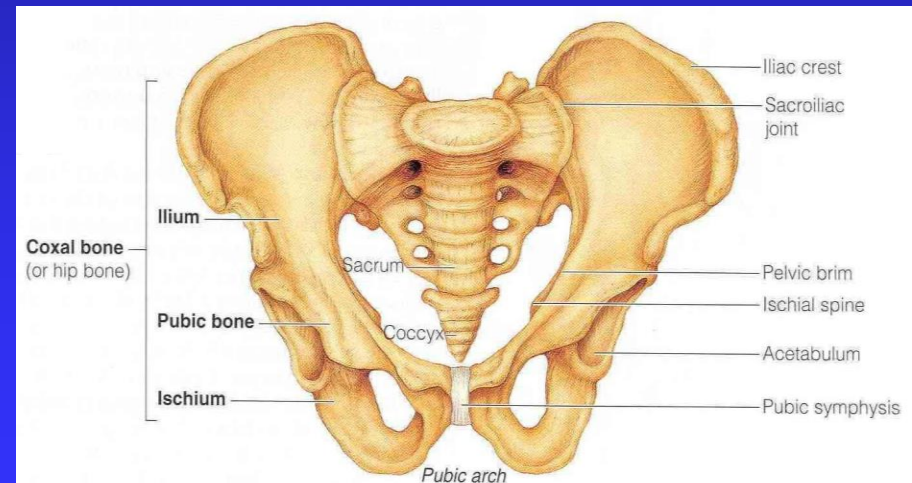
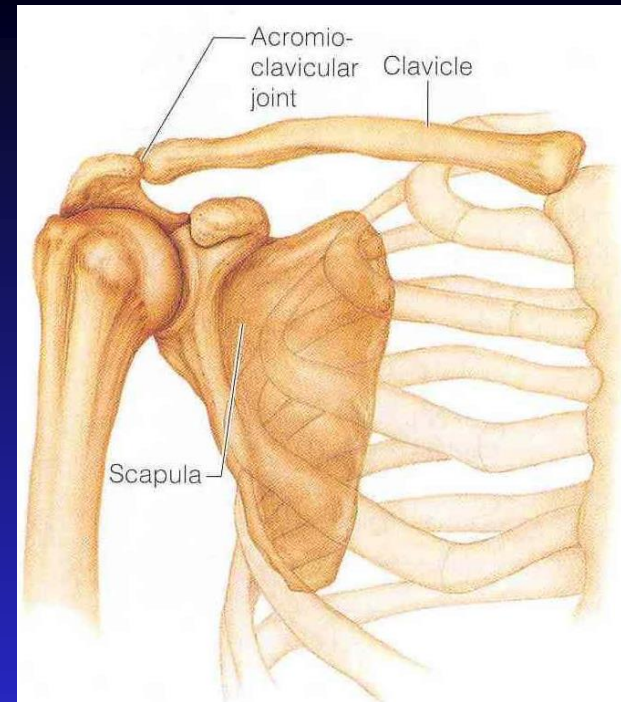
- Pectoral Girdle: Bones connecting the upper limb with the axial skeleton

- ◆ Clavicle

- ◆ Scapula

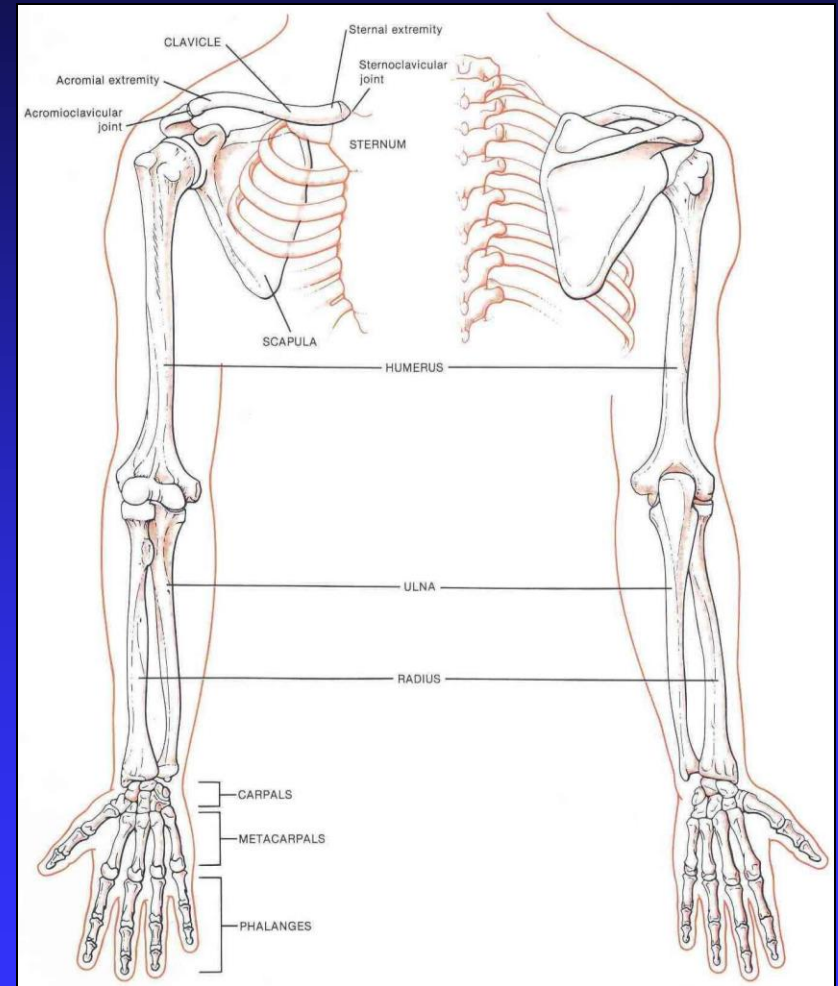
- Pelvic Girdle: Bones connecting the lower limb with the axial skeleton

- ◆ Two hip bones



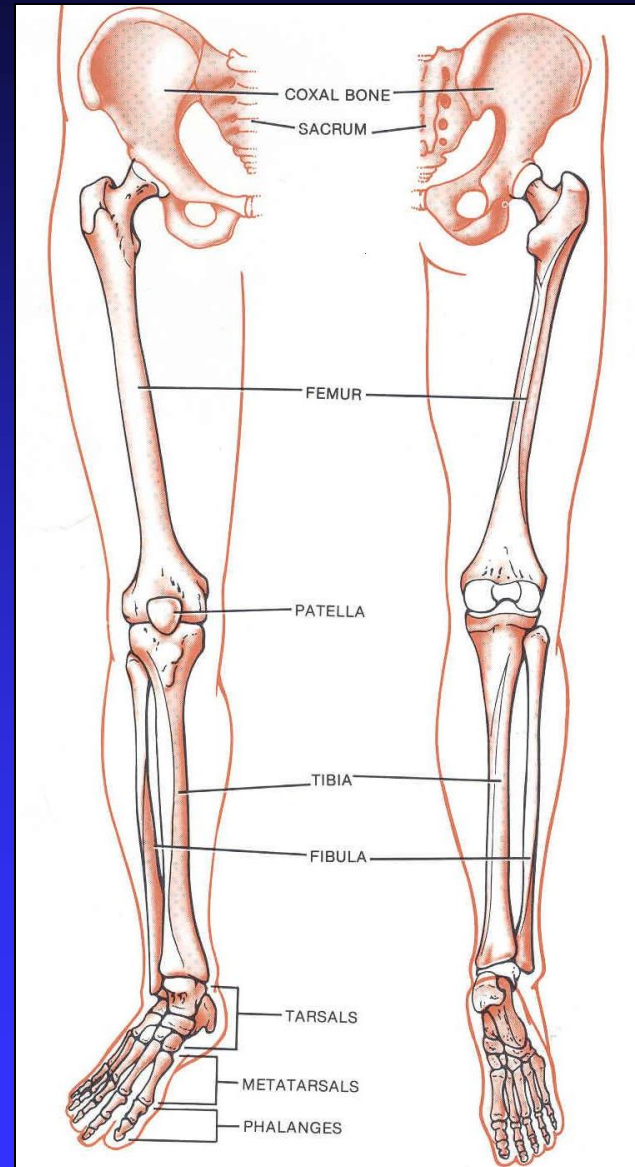
Bones of the Upper Limb

- 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