

ANATOMY OF THE LOWER LIMBS

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ANATOMICAL POSITION

The anatomical position is the standard reference position of the body, used to describe the location of structures.

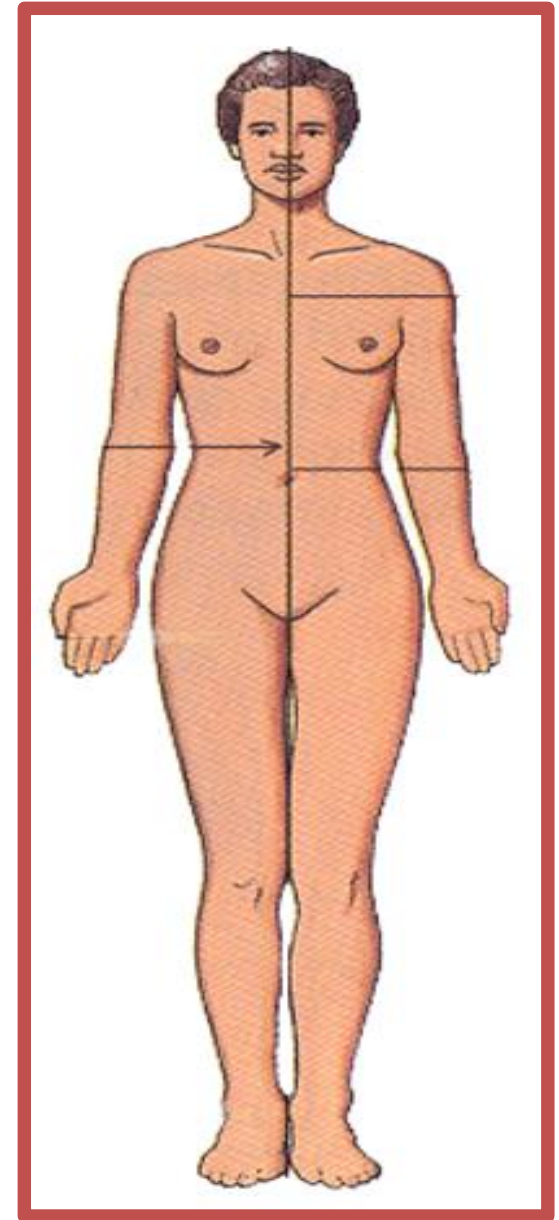
based on the **assumption**
that the person is:

1- Standing erect

**2- The upper limbs by
the sides**

**3- The face and palms of
the hands directed
forward**

4- Feet by the sides



Various parts of the body are described in relation to certain *imaginary planes*

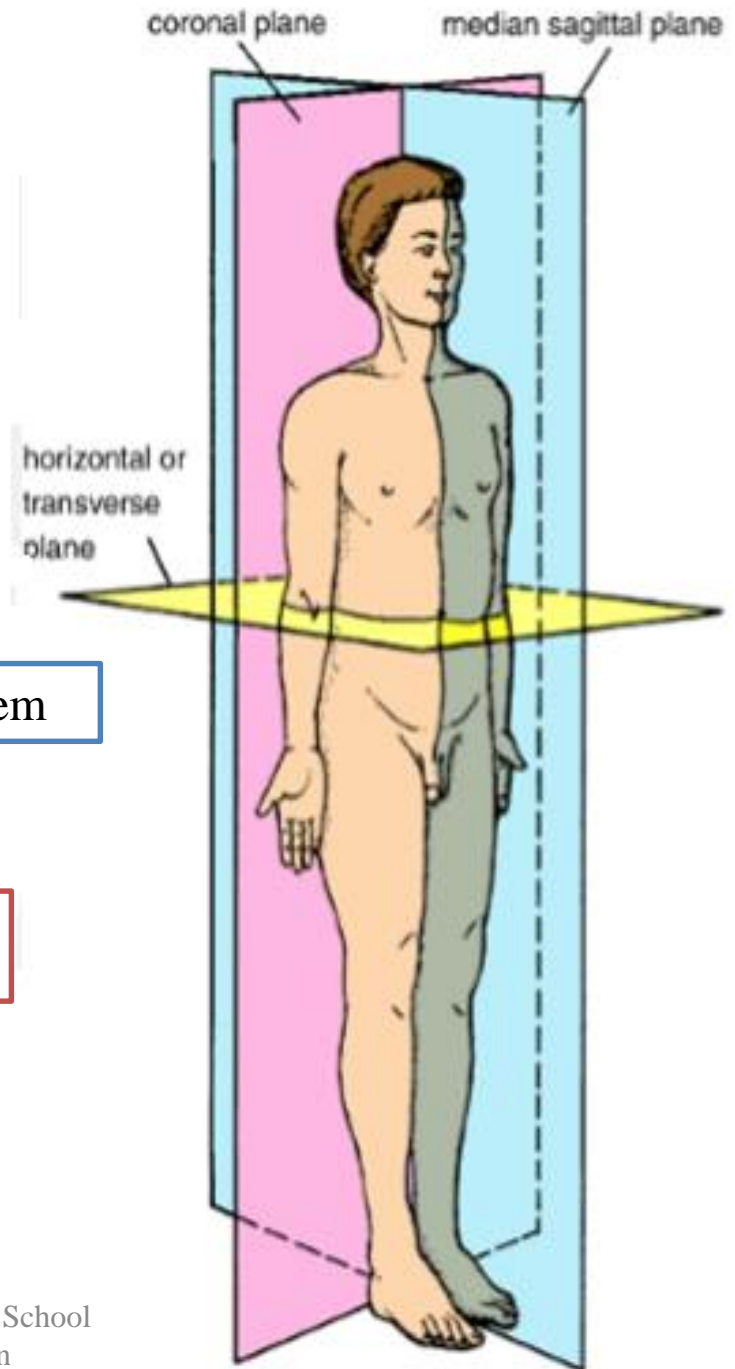
Two Vertical planes

Sagittal

Coronal

This is why we need to know the difference between them

One Horizontal OR Transverse



A-Vertical planes

1-The Sagittal Plane

Passes through the center of the body
Divides the body into right and left halves

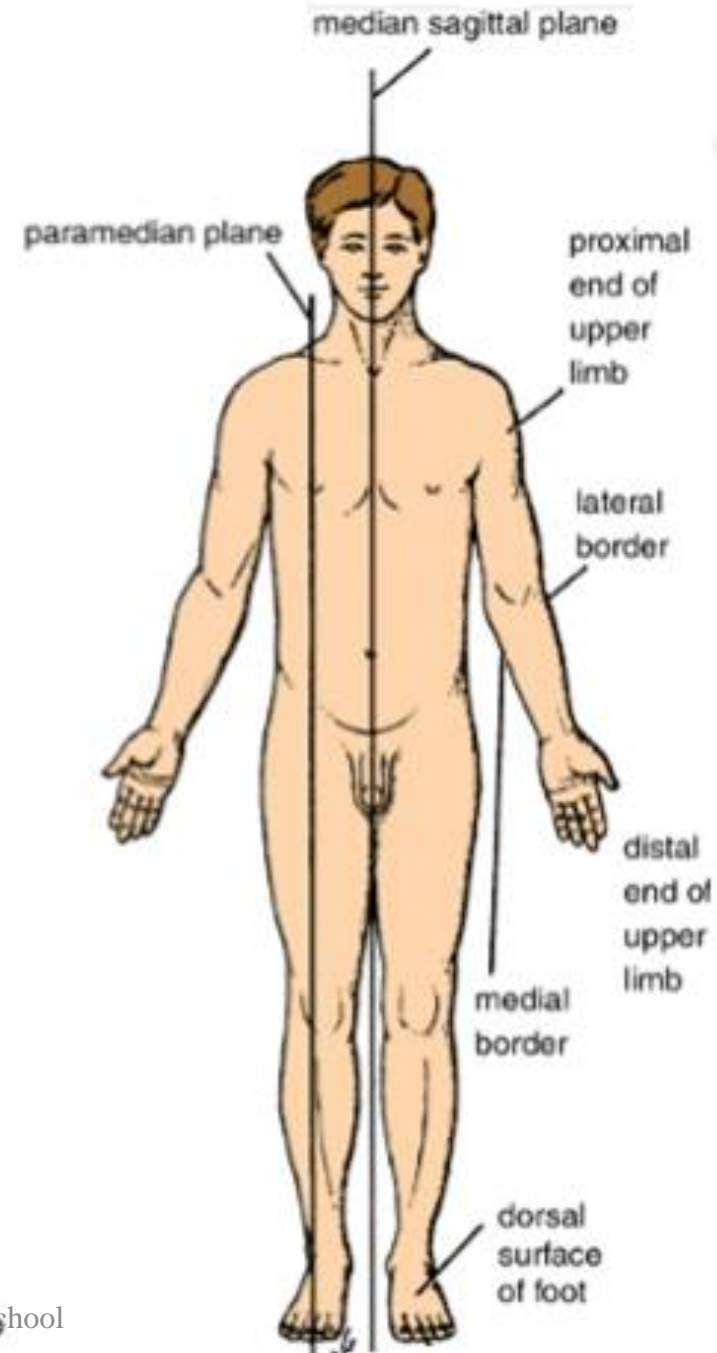
Types:

1- median sagittal plane; Divides the body into equal right and left halves

2-Paramedian plane: Is situated to one or the other side of the median plane and parallel to it.
Divides the body into none equal right and left halves

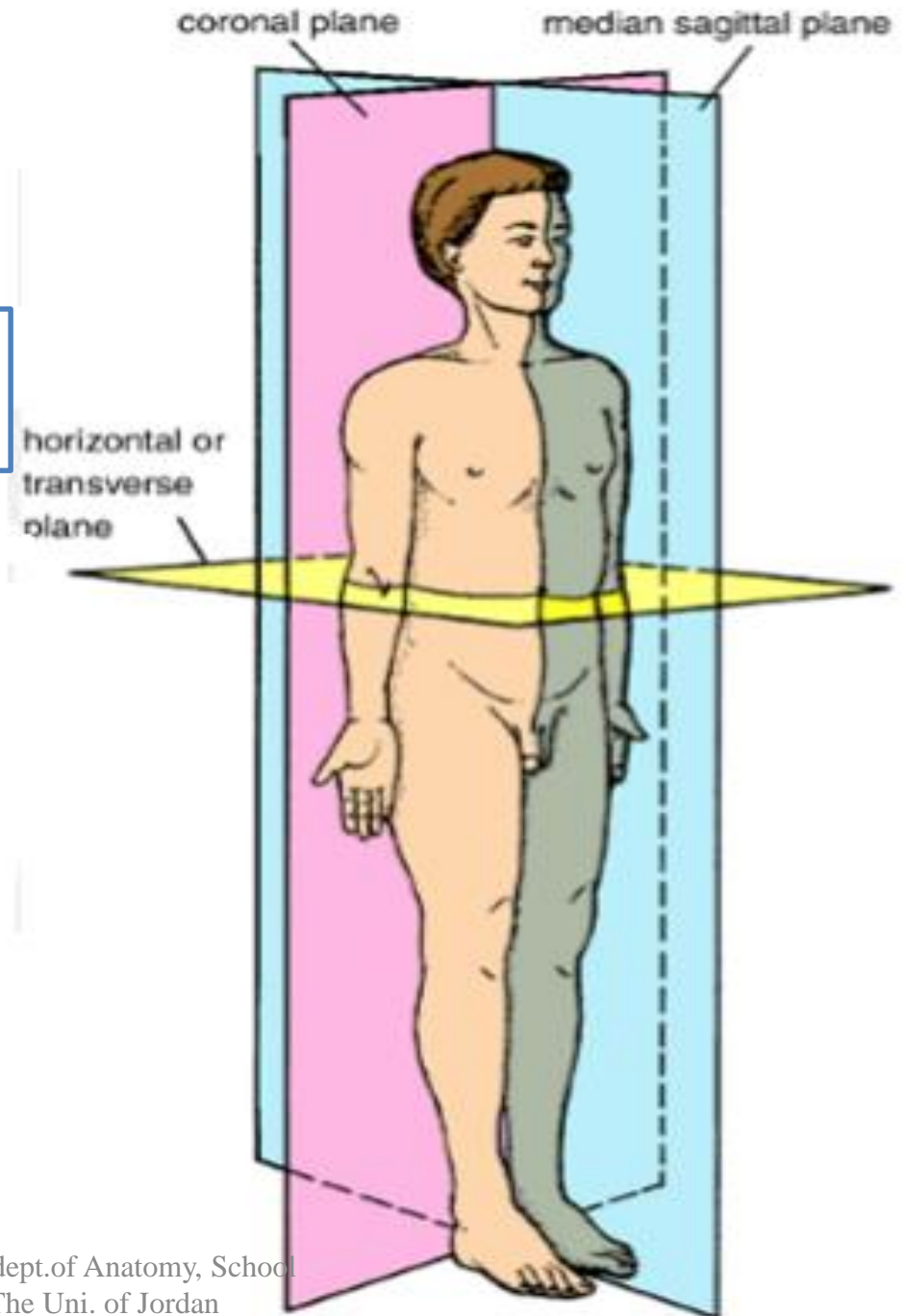
2-Coronal Plane

Is an imaginary vertical plane at right angles to the median plane and divides the body into **anterior and posterior parts**



B- Transverse, horizontal,

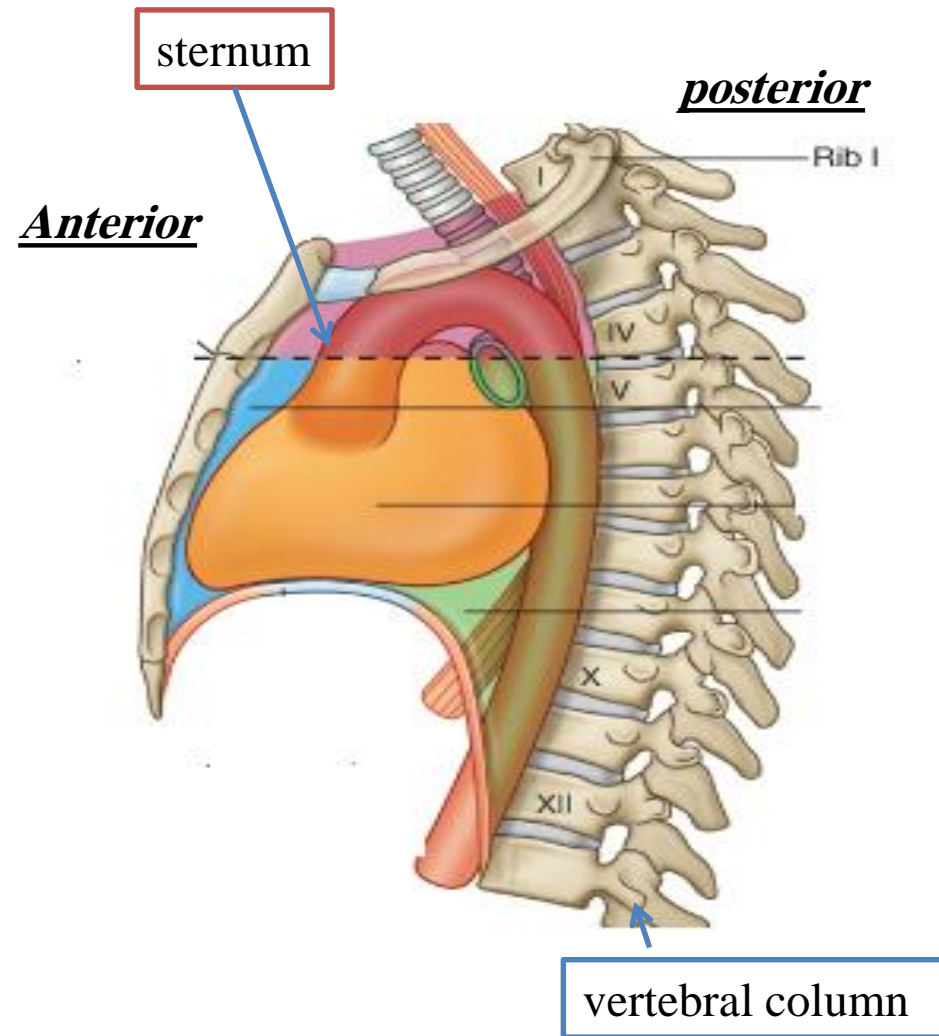
divide the body into
superior and inferior parts



Terms to describe location

Anterior (ventral) and posterior (dorsal)

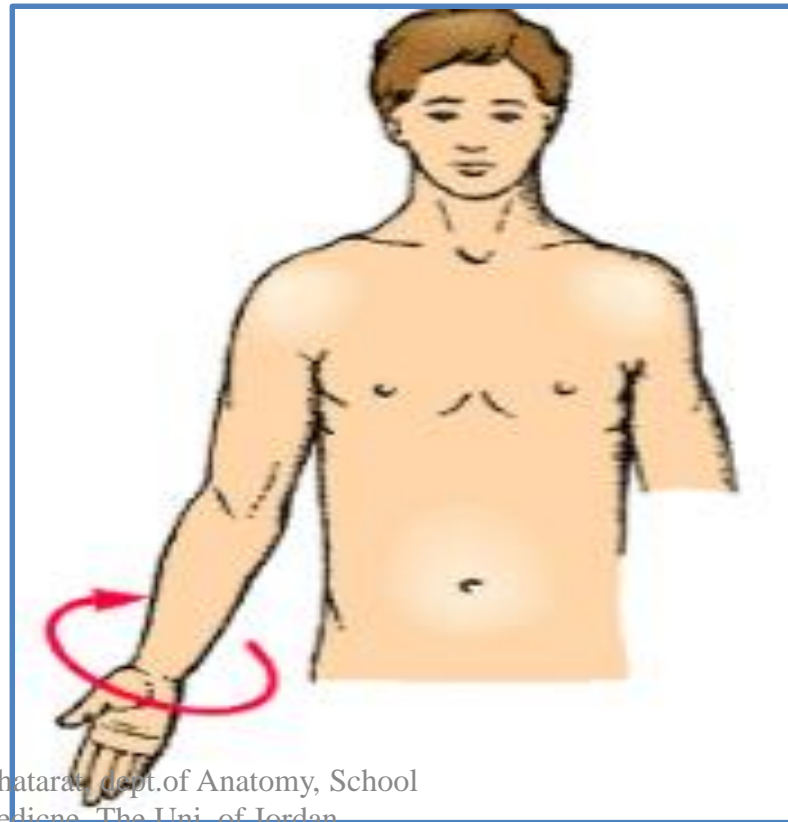
describe the position of structures relative to the 'front' and 'back' of the body.
For example, the nose is anterior to the ears and the *vertebral column is posterior to the sternum.*



Medial and lateral

Medial and lateral describe the position of structures relative to the median sagittal plane and the sides of the body . Any structure situated ***nearer*** to **the median plane** of the body ***than another*** is said to be ***medial to the other***. Similarly, a structure that lies ***farther away from the median plane*** than another is said to be ***lateral to the other***

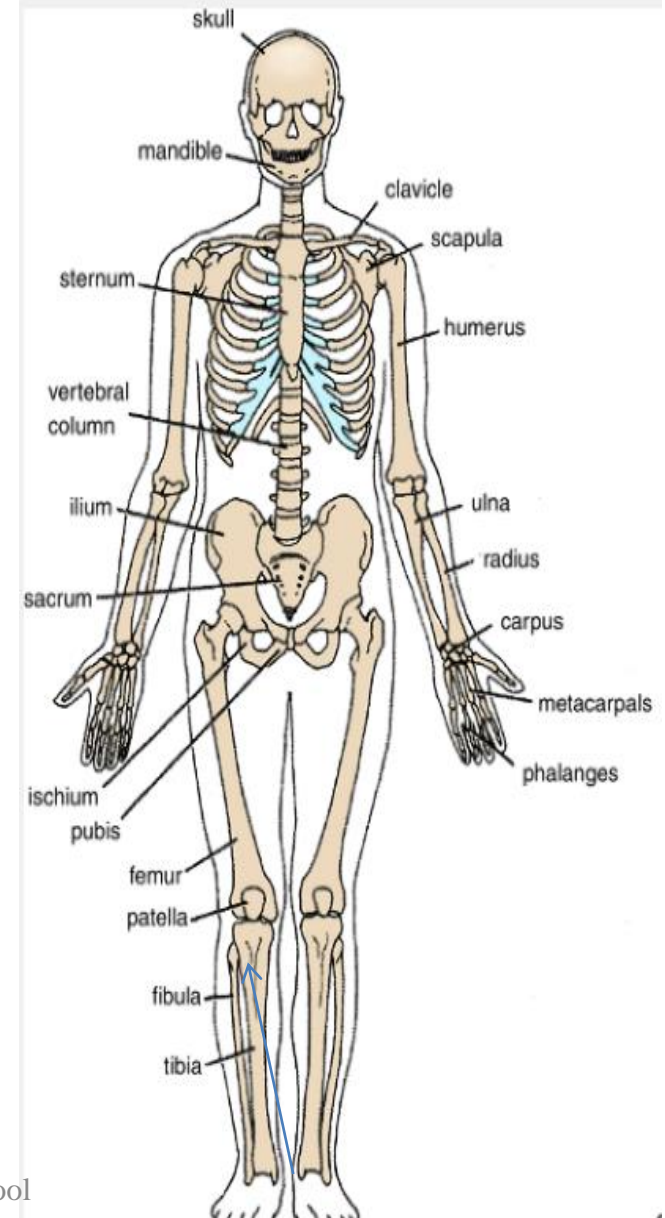
For example, **the thumb** is lateral to **the little finger**.



Superior and inferior

Superior and inferior describe structures in reference to the vertical axis of the body.

For example, the head is superior to the shoulders and the knee joint is inferior to the hip joint.



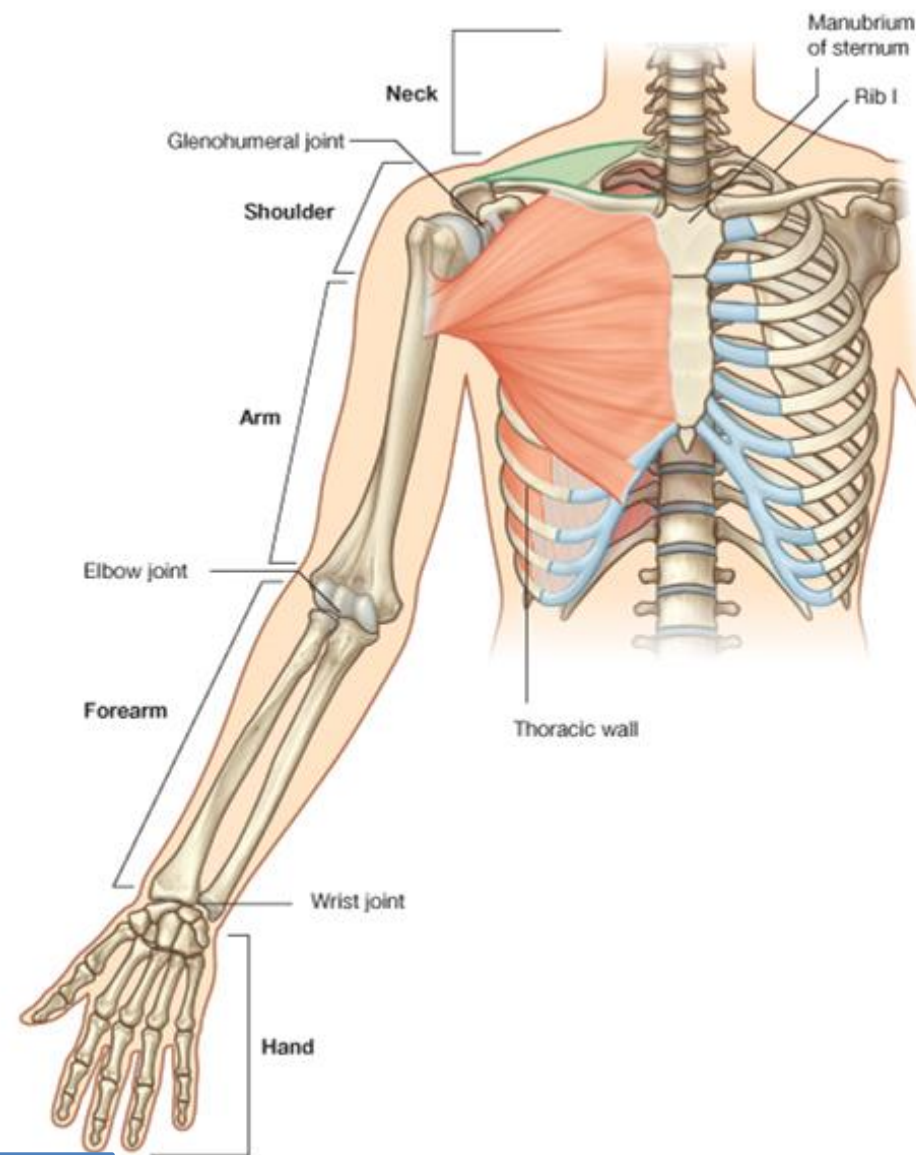
Proximal and distal

are used with reference to being closer or farther from a structure's origin, particularly in the limbs.

For example, the hand is distal to the elbow joint.

Cranial (towards the head) and **caudal** (towards the tail) are sometimes used instead of superior and inferior respectively

Superficial.....Nearer to body surface
Deep..... Away from body surface



THE JOINTS

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Joints

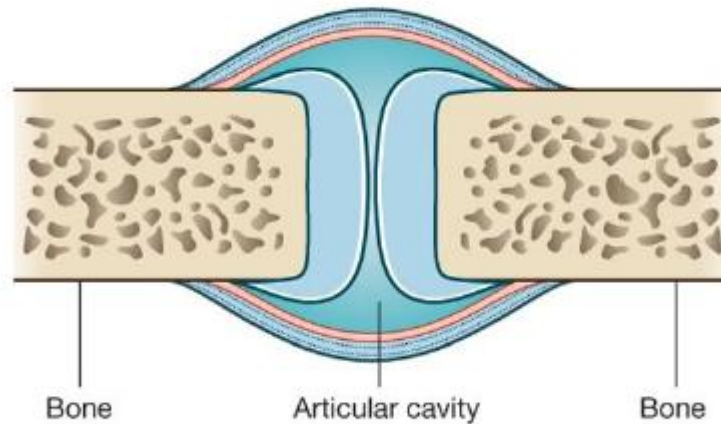
When two bones or more come together wither there is movement between them or not.

According to the tissue laying between the articulating bones ,joints are classified into:

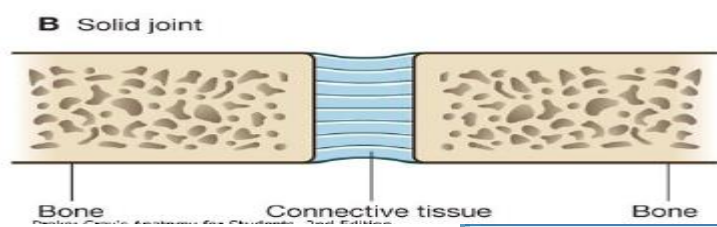
1-Synovial joints

Synovial joints are connections between skeletal components where the elements involved are separated by a narrow articular cavity

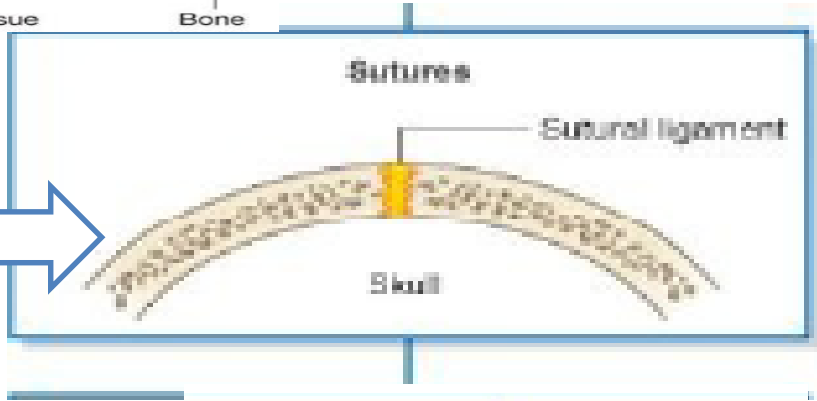
A Synovial joint



2-Fibrous joints

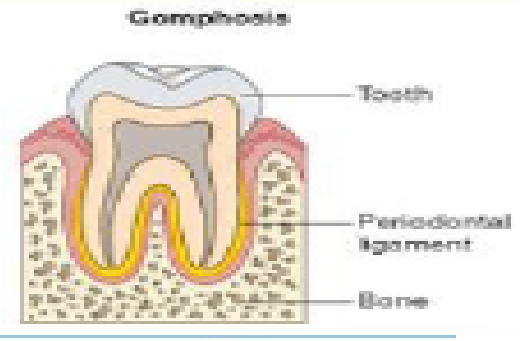


A- Sutures occur only in the skull where adjacent bones are linked by a thin layer of connective tissue termed a *sutural ligament*.



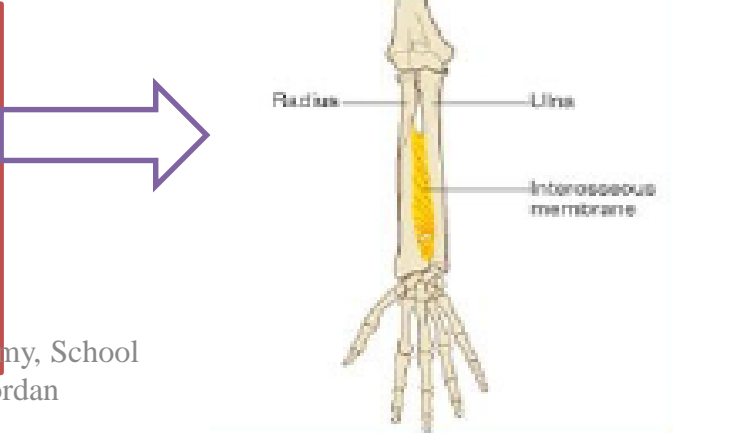
Read only

B-Gomphoses occur only between the teeth and adjacent bone. In these joints, short collagen tissue fibers in the periodontal ligament run between the root of the tooth and the bony socket.



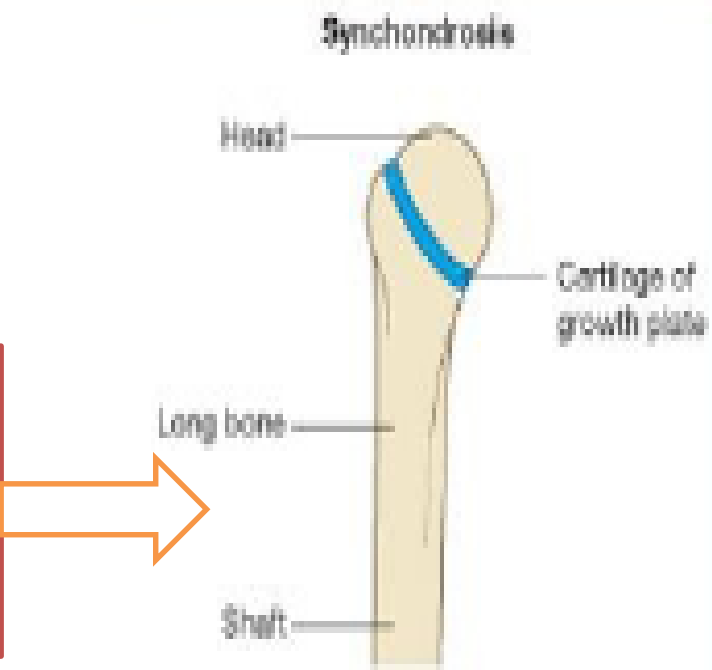
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C-Syndesmoses are joints in which two adjacent bones are linked by a ligament. Examples are the **ligamentum flavum**, which connects adjacent vertebral laminae, and **an interosseous membrane**, which links, for example, the radius and ulna in the forearm.

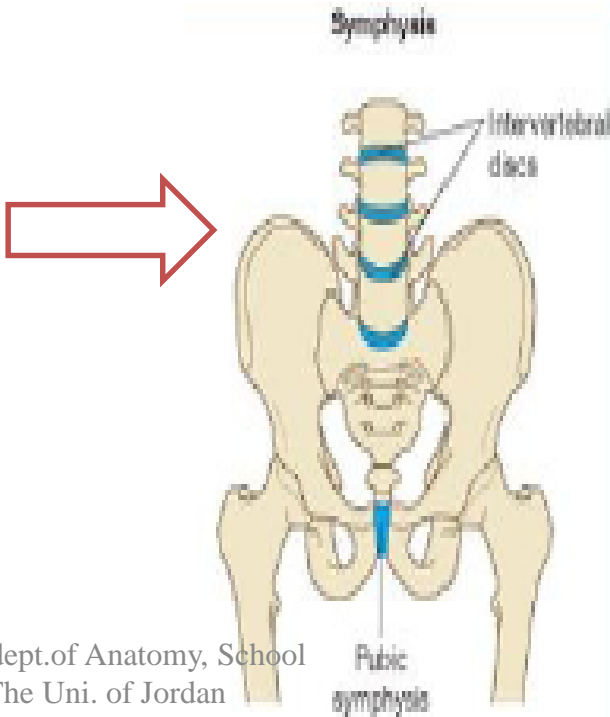


3-Cartilaginous joints

A-Synchondroses occur where two parts in a developing bone remain separated by a layer of cartilage, for example the ***growth plate*** that occurs **between the head and shaft** of developing long bones. These joints allow bone growth and eventually become completely ossified.



B-Symphyses occur where two separate bones are interconnected by cartilage. Most of these types of joints occur in the midline and include **the pubic symphysis** between the two pelvic bones, and **intervertebral discs** between adjacent vertebrae

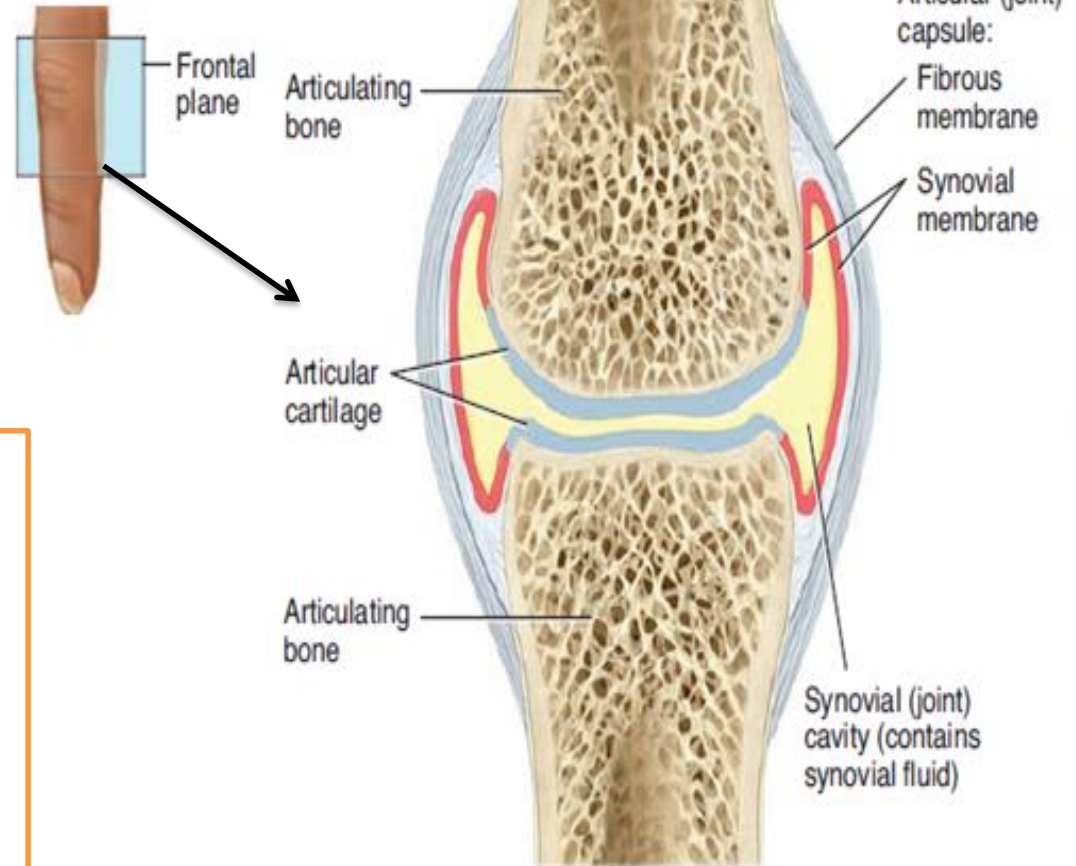


Features of Synovial Joints

1-The presence of a space called a **synovial (joint) cavity between the articulating bones**

2-The bones are covered by a layer of ***hyaline cartilage*** called **articular cartilage**.

The cartilage covers the articulating surface of the bones with a smooth, slippery surface



3-Articular Capsule

A sleeve-like **articular (joint) capsule surrounds a synovial joint**,

The articular capsule is composed of two layers, **an outer fibrous membrane and an inner synovial membrane**

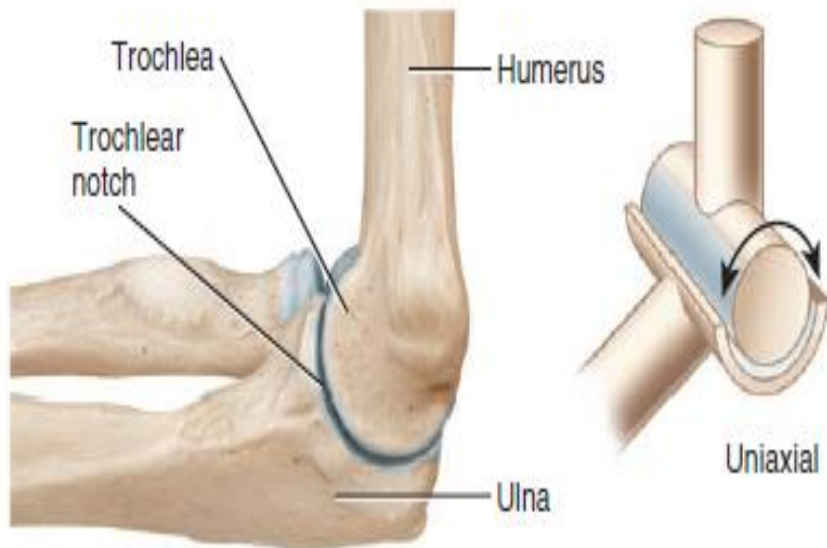
4-Synovial Fluid

The synovial membrane secretes **synovial fluid**. Its functions include reducing friction and supplying oxygen and nutrients to and removing carbon dioxide and metabolic wastes from the chondrocytes within articular cartilage.

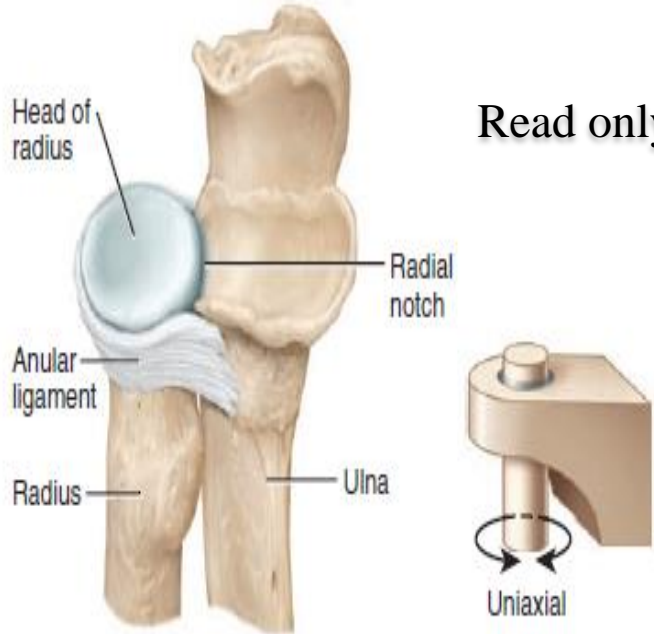
5-Accessory Ligaments, Articular Discs

Many synovial joints also contain **accessory ligaments called extracapsular ligaments and intracapsular ligaments**

Selected Types of synovial joints



(b) Hinge joint between trochlea of humerus and trochlear notch of ulna at the elbow



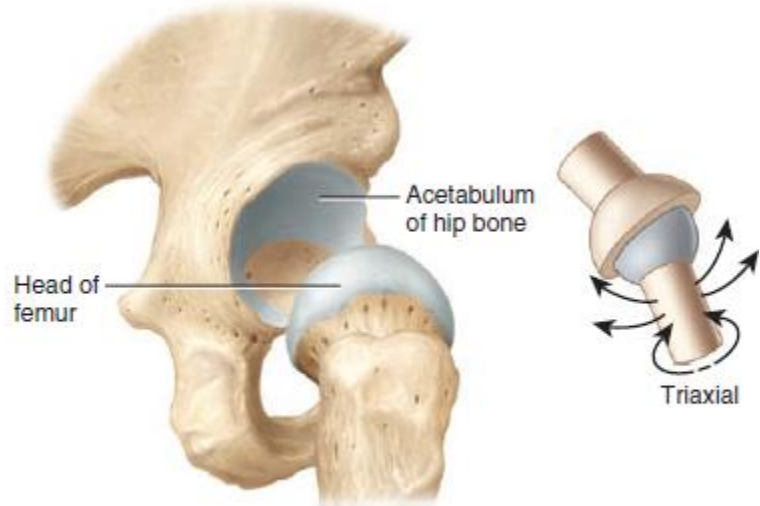
(c) Pivot joint between head of radius and radial notch of ulna

2-Pivot Joints
 In a **pivot joint**, *the rounded or pointed surface of one bone articulates with a ring formed partly by another bone and partly by a ligament*

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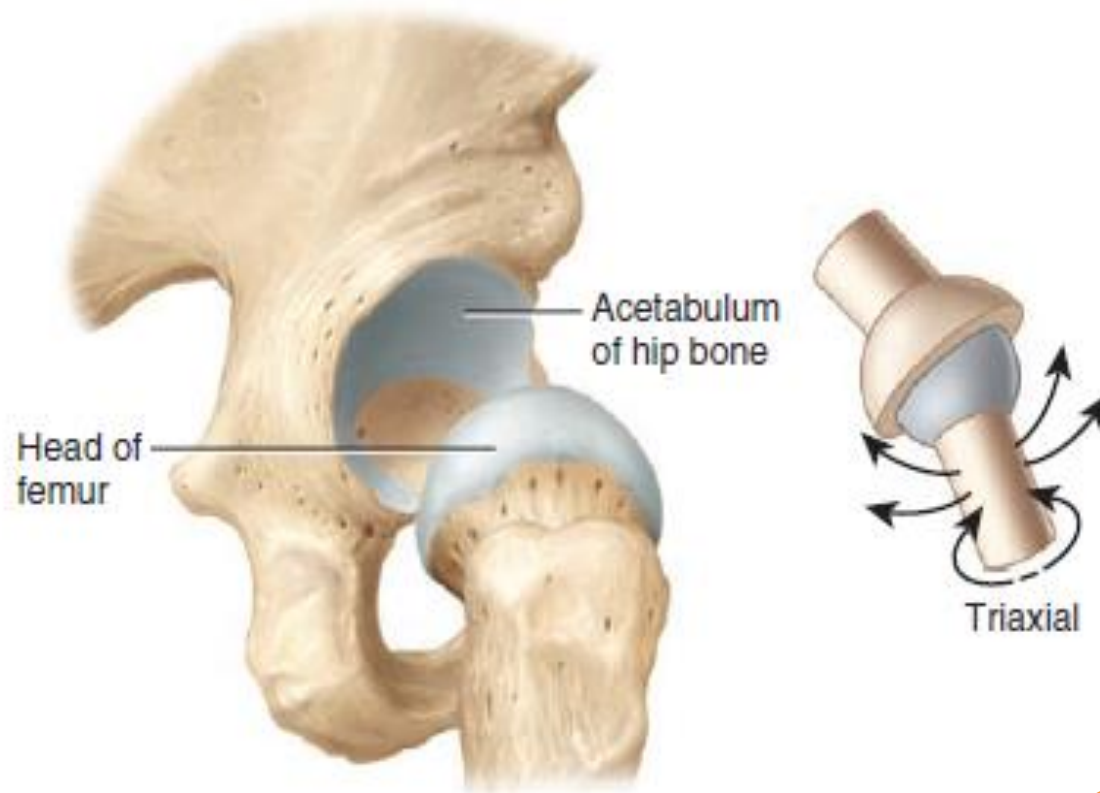
1-Hinge Joints

In a **hinge joint**, *the convex surface of one bone fits into the concave surface of another bone*



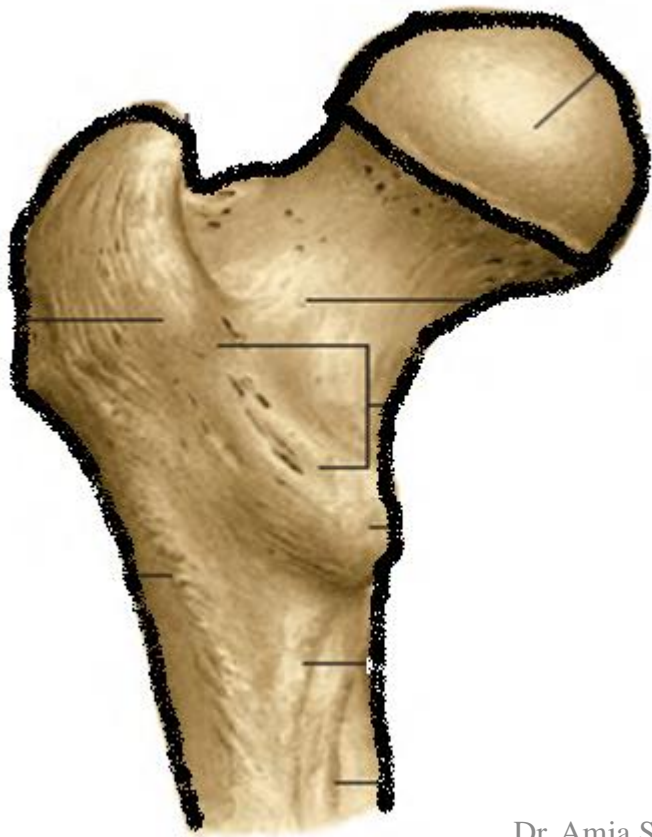
(f) Ball-and-socket joint between the head of femur and acetabulum of hip bone

3-Ball-and-Socket Joints
consists of the ball-like surface of one bone fitting into a cuplike depression of another bone



(f) Ball-and-socket joint between head of femur and acetabulum of hip bone

Ball-and-Socket Joints
consists of the ball-like surface of one bone fitting into a cuplike depression of another bone



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TYPES OF MOVEMENTS AT SYNOVIAL JOINTS

The major movements are:

1-FLEXION

2-EXTENSION

3-ABDUCTION

4-ADDUCTION

5- MEDIAL AND LATERAL ROTATION

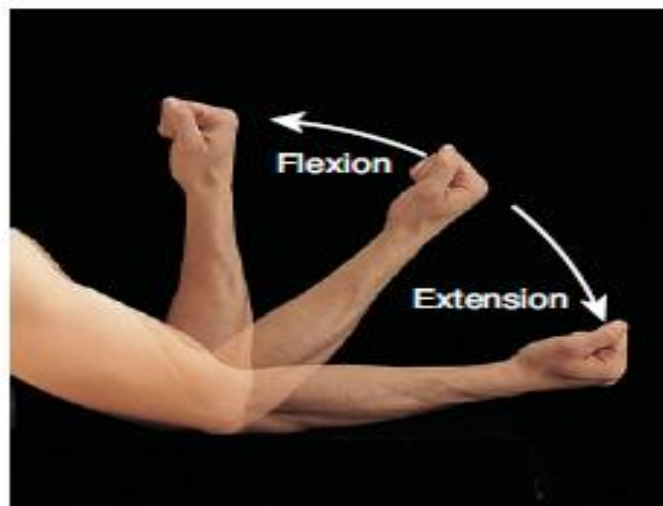
5-CIRCUMDUCTION

Flexion, Extension

Flexion and extension are opposite movements.

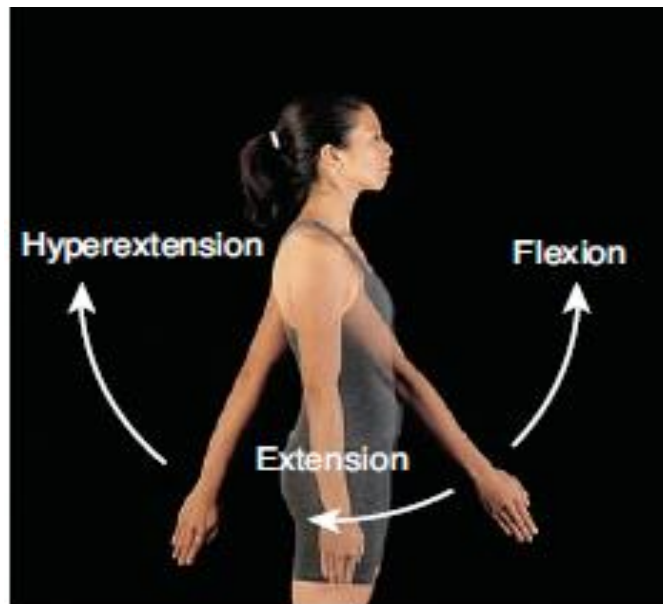
In flexion

there **is a decrease**
in the angle between
articulating
bones



in extension (to stretch out)
there is

an increase in the
angle between articulating
bones, often to restore a part of the
body to the anatomical position
after it has been flexed



Abduction, Adduction

Abduction *is the* movement of **a bone away from the midline**
adduction *is the* movement of a **bone toward the midline**

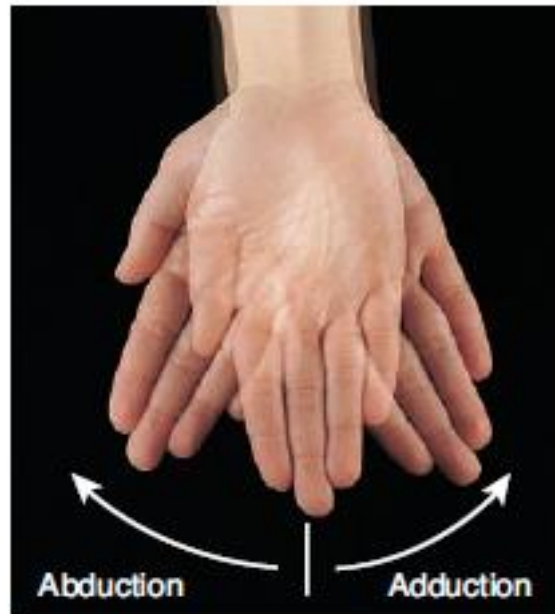
Examples of abduction include

moving the humerus
laterally at
the shoulder joint



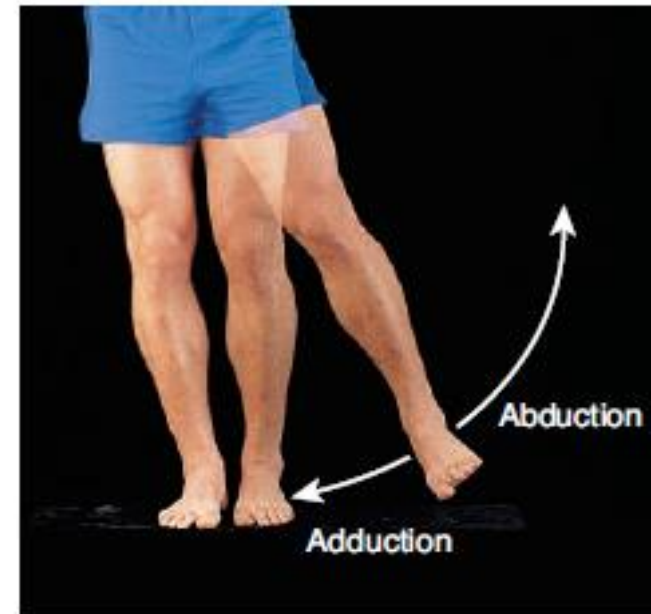
(a) Shoulder joint

moving the palm laterally
at the wrist joint



(b) Wrist joint

moving the femur laterally
at the hip joint



(c) Hip joint

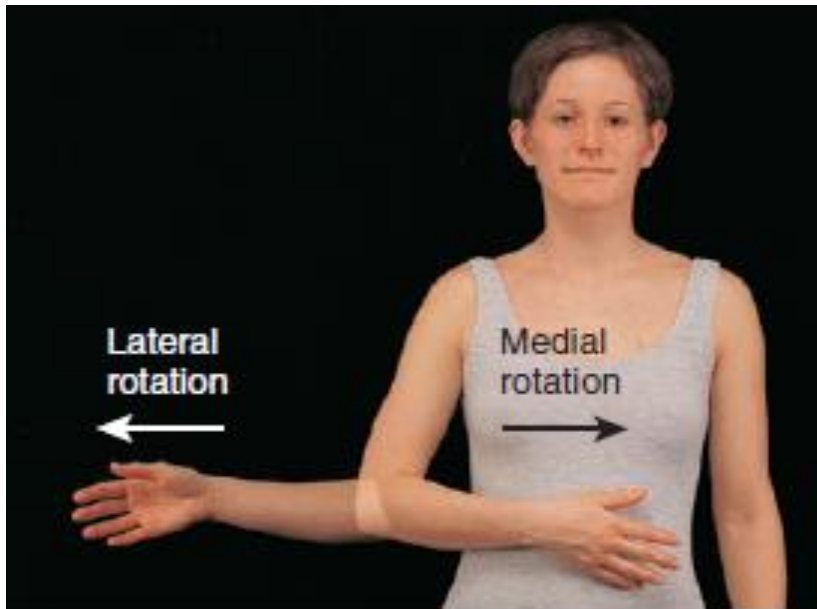
The movement that returns each of these body parts to the anatomical position is adduction

Rotation

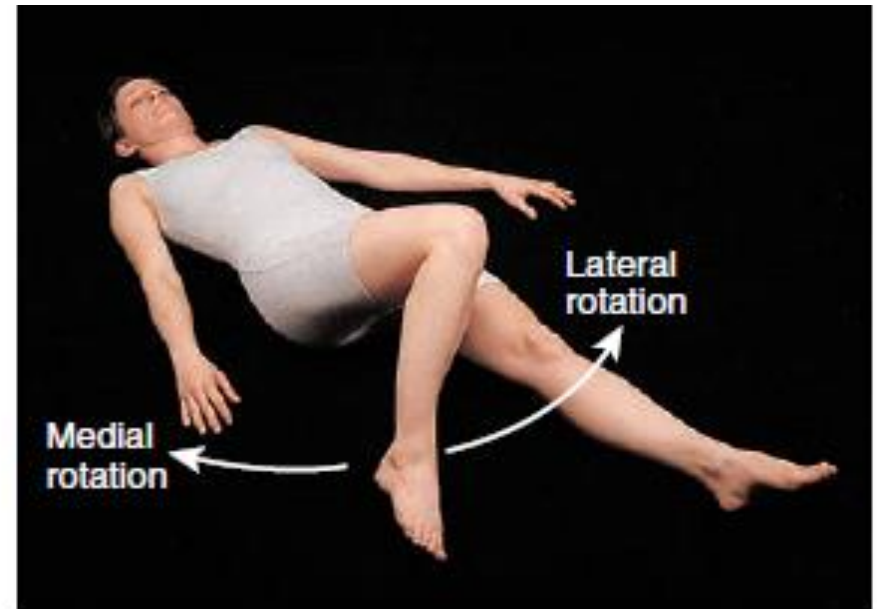
In **rotation** *a bone revolves* around its own longitudinal axis

If the anterior surface of a bone of the limb is turned toward the midline, the movement is called *medial (internal)*

If the anterior surface of the bone of a limb is turned away from the midline, the movement is called *lateral (external) rotation*



(b) Shoulder joint



(c) Hip joint

Inversion

is movement of the sole medially at the intertarsal joints (between the tarsals)

Eversion is a movement of the sole laterally at the intertarsal joints.

- **Dorsiflexion** refers to bending of the foot at the ankle joint (Dorsiflexion occurs when *you stand on your heels.*
- **Plantar flexion** involves bending of the foot at the ankle joint as when you elevate your body by *s*tanding on your toes.**



(e) Intertarsal joints



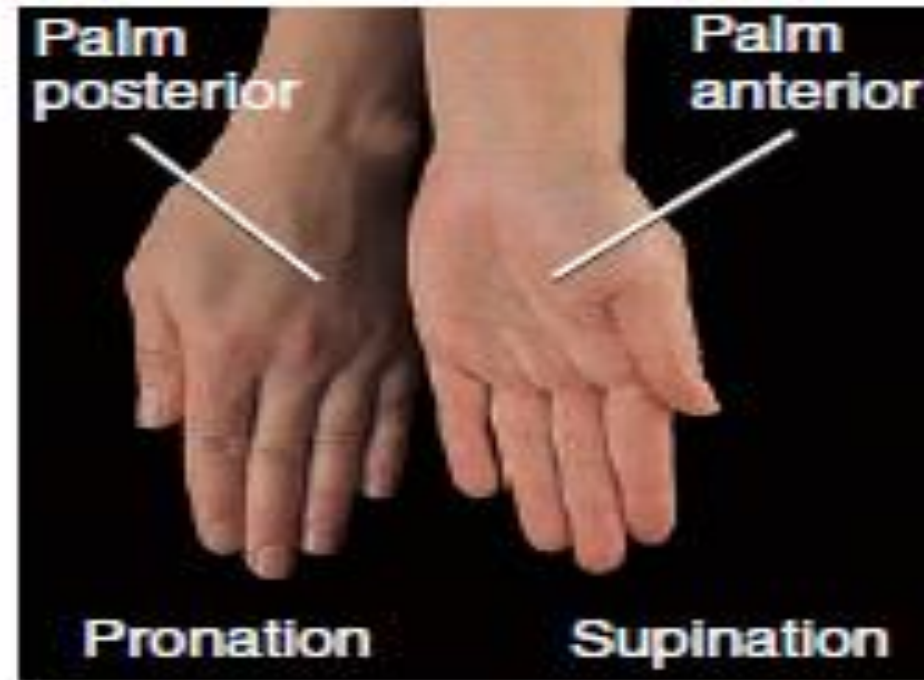
(f)



(g) Ankle joint

Supination is a movement of the forearm at the proximal and distal radioulnar joints in which the palm is turned anteriorly

Pronation is a movement of the forearm at the proximal and distal radioulnar joints in which the palm is turned posteriorly



(h) Radioulnar joint