

Lecture 1

ANATOMICAL TERMS AND SKELETAL SYSTEM



Color Index:

- Main text
- Boys' Slides
- Girls' Slides
- Important
- Dr's Notes
- Extra

OBJECTIVES

- 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 different bones of both axial & appendicular skeleton.

 [Editing File](#)

What is Anatomy?

Girls'
Slides

The word Anatomy is of Greek origin meaning cutting up (ana= up; tome= cutting).

Dr said focus on
Girls' Slide for
Examination

- ◆ Anatomy can also be:
the study of the shape & structure of the body parts.

Subdivisions of anatomical science:

Gross (**macroscopic**) anatomy: Study of human body with **naked eye**.

Microscopic anatomy; (Histology): Study of **fine structure** (cells & tissues) of the human body with the help of **microscope**.

Developmental anatomy; (Embryology).

Radiological anatomy: **The study of the body and its organs and tissues using x-ray imaging.**

Applied anatomy: **application of anatomical knowledge, in the diagnosis and treatment of disease.**

Surface anatomy: **superficial anatomy, without dissection (تشریح).**

Surgical anatomy: study of the structure and morphological characteristics of the tissues and organs of the body as they relate to surgery.

Anatomical Position

It is the **standard position** in which the body assume to describe its parts.



Body is Erect

The diagram shows a human silhouette in the anatomical position. The body is upright, arms are at the sides with palms facing forward, and feet are parallel. Callout boxes with arrows point to these features: 'Body is Erect' points to the torso, 'Arms are hanging by the side' points to the right arm, 'Palms facing forward' points to the left hand, and 'Feet are parallel' points to the feet.

Arms are hanging
by the side

Palms facing forward

Feet are parallel

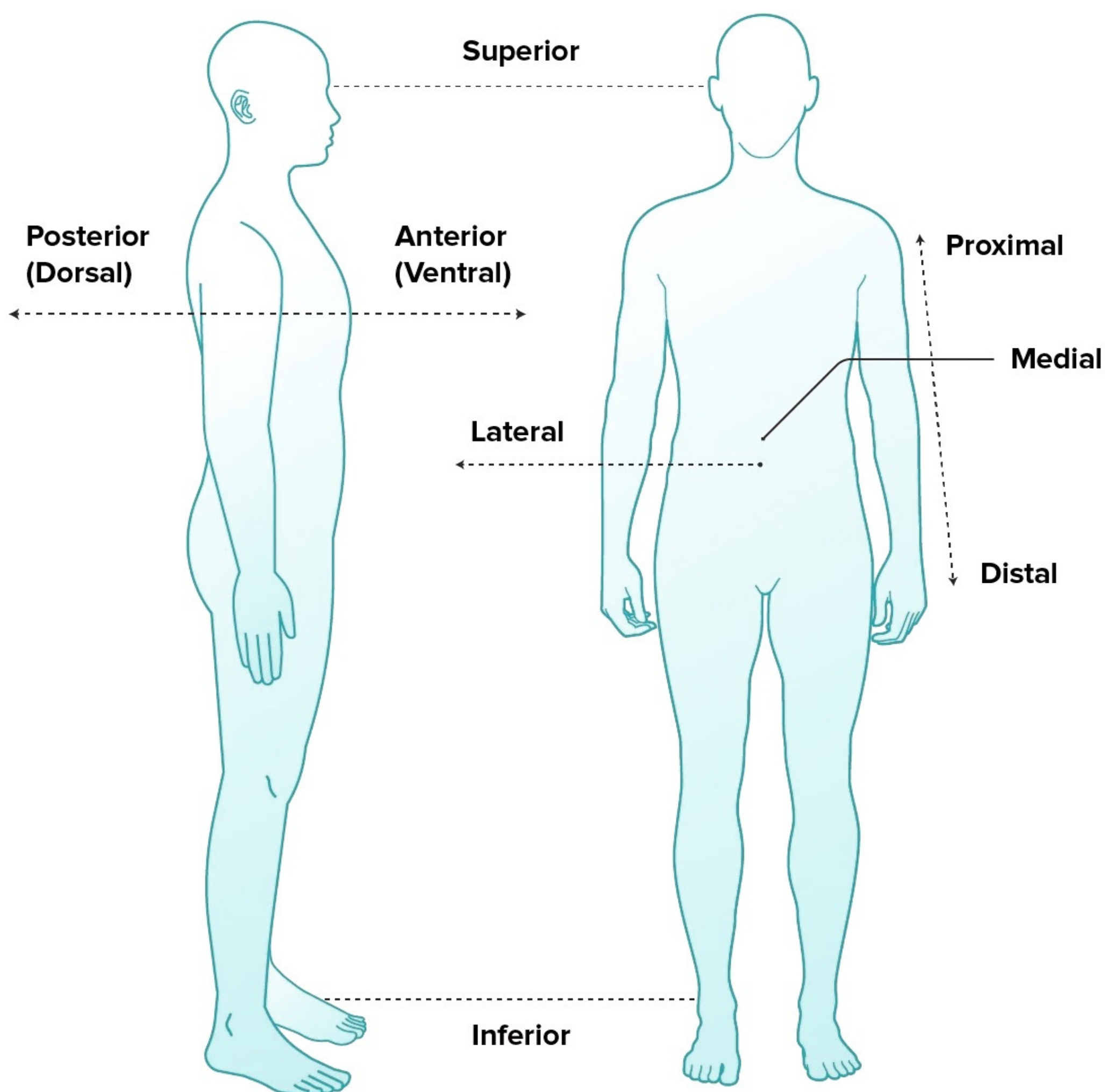
Anatomical Terminology

TERMS OF POSITION:

- **Superior/cephalic (cranial):** near to head.
- **Inferior (caudal):** away from head.
- **Anterior (ventral):** near to front.
- **Posterior (dorsal):** near to back.
- **Medial:** near to median plane.
- **Lateral:** away from median plane.
- **Proximal:** near to trunk. (Closer to origin)
- **Distal:** away from trunk. (Further Away)



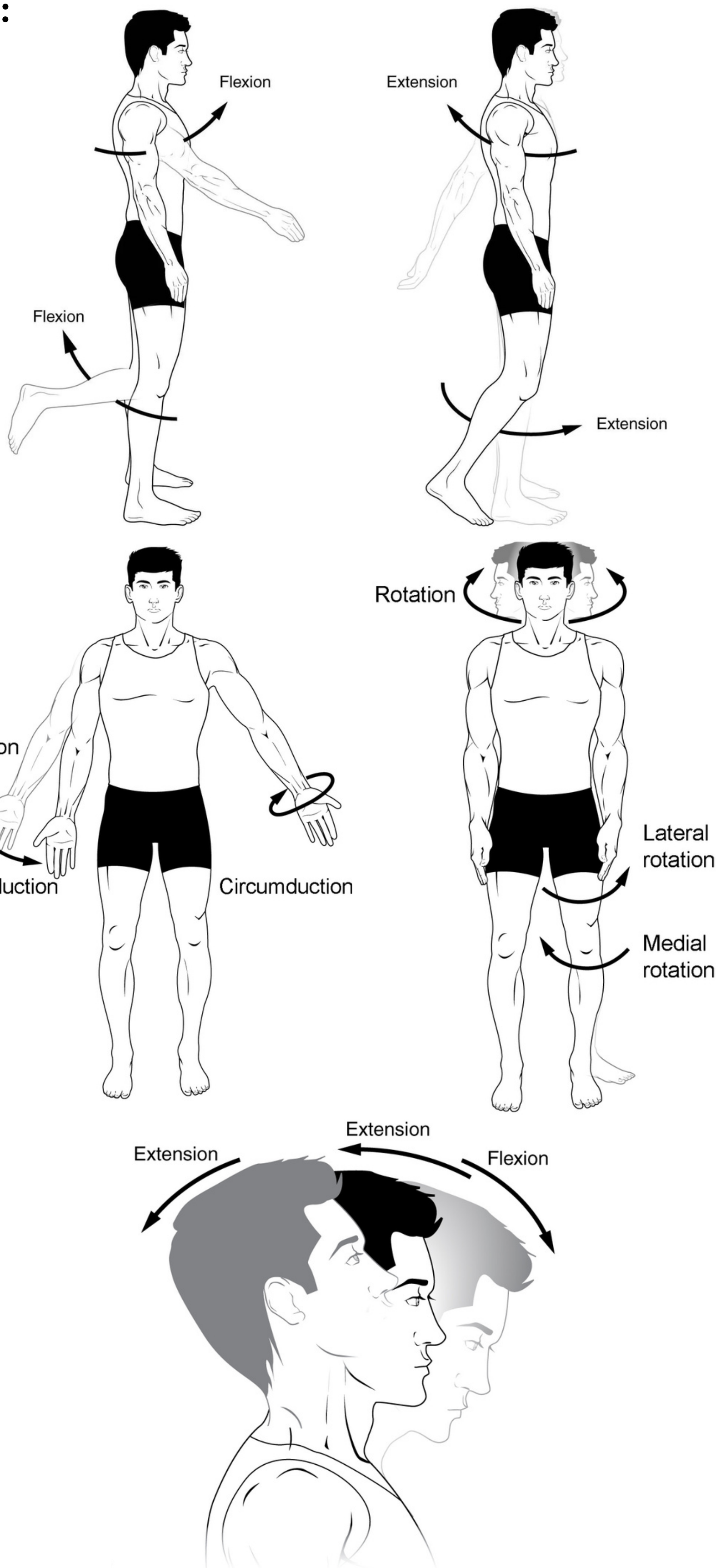
like the skin is superficial to the ribs, and the lung is deep to the ribs.



Anatomical Terminology

TERMS OF GENERAL MOVEMENT:

- **Flexion**(انقباض):
approximation of 2 parts
(**decreasing** the angle
between 2 parts).
- **Extension**(انبساط):
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.

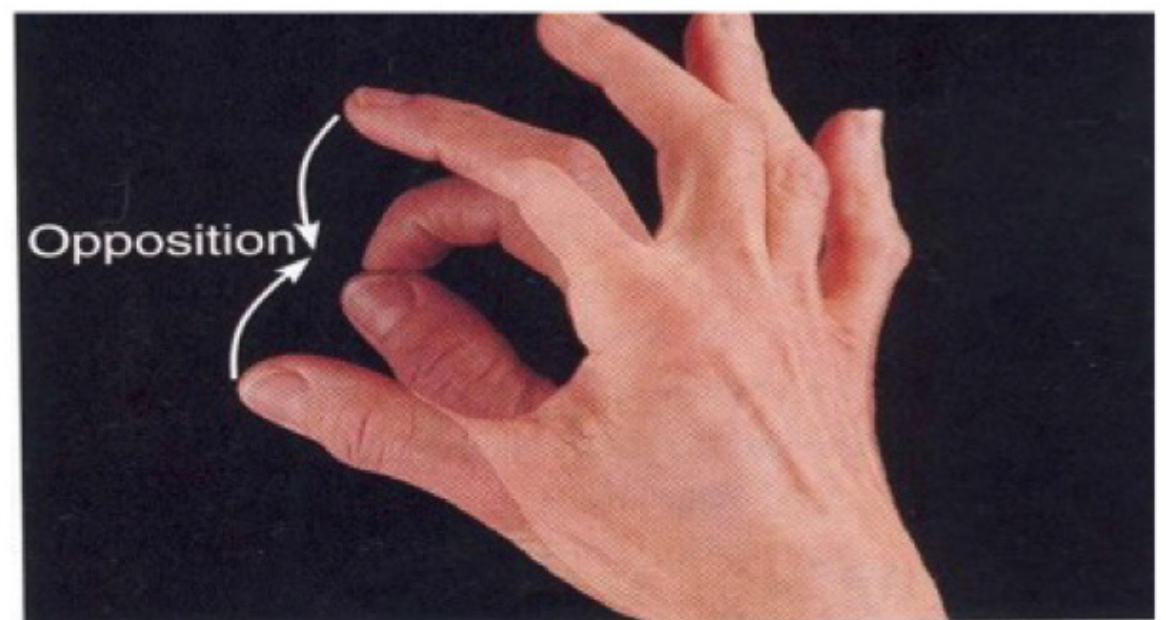


Special movements of the upper limb

Girls' Slides

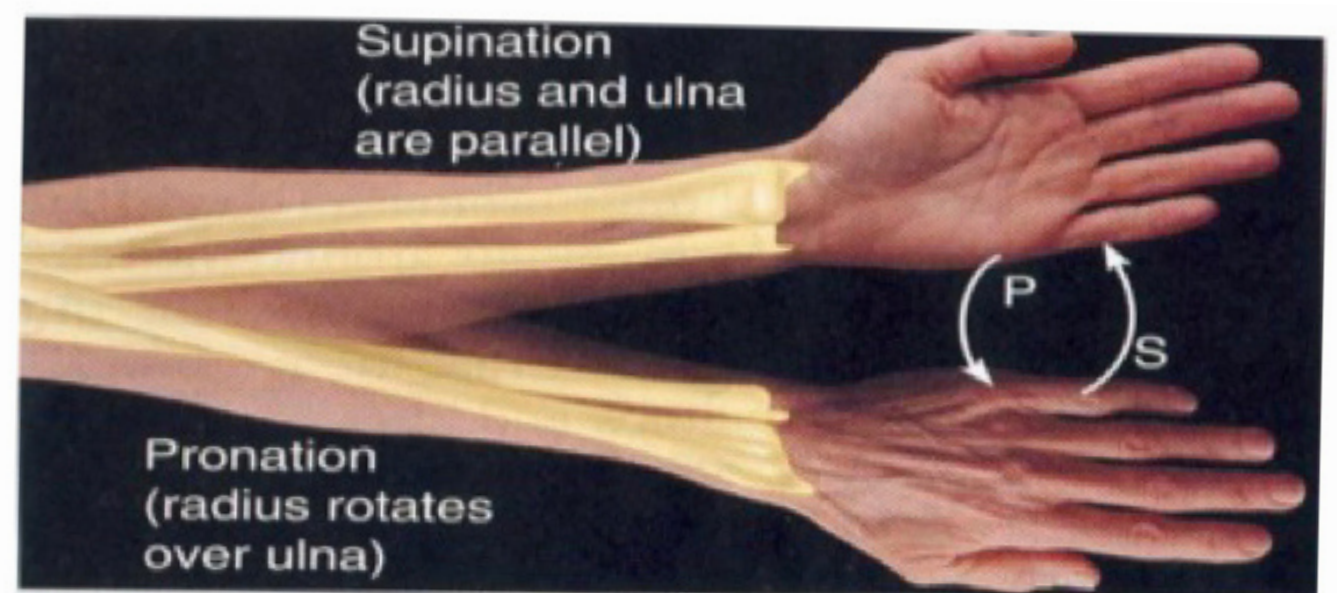
☀ Opposition

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**.



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

☀ Pronation

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

Special movements of the lower limb



Dorsiflexion

Flexing the foot **up**
(Standing on the heels).



Plantar flexion

Flexing the foot **down**
(Movement with pointing the toes).



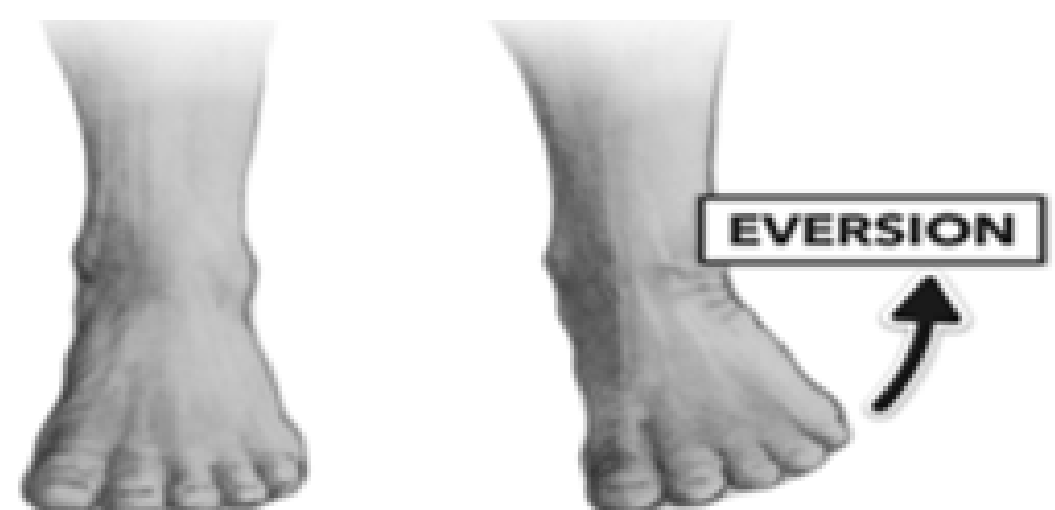
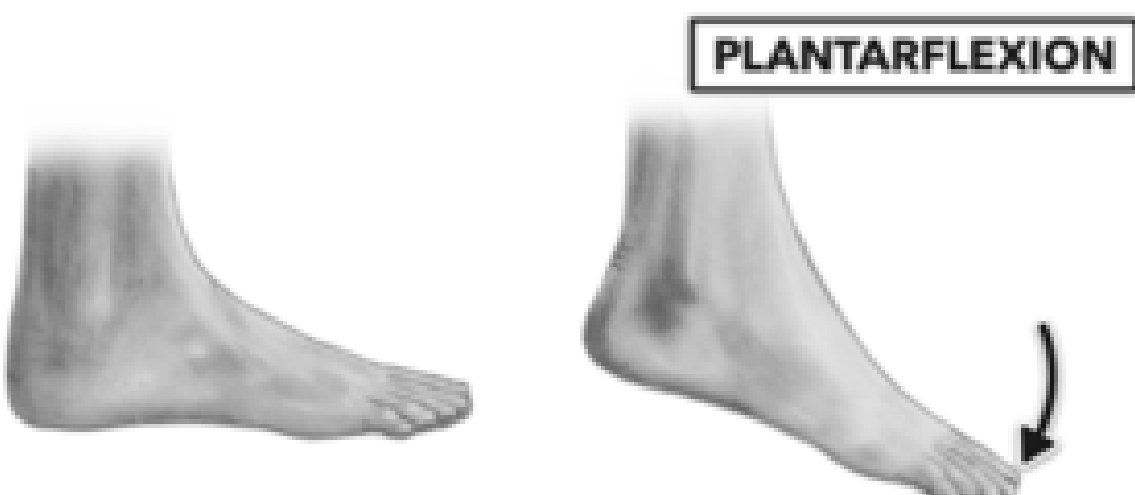
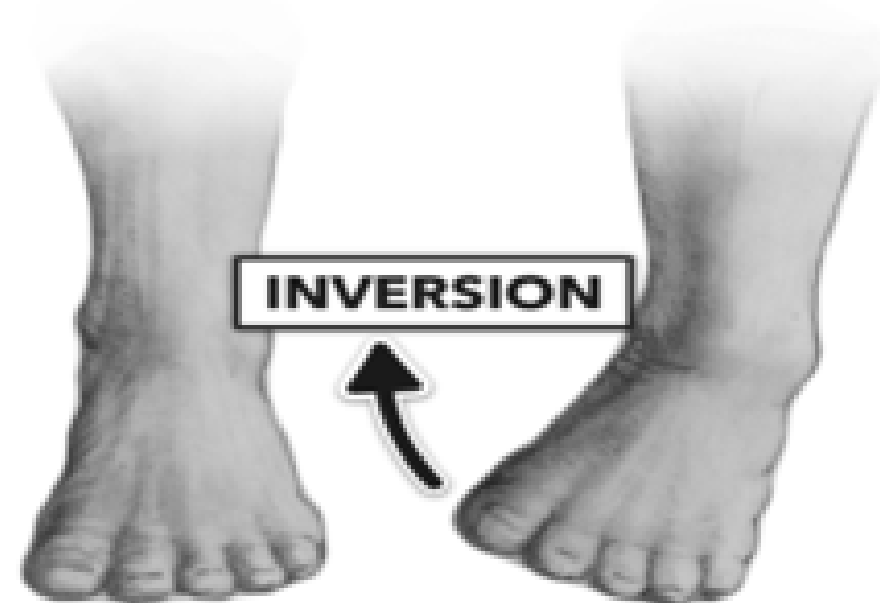
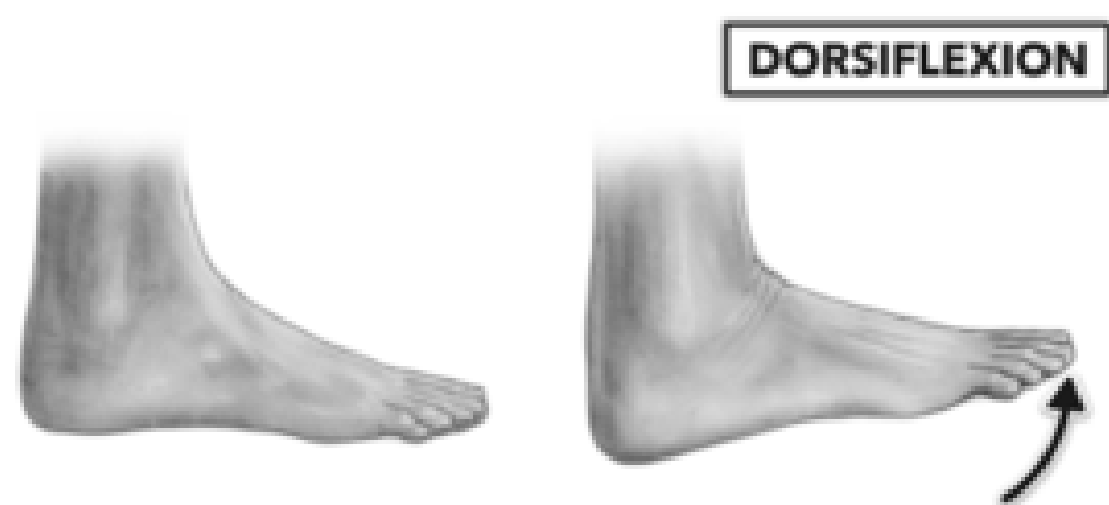
Inversion

The sole (باطن القدم) faces in a **medial** direction.



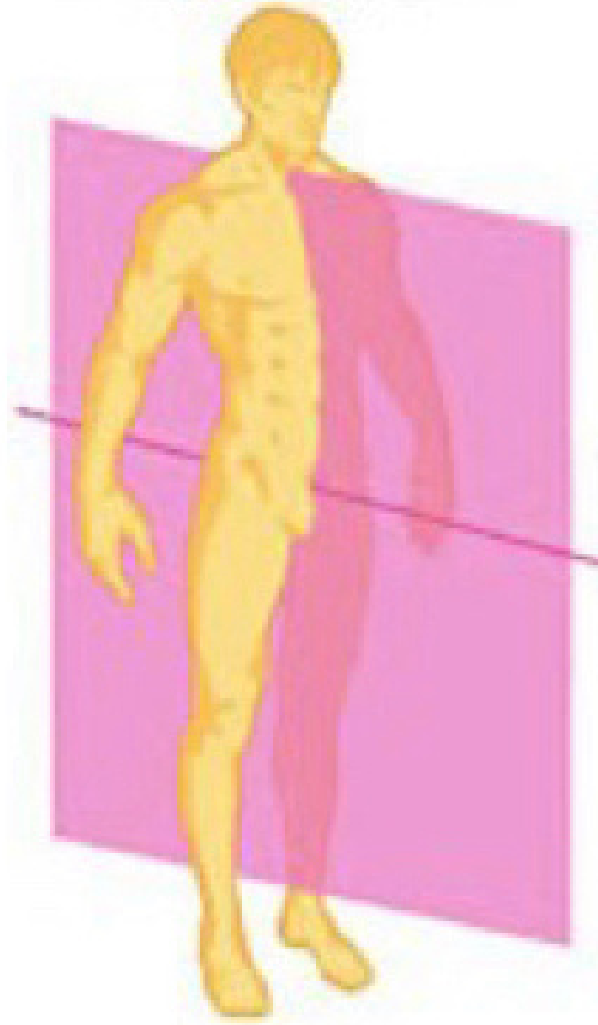
Eversion

The sole faces in a **lateral** direction.



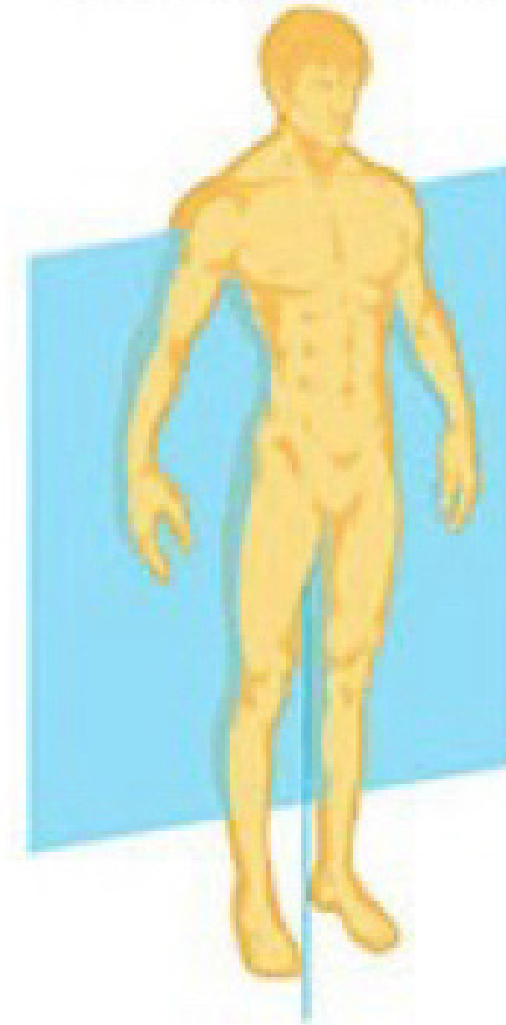
ANATOMICAL PLANES & SECTIONS

Sagittal plane



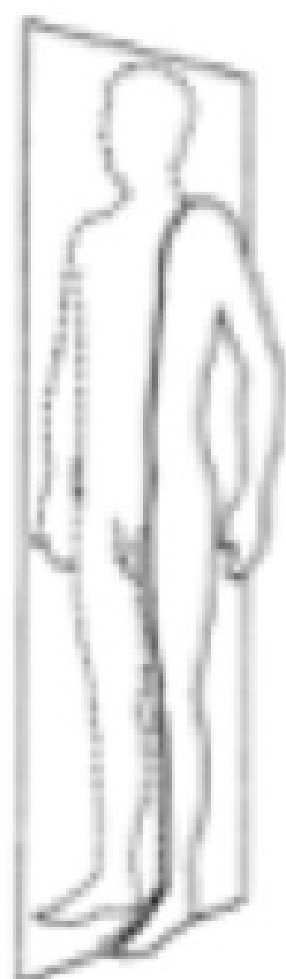
Sagittal / Longitudinal (median): divides the body into **two equal** halves (right & left).

Frontal plane



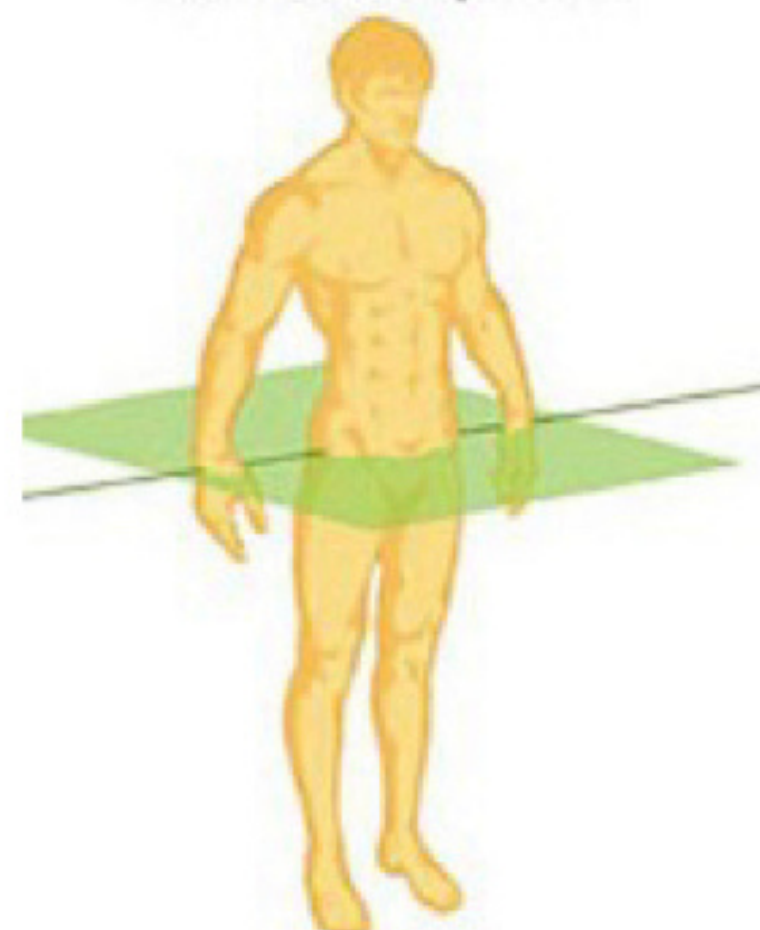
Frontal (coronal): divides the body into **anterior & posterior** parts.

Parasagittal (paramedian): divides the body into **two unequal** parts (right & left).



Transverse / Horizontal (cross): divides the body into **superior & inferior** parts.

Horizontal plane



Body Cavities

Girls' Slides

Ventral body cavity

It is divided by **diaphragm** into:

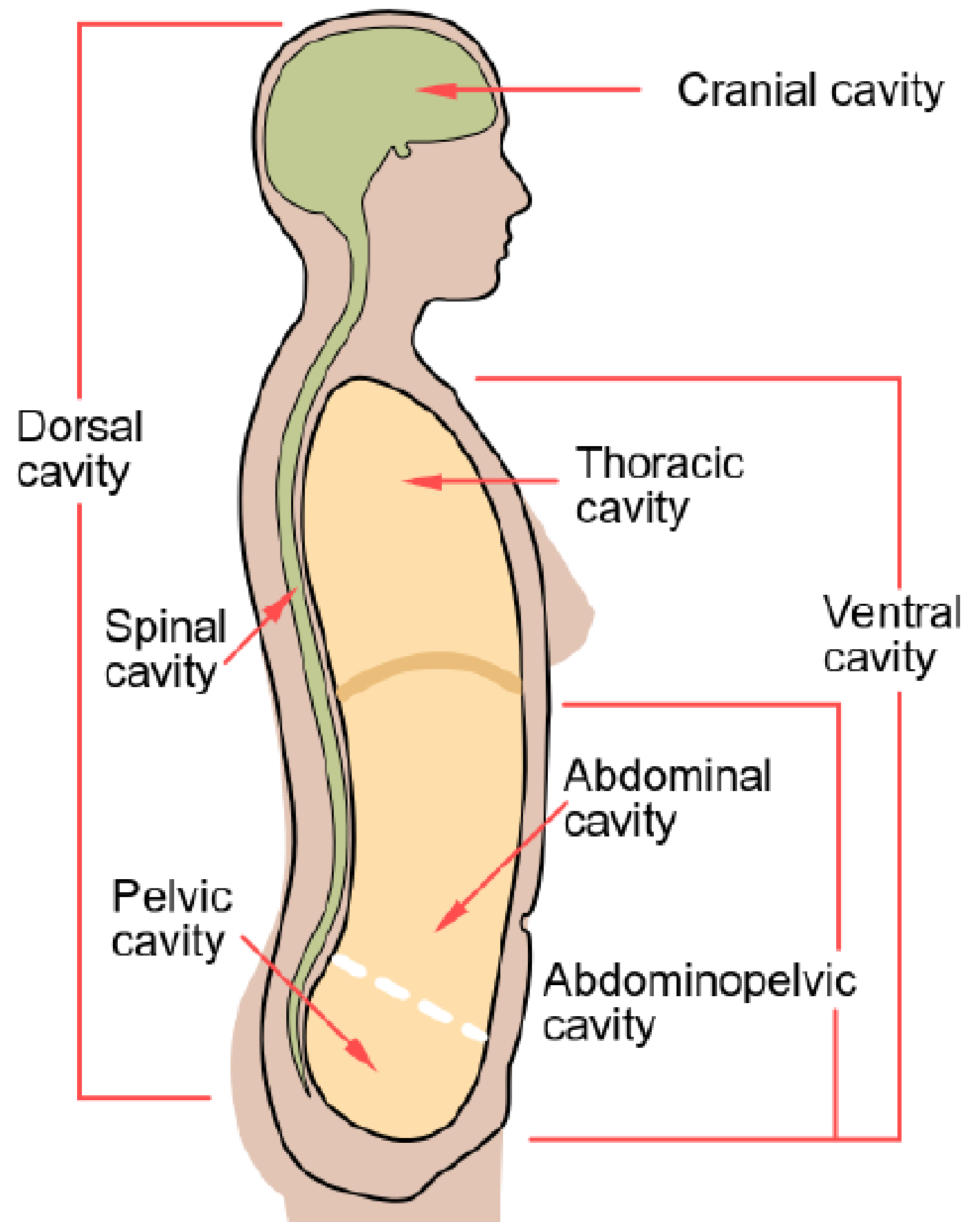
- **Thoracic cavity:** superior to diaphragm, contains: heart & lungs.
- **Abdominal cavity:** inferior to diaphragm, contains: stomach, intestine, liver, urinary bladder, etc...

(abdominopelvic cavity consists of Abdominal and Pelvic cavity)

Dorsal body cavity

It is also divided into 2 parts that are **continuous** with each other:

- **Cranial cavity:** space inside **skull**, contains brain.
- **Spinal cavity:** space inside **vertebral column**, contains spinal cord.



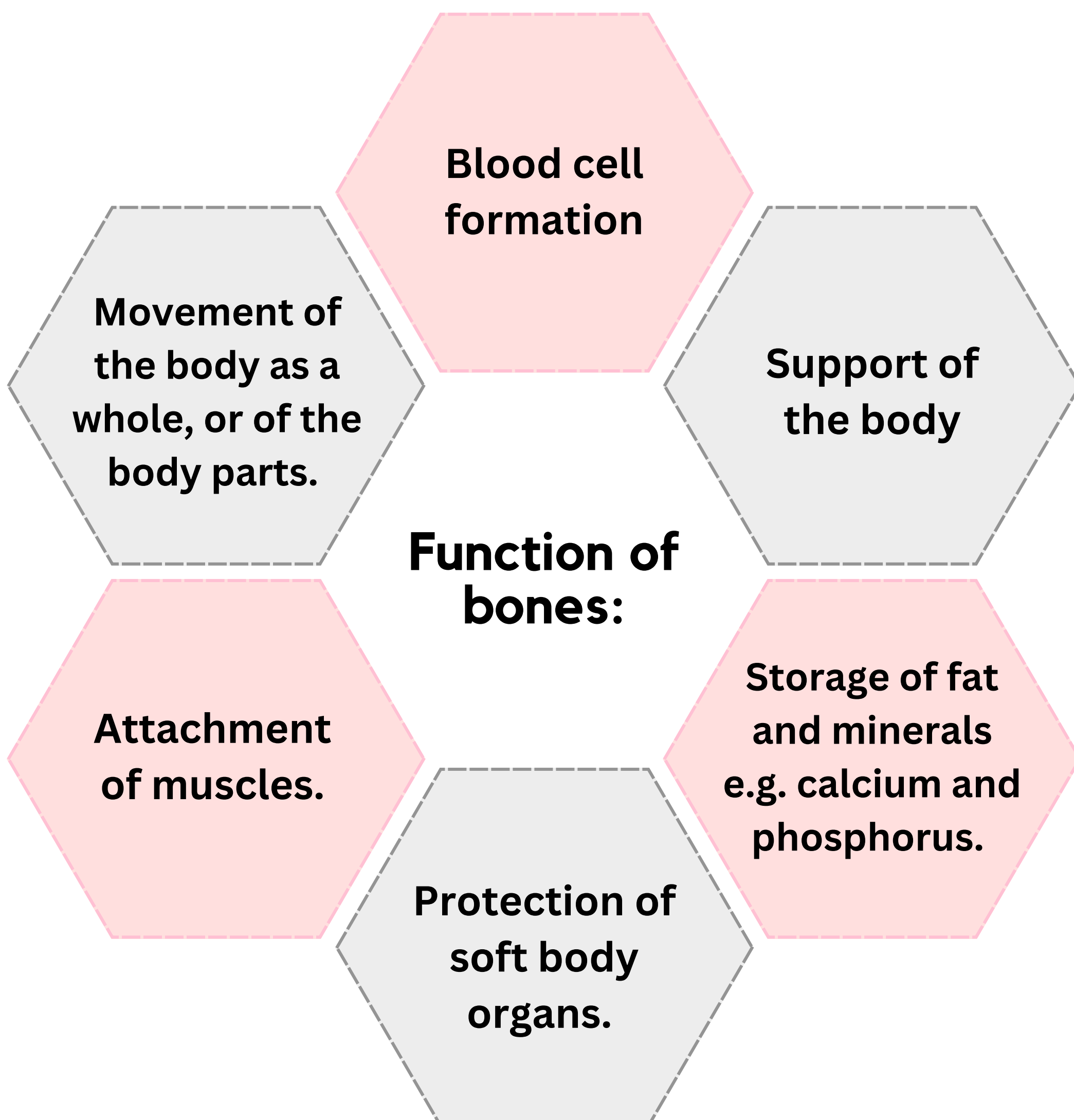
Skeletal System

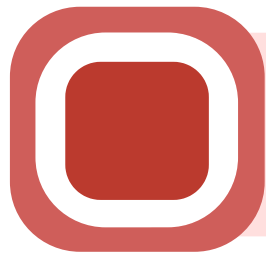
1

Bones

2

joints : articulations between bones





Classifications of bone

◆ **Compact**

◆ **Spongy**

◆ **Membrane**

◆ **Cartilage**

Structure

Shape

Development

- E.g: Carpal and tarsal bones.
- provide stability and some movement



◆ **Long**

◆ **Short**

◆ **Flat**

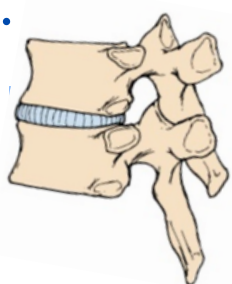
◆ **Irregular**

◆ **Sesamoid**



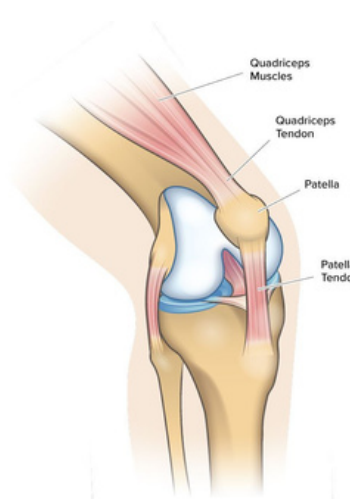
- E.g: Femur, humerus, tibia, fibula, clavicle, metatarsal, and metacarpals
- support the weight of the body and facilitate movement.

- E.g: Vertebrae and sacrum, hips, bones of the face.
- vary in shape and structure, don't fit into any other category.
- protect internal organs, for example: the vertebrae protect the spinal cord.



- E.g: cranium (occipital, parietal and frontal of the skull), sternum, scapula, ribs.
- protect internal organs such as the brain, heart, and pelvic organs.
- also provide large areas of attachment for muscles.

- E.g: Patella
- bones embedded in tendons.
- commonly found in the tendons the hands, knees, and feet.
- protect tendons from stress.



Types of Osseous Tissue



There are two types of osseous tissue making up bones:

| Compact/hard bony tissue (cortical tissue) | Cancellous/spongy tissue. |
|---|---|
| made up of closely packed cells which have thin canals running through them for blood vessels to pass through. | has spaces in between the cells, giving it a lattice-like (network) appearance. |
| <ul style="list-style-type: none">• Usually located on the outside of bones• Gives bones their characteristic: hard, smooth, white appearance. | <ul style="list-style-type: none">• generally found on the inside of bones• highly vascular• houses the bone marrow where haematopoiesis (formation of blood components) takes place. |



The difference lies in the **denseness** of the cells.

The Skeleton

- Formed of **206** bones.
- The smallest bones are the ossicles in the ear
- The largest bones are the femurs in the thighs
 - Divided into:

1. Axial skeleton:

Bones forming the **trunk** (longitudinal axis) of body.

2. Appendicular skeleton:

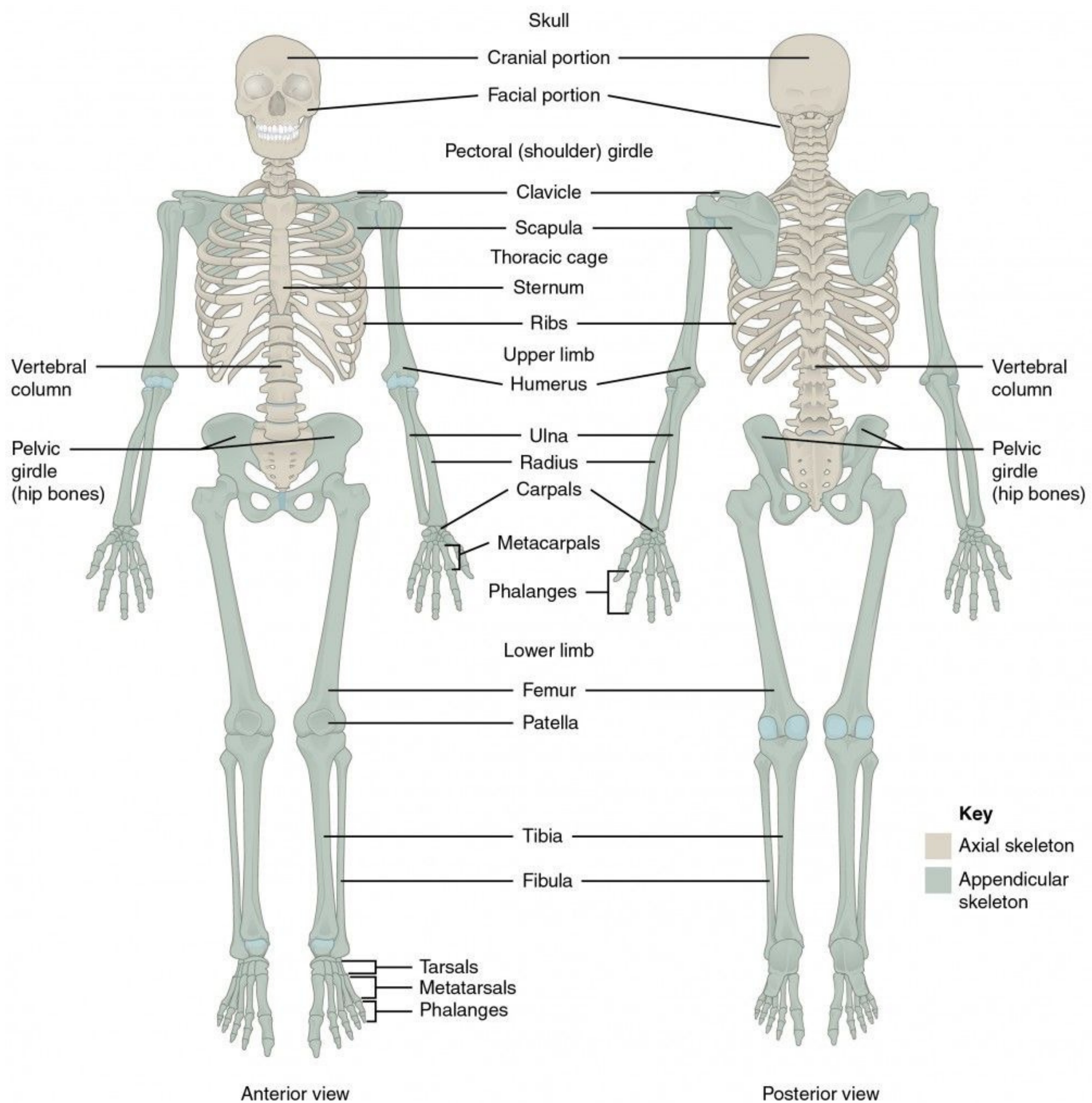
Bones forming the **girdles & limbs**.

| Axial | Appendicular |
|------------------|-----------------|
| Skull | Pectoral girdle |
| Vertebral column | Pelvic girdle |
| Sternum | upper limb |
| Ribs | Lower limb |

THE SKELETON

Axial skeleton

Appendicular skeleton



Bones of Axial Skeleton

Skull

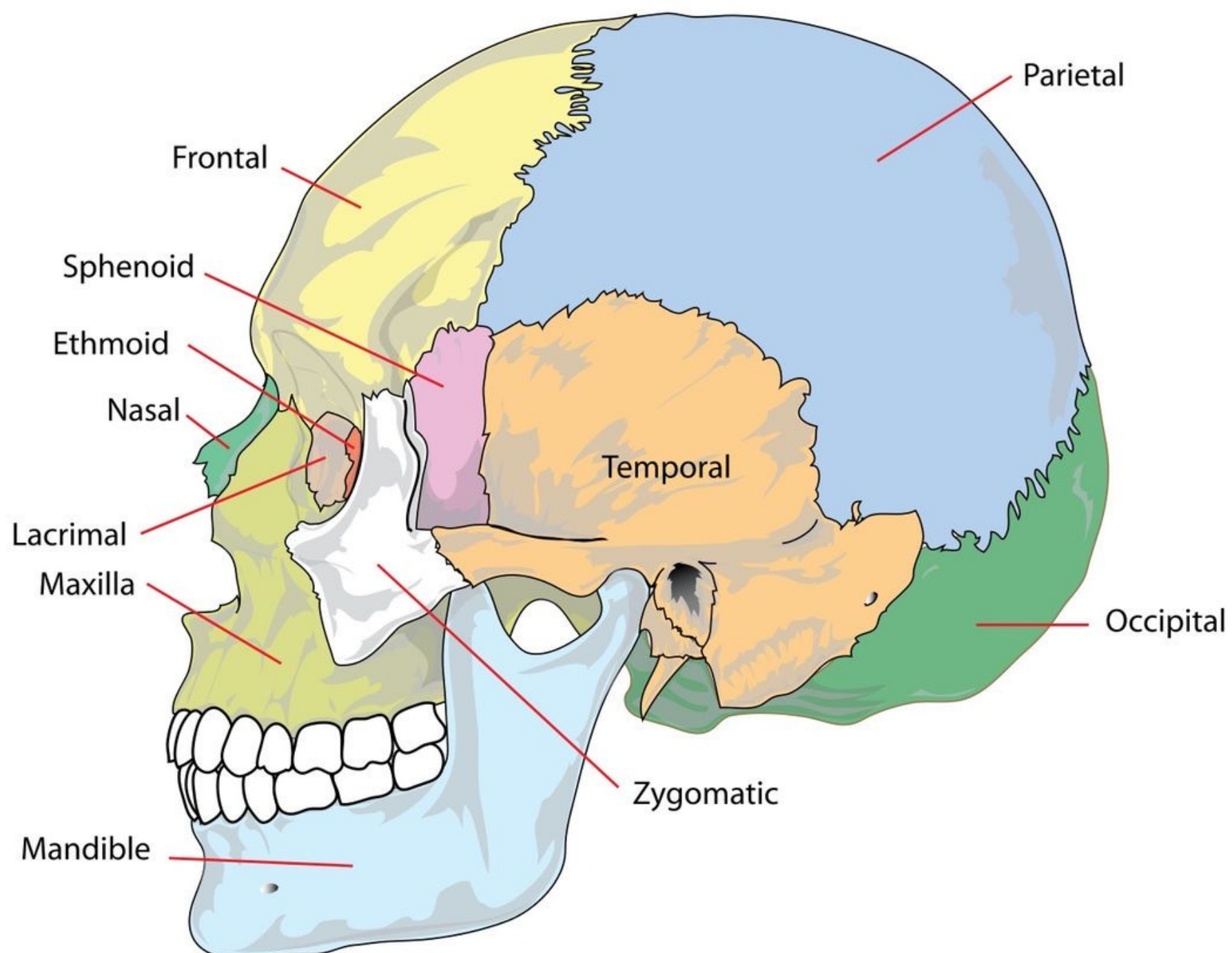
Girls' Slides

Cranium bones

- Frontal
- Occipital
- Parietal
- Temporal

Facial bones

- Maxilla
- Nasal
- Zygomatic
- Mandible



Bones of Axial Skeleton

Vertebral Column



- Number: **33** vertebrae
- Functions: protects **spinal cord** and supports the body
- Formed of :

It's 26
vertebrae
when they
fuse

7 cervical vertebrae

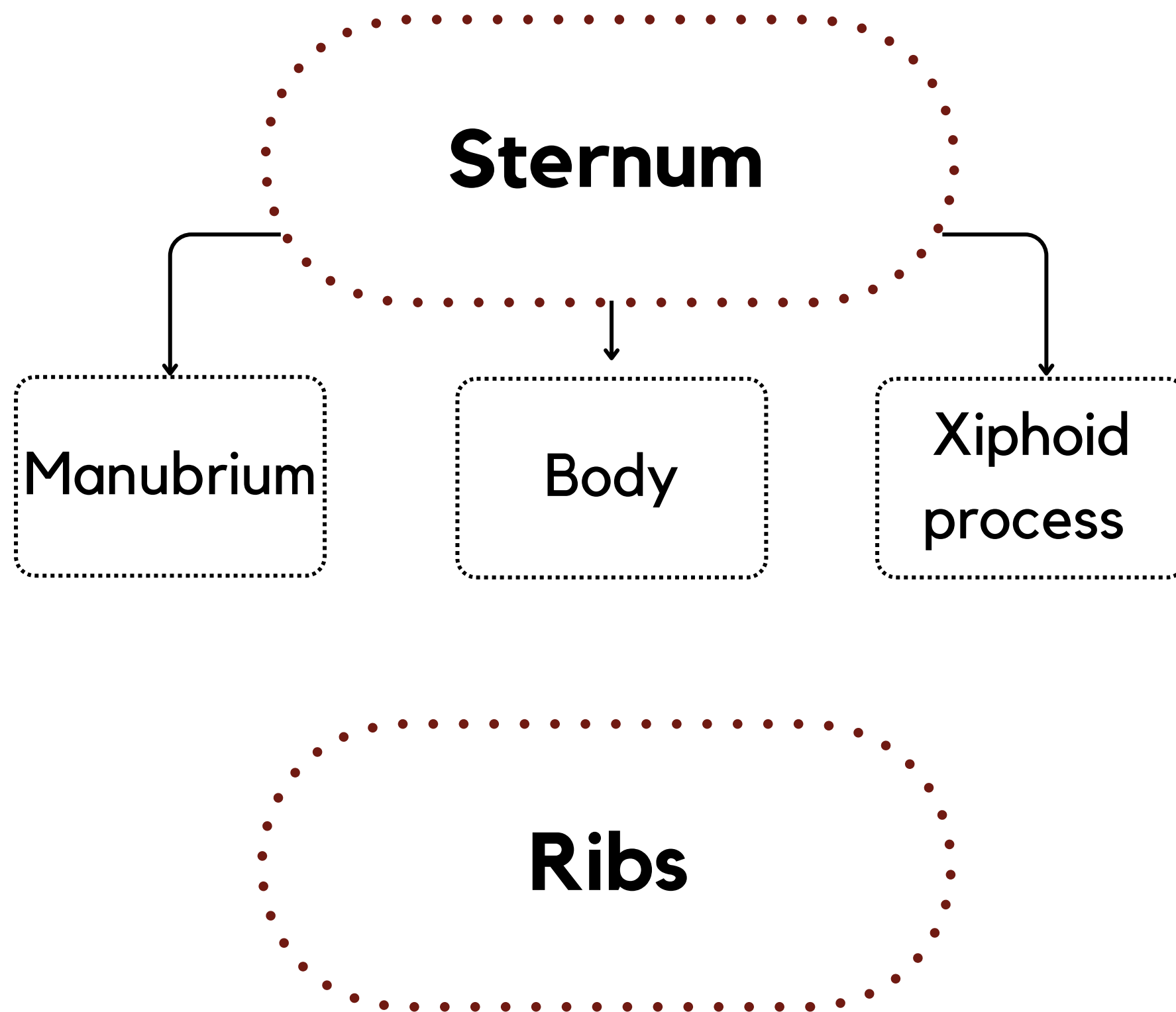
12 thoracic vertebrae

5 lumbar vertebrae

5 sacral vertebrae
fused to form **sacrum**

4 coccygeal vertebrae
fused to form **coccyx**.

Bones of Axial Skeleton



All ribs articulate with vertebrae **posteriorly**

Only upper **7** pairs articulate with sternum, (**true ribs**)

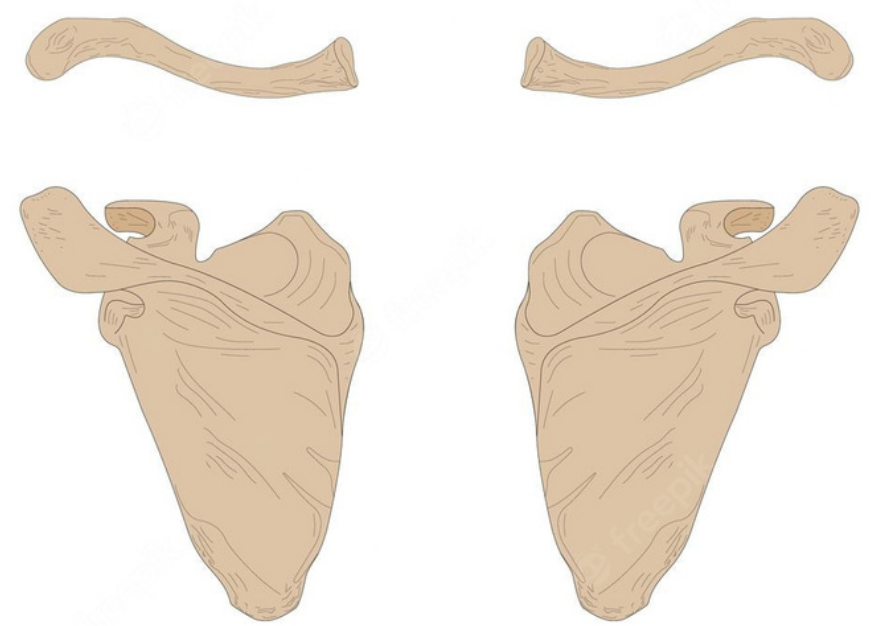
8th , 9th & 10th ribs are **false ribs**

11th & 12th ribs are **floating ribs**

Bones of Appendicular Skeleton

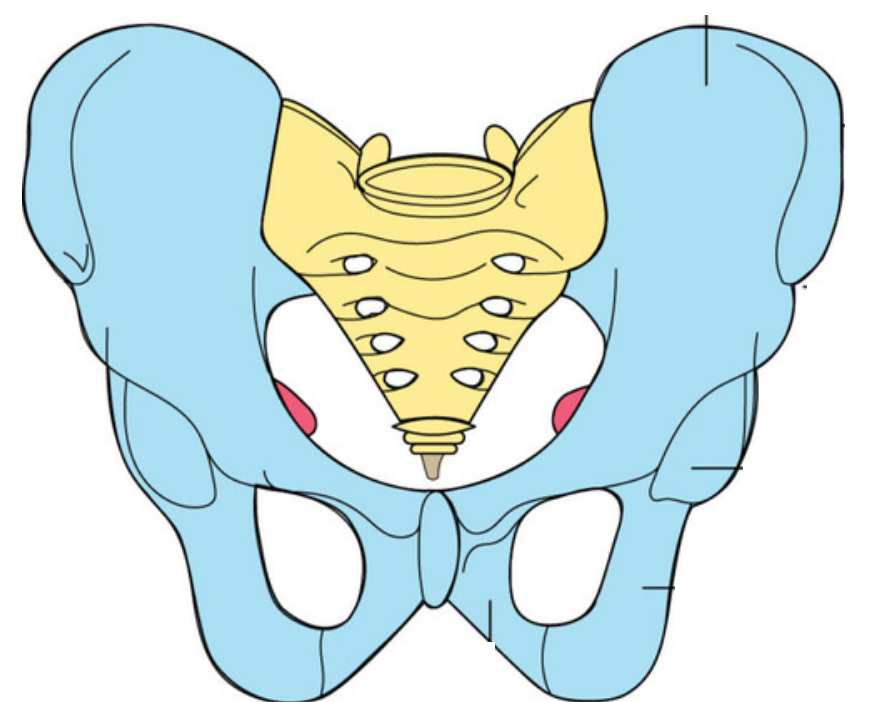
PECTORAL GIRDLE

- Connects **upper limb** with axial skeleton.
- Formed of:
 - **Clavicle**
 - **Scapula**
- (**2** bones on each side)



PELVIC GIRDLE

- Connects **lower limb** with axial skeleton.
- Formed of:
 - **Hip bone**
- (**one** only on each side)



Bones of Appendicular Skeleton



UPPER LIMB



Bone of arm

- Humerus



Bones of forearm

- Radius (**lateral**)
- ulna (**medial**)



Bones of the hand

8 carpal bones.

5 metacarpal bones.

14 phalanges.

2 for **thumb** & 3 for each of **medial 4** fingers.

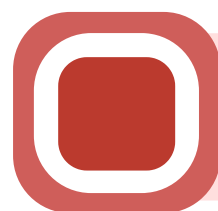


© MAYO FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH. ALL RIGHTS RESERVED.



Numbers only in
Girls' Slides

Bones of Appendicular Skeleton



LOWER LIMB



Bone of thigh

- Femur

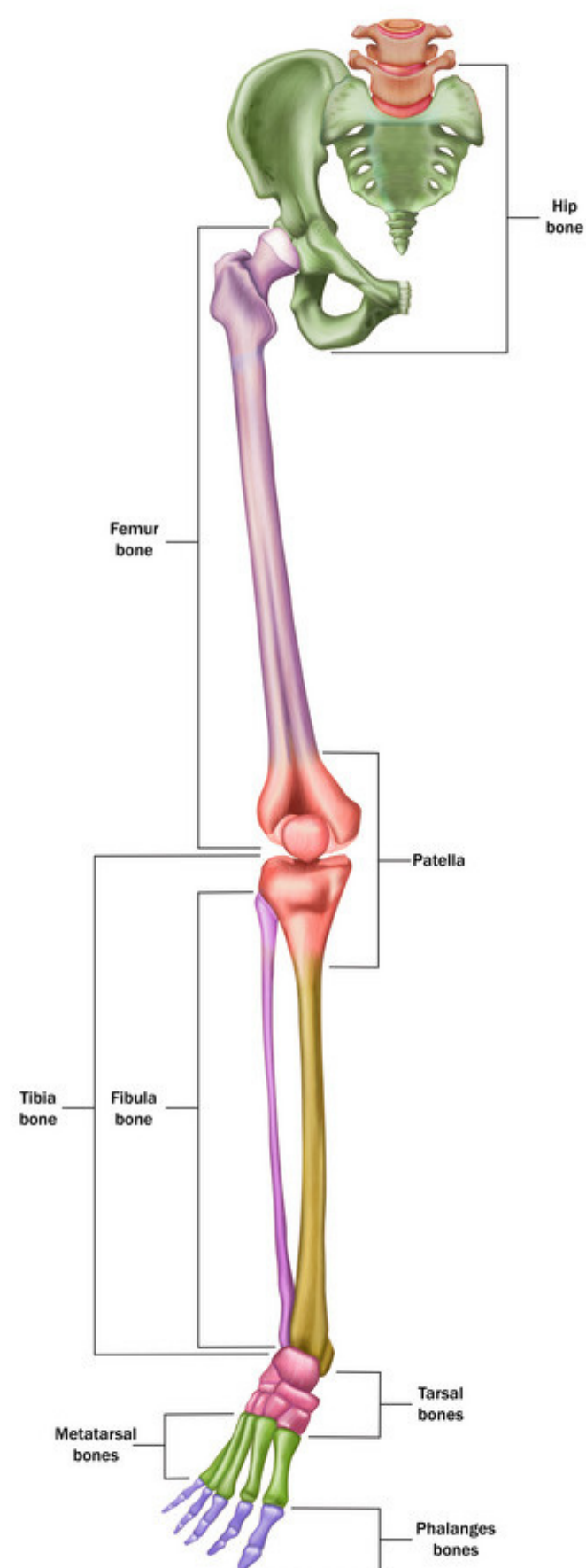


Bones of leg

- Fibula (**lateral**)
- Tibia (**medial**)
- Patel



Bones of foot



7 tarsal bones.

5 metatarsal bones.

14 phalanges.

2 for **big toe** & 3 for each of **lateral** 4 toes.



Numbers only in
Girls' Slides

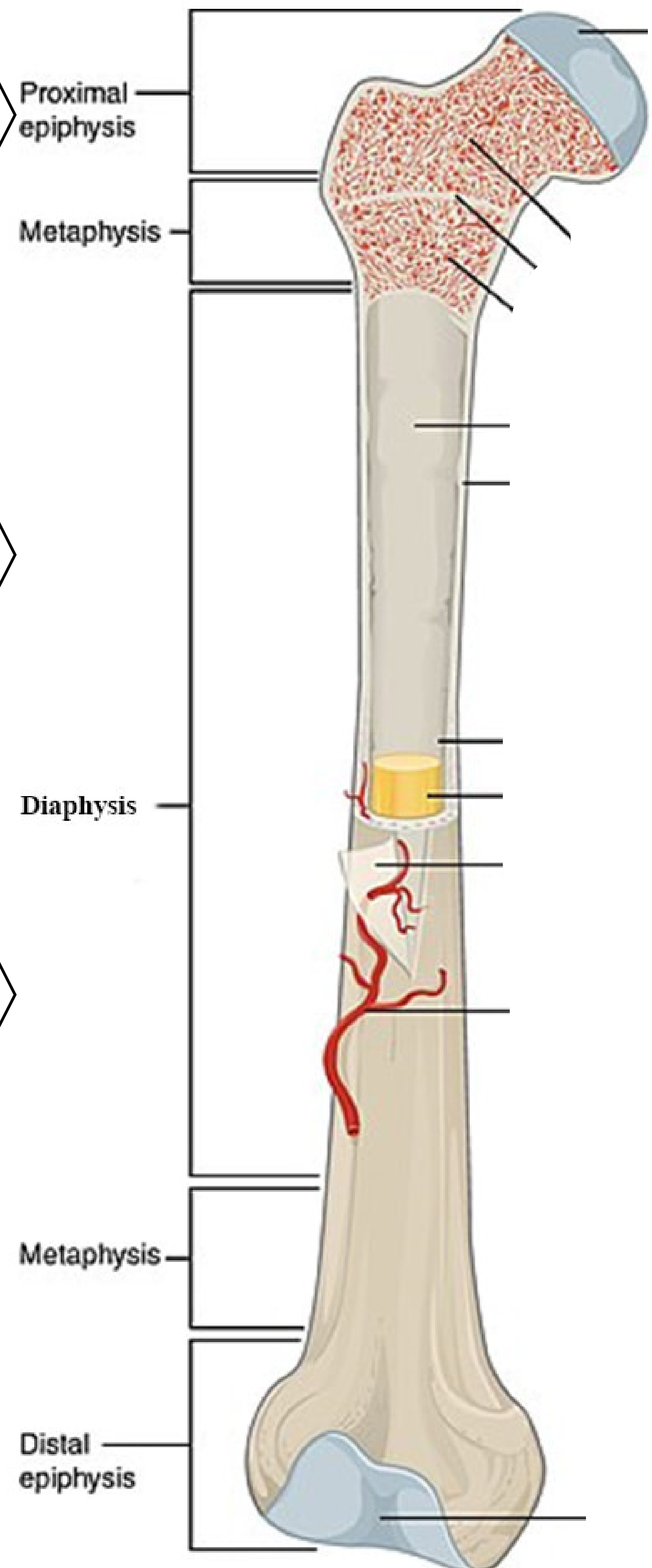
Long Bones

A shaft (**diaphysis**): composed of **compact** bone.
Covered by **periosteum**.
(**Fibrous Connective tissue**)

Two ends (**epiphysis**): composed of **spongy** bone.
Covered by **articular cartilage**.

Metaphysis: This is the region of contact **between** epiphysis & diaphysis.

- The **metaphysis** contains epiphyseal plate of cartilage responsible for linear bone growth.



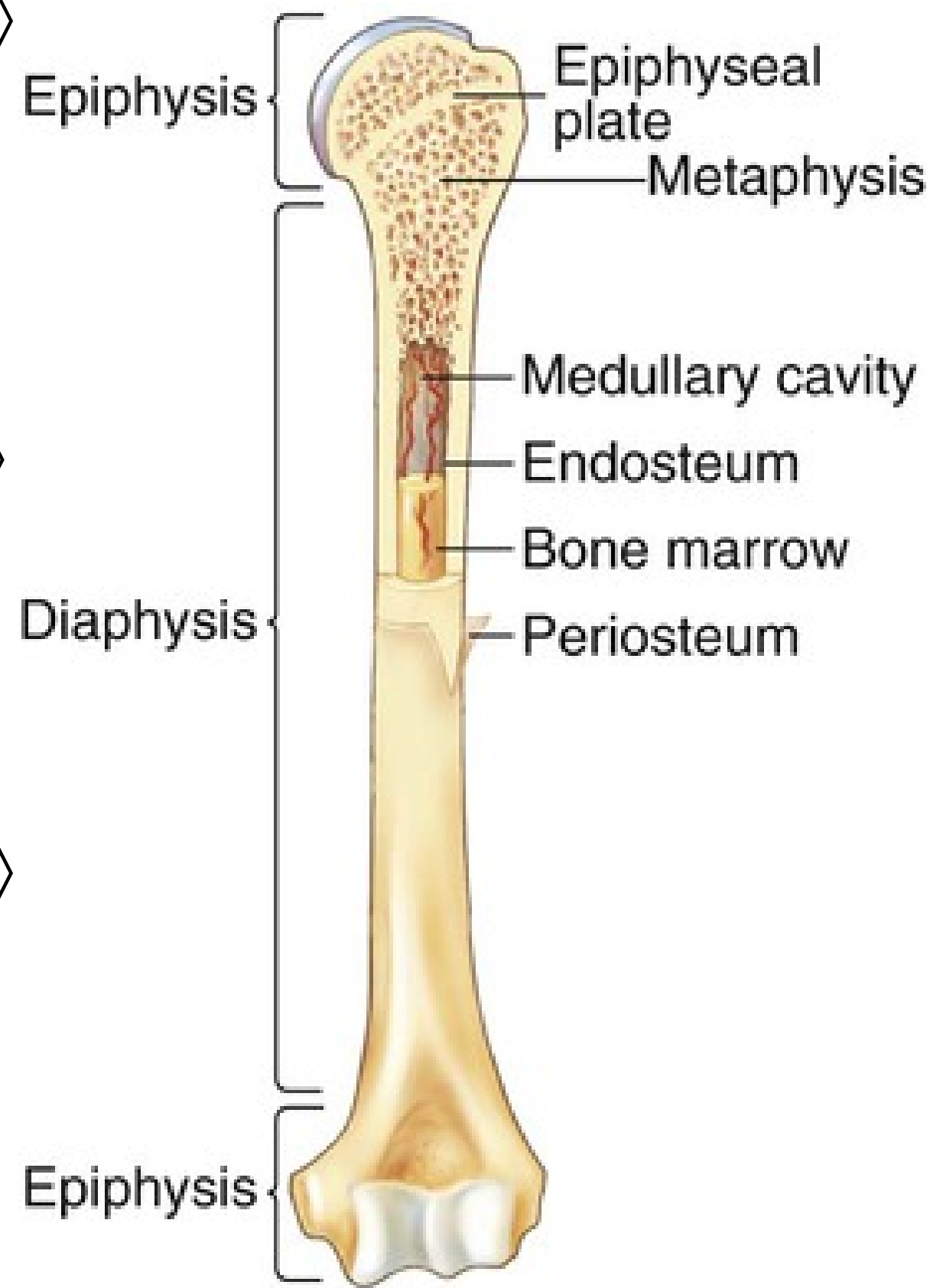
Inner Membrane of Long Bones

In Infants, the medullary cavity(cavity in shaft) is a storage area of red marrow

Until age 6 or 7 red marrow is replaced by yellow marrow which stores Adipose fat tissue

In adults, red marrow is confined in spongy bone in axial, hip bone and epiphysis of long bones

Inner bony surface of shaft is covered by **endosteum**



Bone makings

Projections or processes: grow from bone surface

Depressions or cavities: indentations in the bone

Pathology & Diseases

Osteomalacia

it is a **softening** of the bones due to a **lack of vitamin D** or a problem with the body's ability to metabolize and absorb this vitamin.

Adequate amounts of vitamin D are essential for the body to be able to absorb calcium and phosphorous into the bloodstream.

Vitamin D deficiency may be caused by a lack in the diet, limited exposure to sunlight which produces vitamin D in the body, or malabsorption by the intestines.

Treatment involves vitamin D, calcium, and phosphorous supplements. In children, osteomalacia is called **rickets**.

Osteoporosis

occurs when there is a **decrease** in bone density due to bones **losing minerals, such as calcium**, more quickly than the body can replace them.

Bones become **porous** and brittle resulting in an increased likelihood of fractures.

While any bone can be affected by osteoporosis, the most common sites for osteoporotic fractures are **the hip, spine, ribs, pelvis, wrist and upper arm**.

While it is most **frequently seen in postmenopausal women** due to decreased levels of oestrogen, osteoporosis can occur in younger women and in men.

Curvature of Spine

Kyphosis: an abnormal convex or posterior curvature of the thoracic spine. It is also called hunchback or humpback.

Lordosis: an abnormal concave or anterior curvature of the lumbar spine. It is also called a sway back.

Scoliosis: a lateral S-shaped curvature of the spine.

Fractures

A fracture is a break or crack in a bone.

Fractures are caused by trauma such as a fall or motor vehicle accident, through overuse or repetitive movements as may occur in athletes, or as a result of a disease process such as osteoporosis that weakens the bones.

Fractures are classified by type and whether they are open or closed.

◆ **Open fracture:** a fracture in which there is an open wound communicating with the fracture exposing the underlying bone. There is an increased risk of infection with an open fracture.

◆ **Closed fracture:** the bone is broken but there is no open wound.

Herniated Intervertebral Disc

Intervertebral discs are pillows of fibrocartilagenous tissue located between the vertebrae of the spine.

Sometimes as a result of an acute injury to the spine or because of degenerative wear and tear to a disc, it splits or ruptures.

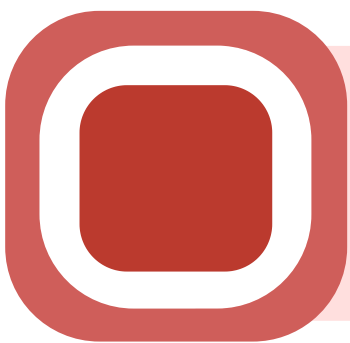
When this happens, the inner gel-like substance (nucleus pulposus) leaks out into the spinal canal. This is called a **herniation of the nucleus pulposus** — or a herniated disc.

The most common site for a herniated disc is in the lumbar spine especially at **L4-L5**.

Symptoms will vary depending on the site and degree of the herniation but can include paraesthesia sciatica and back pain. Some patients will not experience any pain at all. Many cases will resolve spontaneously with bed rest, analgesics and physiotherapy, but if the condition persists, more invasive treatments such as discectomy or laminectomy may be required.

Extra information that you can read

Joints



Joints are the location where two or more bones come together to create body movement or articulation.

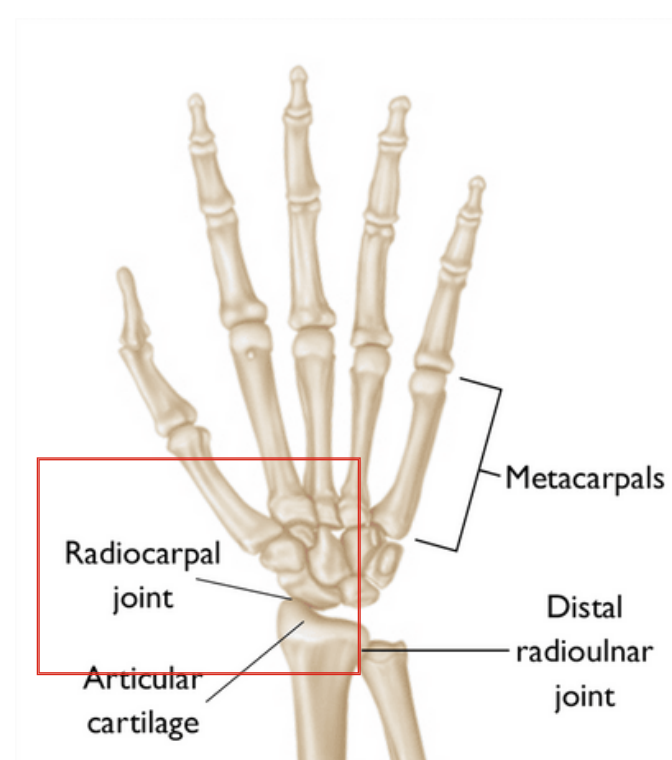
Classification Of Joints

Movement

- ◆ **Fibrous**
- ◆ **Cartilaginous**
- ◆ **Synovial**

Number of Bones Involved

- ◆ **Simple**
two articulation surfaces
(shoulder and hip joints)
- ◆ **Compound**
three or more articulation
surfaces (radiocarpal joint)
- ◆ **Complex**
two or more articulation
surfaces and an articular
disc or meniscus (knee joint)



Extra information
that you can read

Joints

Boys'
Slides

Most joints are mobile, allowing the bones to move.

Cartilage

This is a type of tissue that covers the surface of a bone at a joint. It helps reduce the friction of movement within a joint.

Synovial Membrane

lines the joint and seals it into a joint capsule. secretes a clear, sticky fluid (**synovial fluid**) around the joint to lubricate it.

Meniscus

This is a curved part of cartilage in the knees and other joints.

Joints consist of

Ligaments

Strong ligaments (tough, elastic bands of connective tissue) surround the joint to give support and limit the joint's movement. It connects bones together.

Bursae

Fluid-filled sacs, between bones, ligaments, or other nearby structures. They help cushion the friction in a joint.

Tendon

another type of tough connective tissue, is on each side of a joint attach to muscles that control movement of the joint.

Extra information that you can read

MCQs

1

Which one of the following bones is a bone of the axial skeleton?

A. Femur

B. Humerus

C. Scapula

D. Sternum

2

Which one of the following bones is an example of an irregular bone?

A. Femur

B. Vertebra

C. Scapula

D. Sternum

3

Which one of the following planes divides the body into superior & inferior parts?

A. Frontal
(coronal) plane.

B. Sagittal
(median) plane.

C. Parasagittal
(Paramedian) plane

D. Transverse
(cross) plane.

4

All ribs articulate with vertebrae?

A. Anteriorly

B. Posteriorly

C. Superficially

D. Dorsally

5

Flexion means :

A. approximation

B. straightening

C. Circumduction

D. cranial

Answer key: 1.D 2.B 3.D 4.B 5.A



LEADERS

Nisreen Alotaibi

Omar Alattas

MEMBERS

- Shaden Alotaibi
- Danah Khallaf
- Elaf Alshamlan
- Jana Alahaideb
- Dana Alotaibi
- Noorah Alkhilawi
- Orjwan Alharthi
- Lana Alfouzan
- Abdulhadi Alqahtani
- Turki Alanzi
- Talal Alrobaian
- Abdulmalik Aldafas
- Ahmad Addas
- Salman AlHakeem
- Ziyad Bukhari