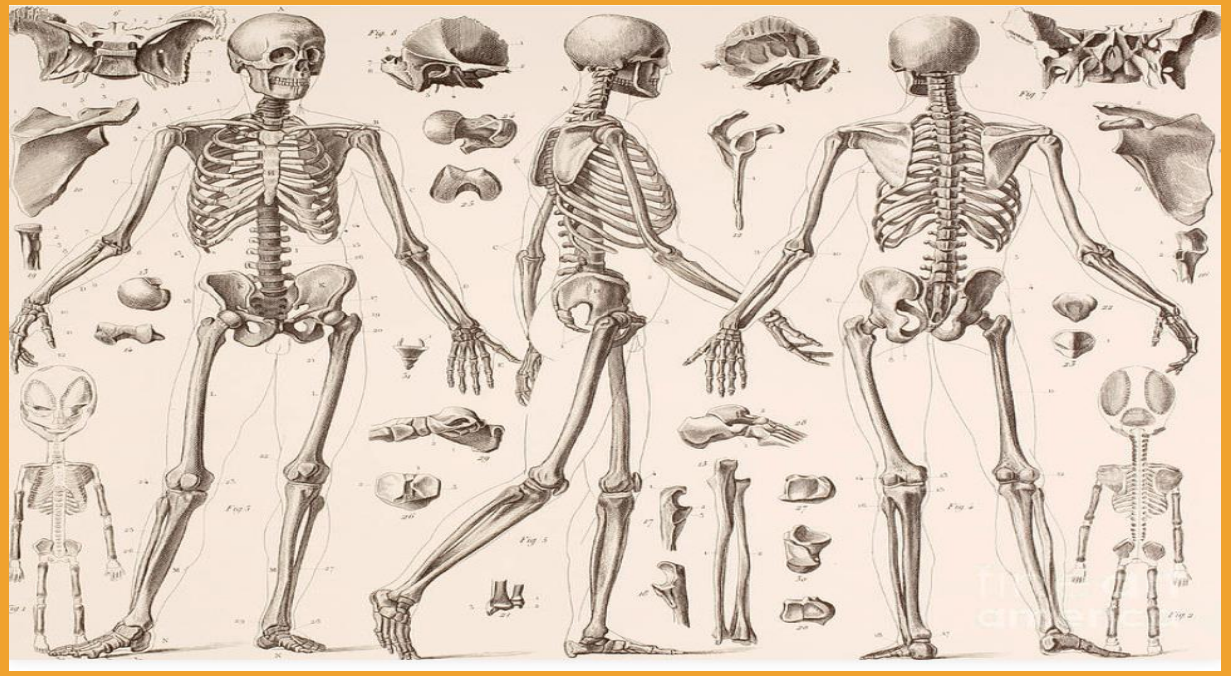
Osseous system



By: M. M. Shinde

K. K. Wagh College of Pharmacy, Nashik.

Bone

- Bone is a strong and durable type of connective tissue.
- Its major constituent (65%) is a mixture of calcium salt, mainly calcium phosphate.
- Consist of extracellular matrix- 25% water, 25% collagen fiber and 50% mineral salt.
- Common mineral salt- Calcium phosphate + calcium hydroxide = crystals of hydroxyapatite.
- Form crystals combines with other mineral salt, such as calcium carbonate and ions.
- As mineral salts are deposit in extracellular matrix- they crystallize and tissue hardens. This process is called as calcification of bone.

Bone Cells -

1. **Osteogenic cells-**

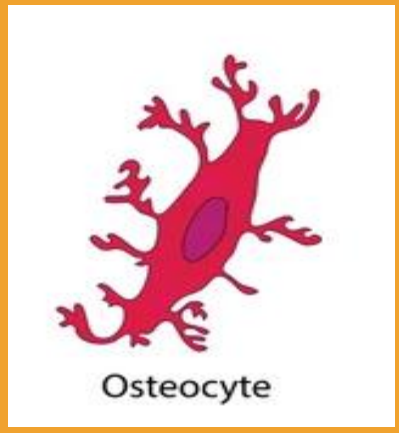
- ✓ Unspecialized stem cells derived from mesenchyme
- ✓ The tissue from which almost all connective tissues are formed.
- ✓ Only bone cell to undergo cell division, resulting cells developed into osteoblast.

2. **Osteoblasts-**

- ✓ Bone building cells.
- ✓ Synthesized and secrete collagen fibres and organic component.
- ✓ They initiate calcification.

3. **Osteocytes-**

- ✓ Main cells in bone tissue.
- ✓ Maintain its daily metabolism.
- ✓ Do not undergo cell division.

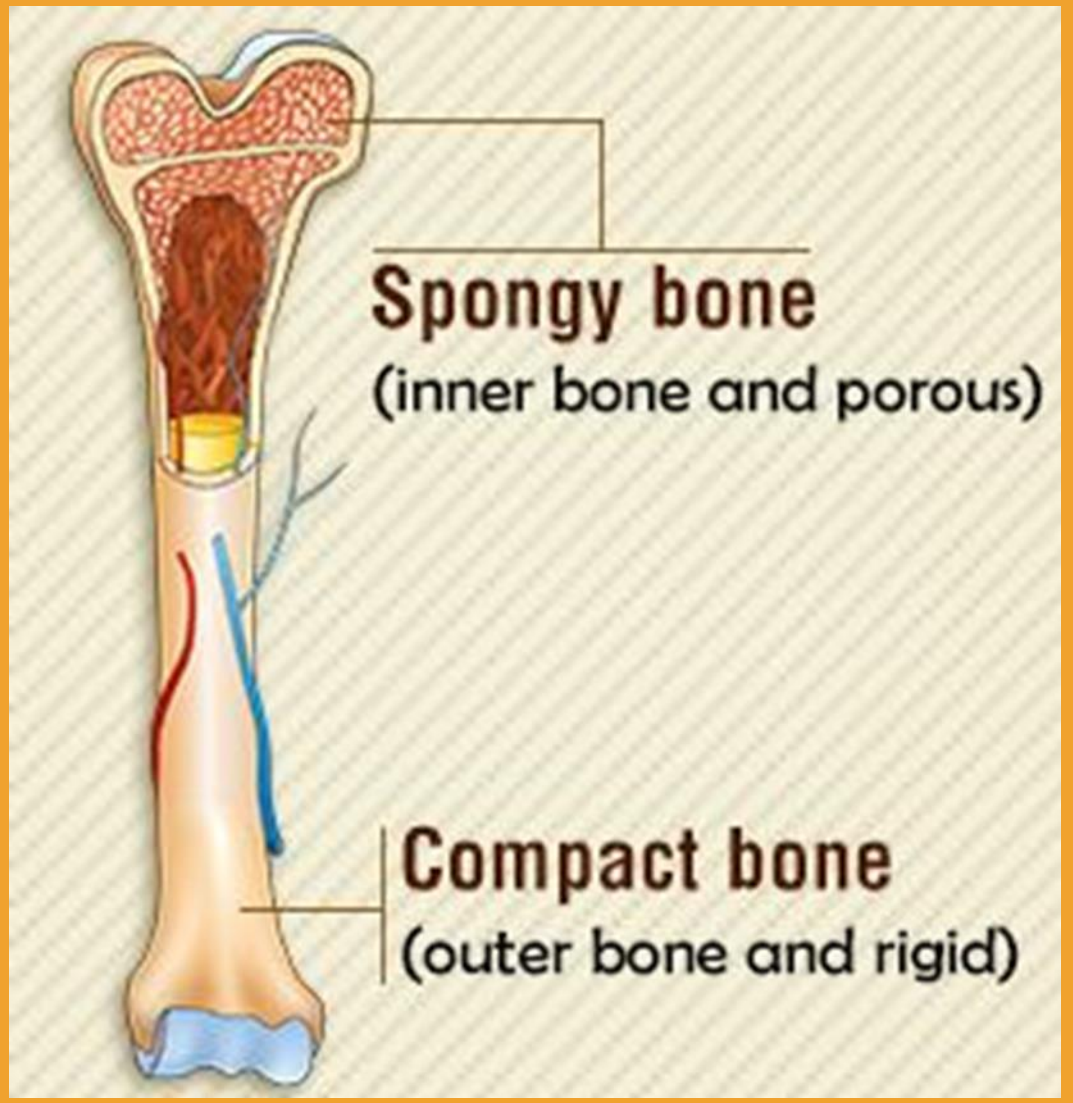


4. **Osteoclasts –**

- ✓ Huge cells derived from the fusion of 50 monocytes.
- ✓ Release powerful lysosomal enzymes and acids- digest protein and mineral of the underlying bone matrix.

Compact bone:

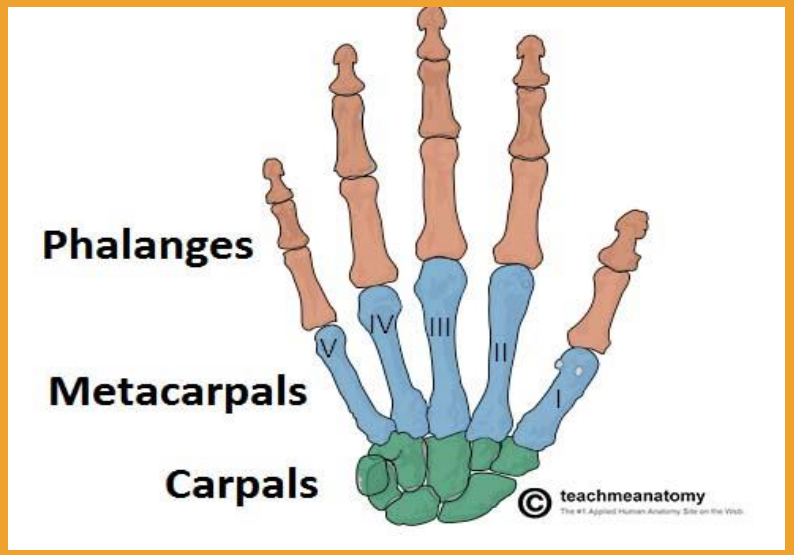
Spongy bone:



Classification of bone –

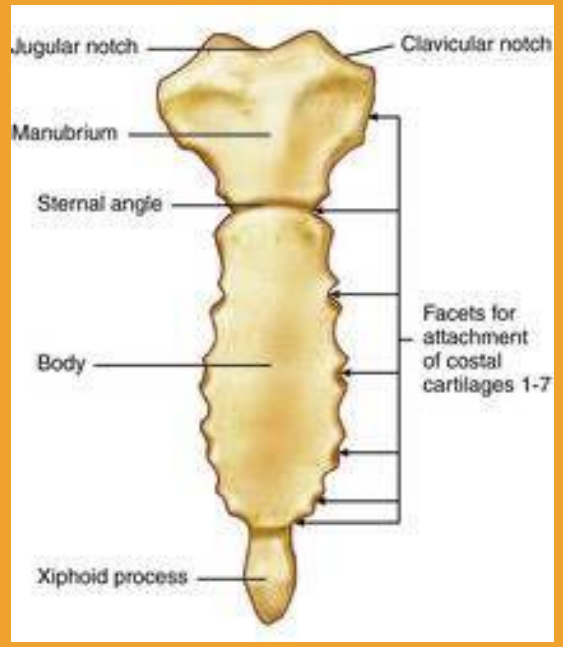
Short bone:

- ✓ Cube shaped
- ✓ Equal in length and width.
- ✓ Consist of spongy bone tissue.
- ✓ Example: carpel bone, tarsal bone.



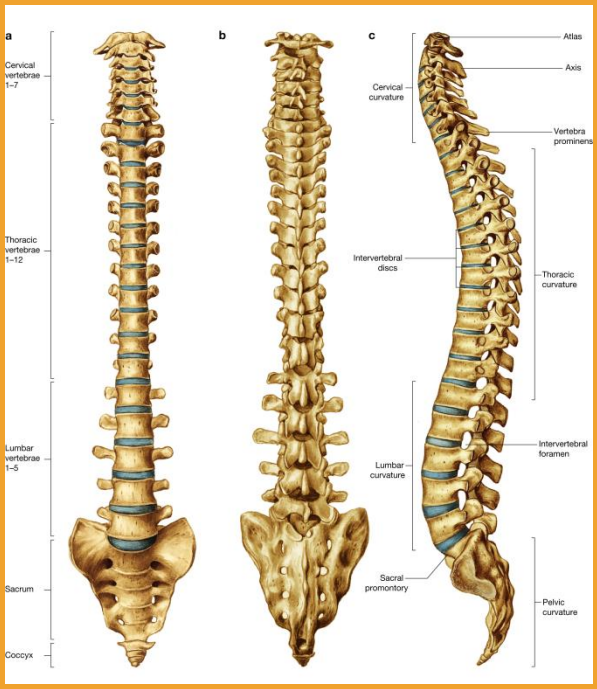
Flat bone:

- ✓ Thin bone, composed of two parallel plates of compact bone tissue enclosing layer of spongy bone tissue.
- ✓ Provide protection, extensive area for muscle attachments.
- ✓ Example: cranial bone, sternum, scapulae.



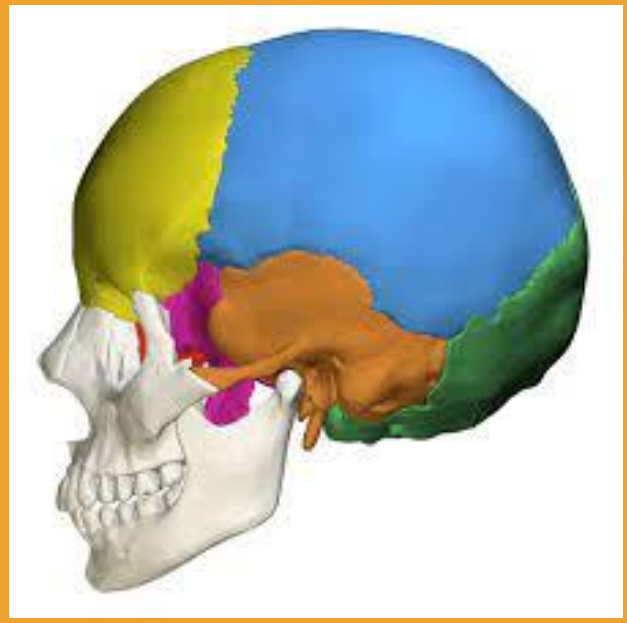
Irregular bone:

- ✓ Complex shape
- ✓ Vary in amount of spongy and compact bone present.
- ✓ Example: vertebrae, hip bone, facial bone.



Sutural bone:

- ✓ Small bone located in sutures between cranial bones.
- ✓ No. varies greatly from person to person.

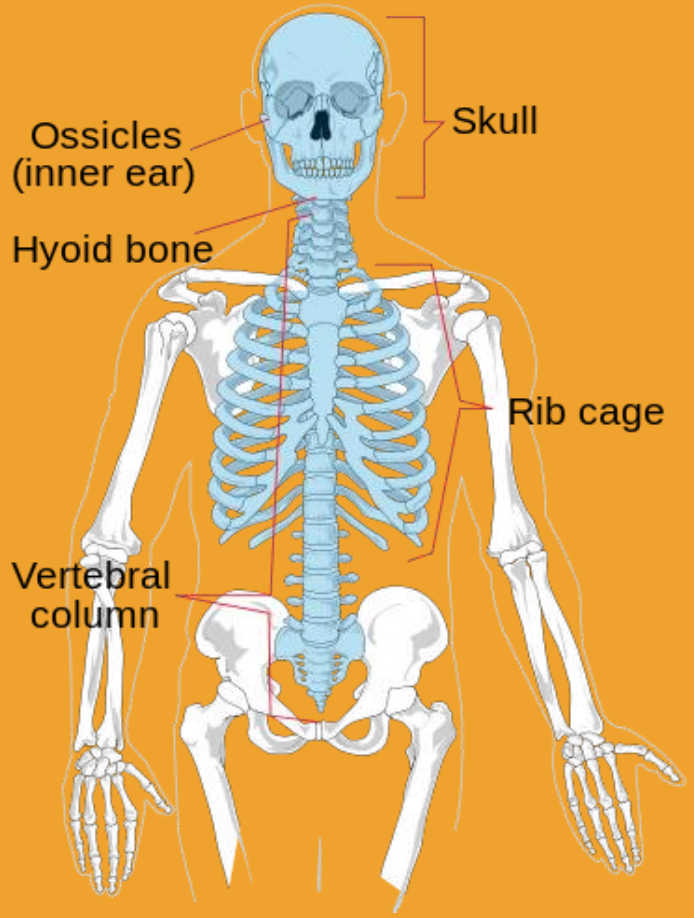


Functions of bone

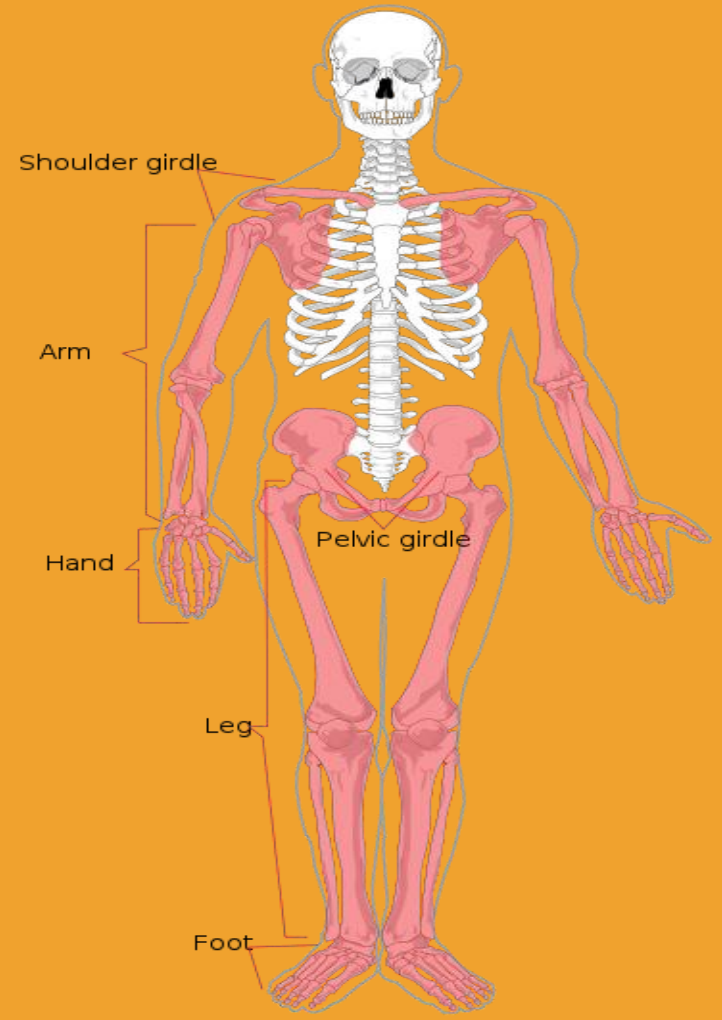
1. Providing the body framework.
2. Giving attachment to muscles and tendons.
3. Allowing movements of the body as a whole and of parts of the body, by forming joints that are moved by muscles.
4. Forming the boundaries of the cranium, thorax, and pelvis, and protecting the organs they contain.
5. Haemopoiesis, the production of blood cells in red bone marrow.
6. Mineral storage, especially calcium phosphate- the mineral reservoir within bone is essential for maintenance of blood calcium levels, which must be tightly controlled.

The bones of the skeleton are divided into two groups:

The axial skeleton

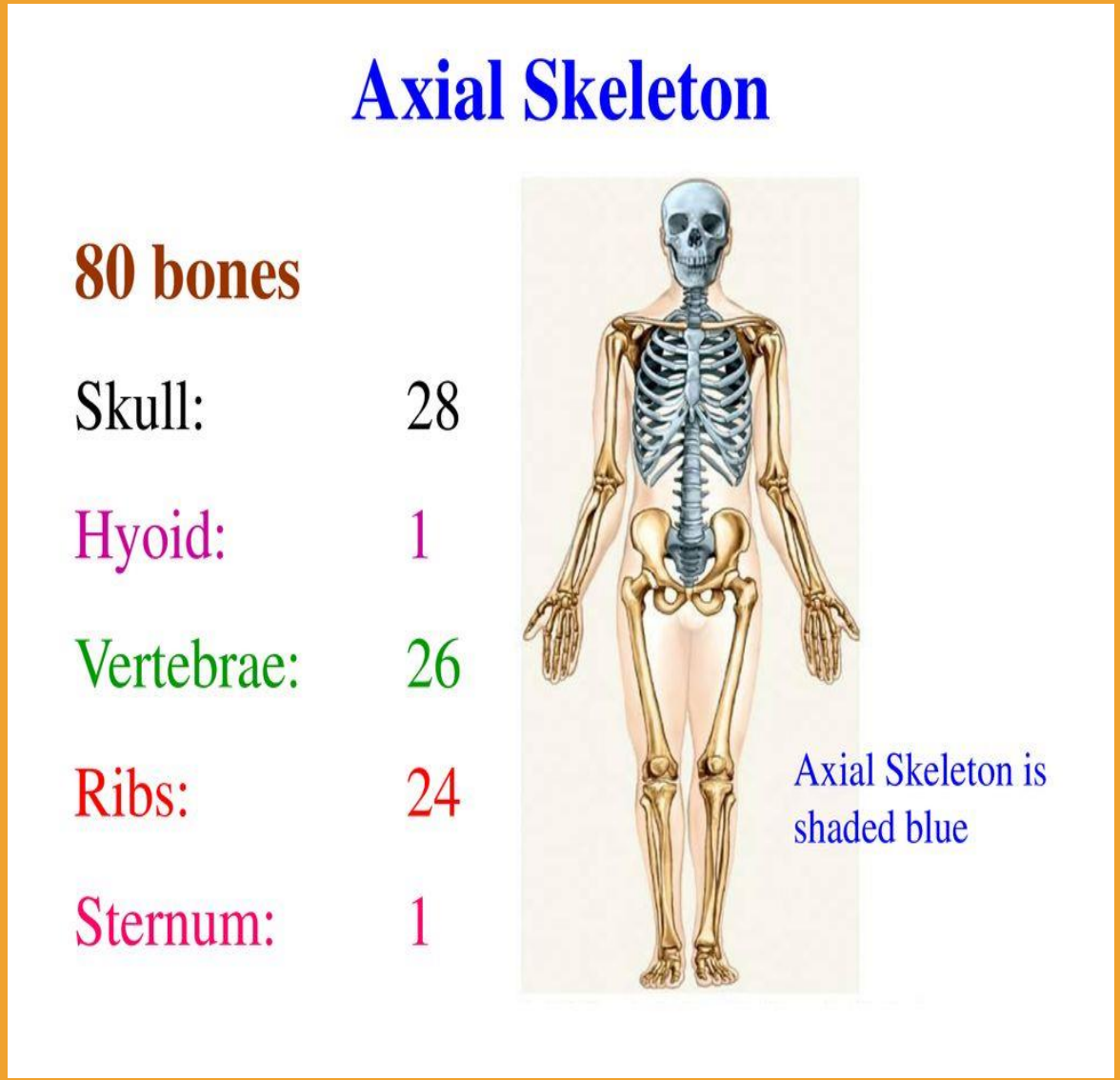


The appendicular skeleton



AXIAL SKELETON

- ✓ The axial skeleton consist
1. Skull
2. Vertebral column
3. Ribs
4. Sternum
- ✓ Together the bones forming these structure constitute the central bony core of the body, the axis.



1. Skull

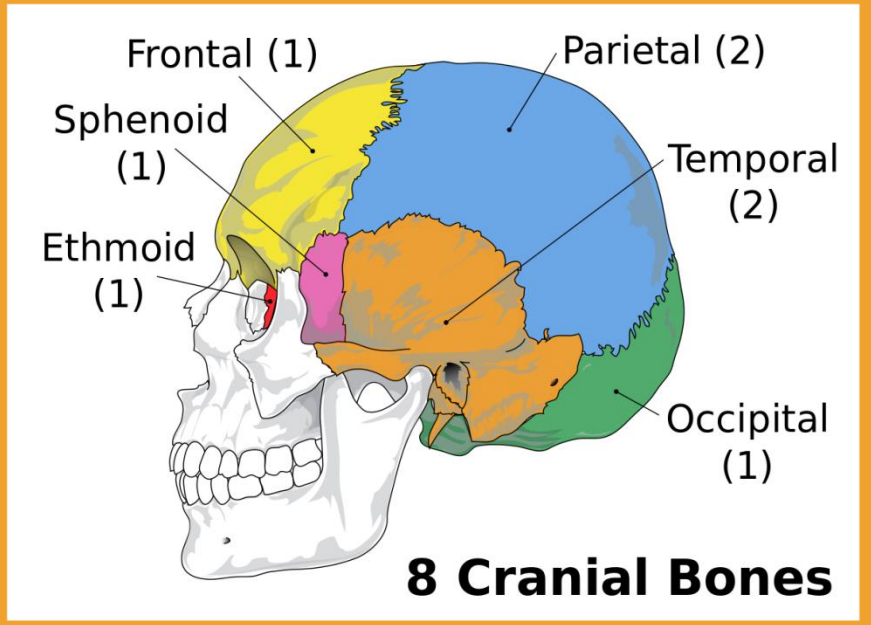
the skull rests on the upper end of the vertebral column and its bony structure is divided into two parts:

a. The cranium

b. The face

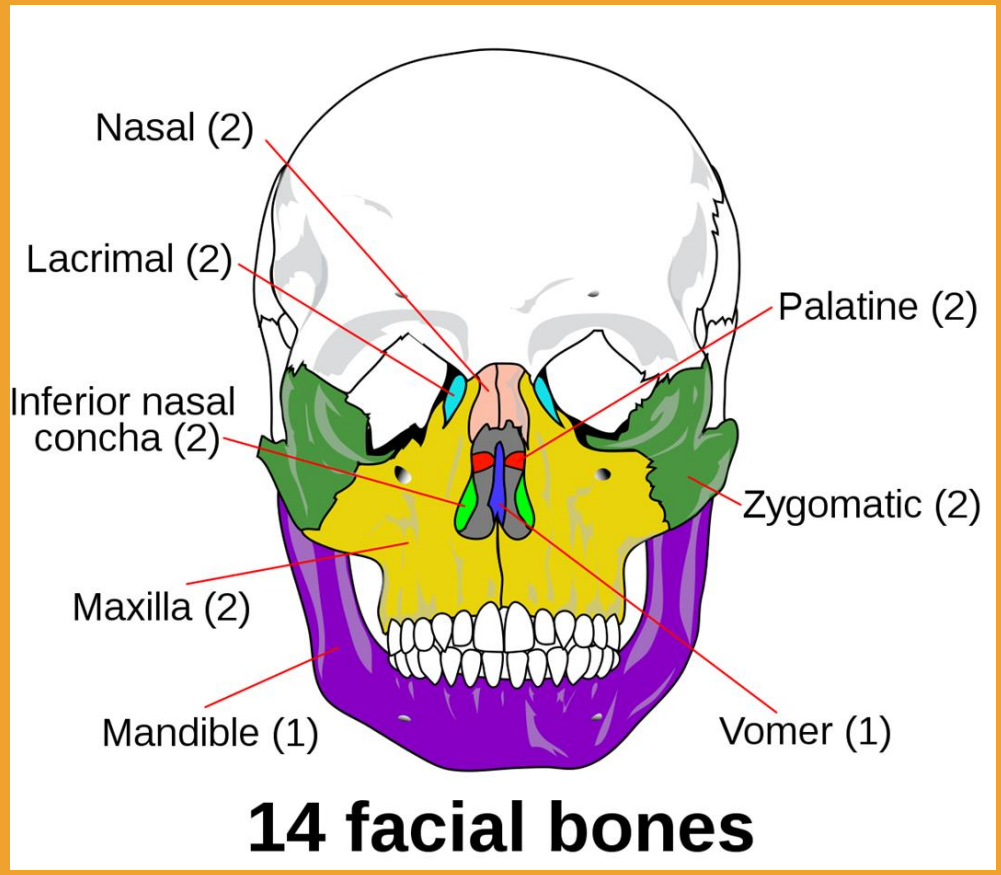
a. Cranium

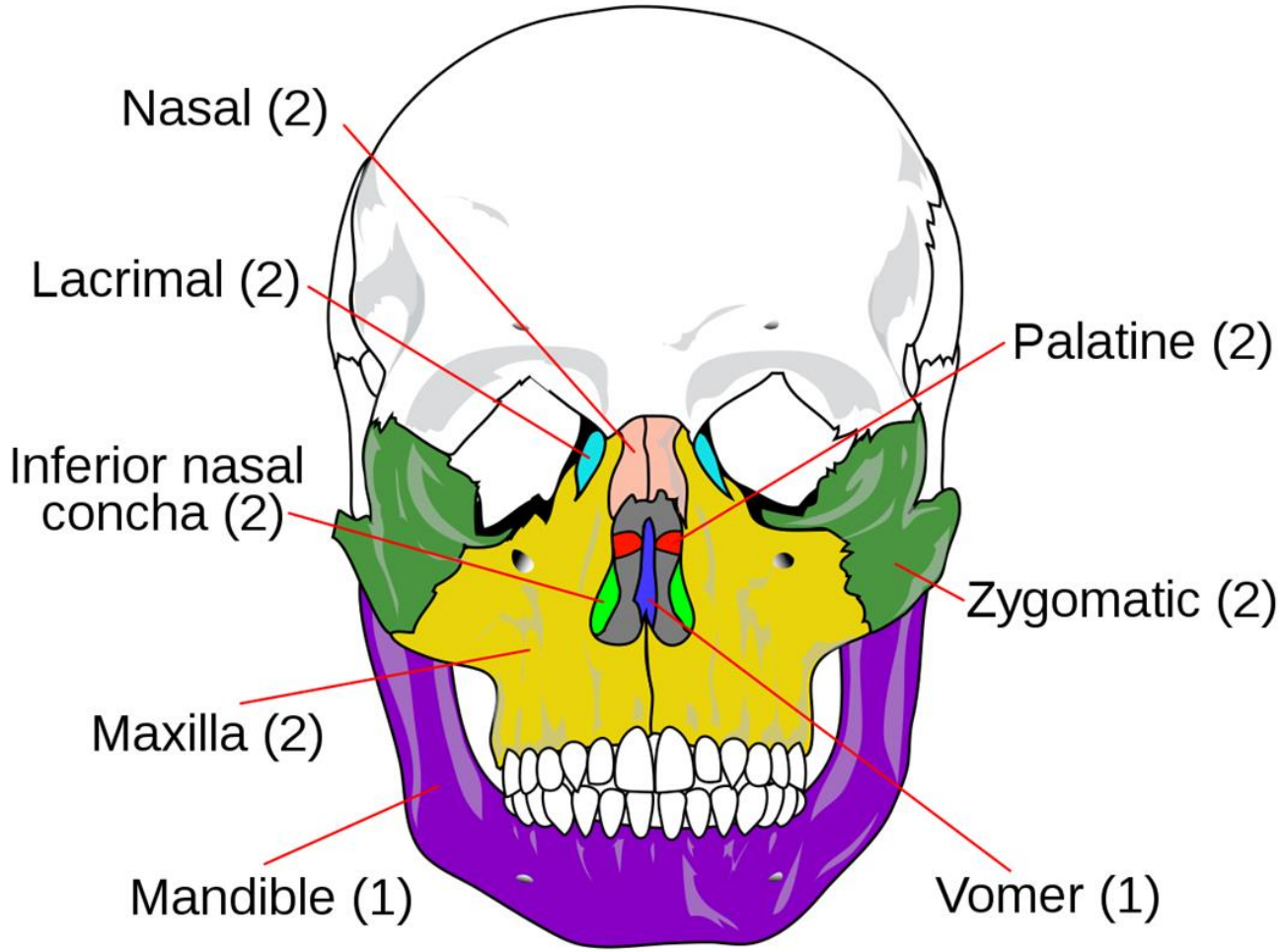
- ✓ Formed by a number of flat and irregular bones that protects the brain.
- ✓ The bones of cranium are:
- ✓ 1 Frontal bone – bone of forehead
- ✓ 2 Parietal bone – form side and root of skull
- ✓ 2 Temporal bones – bone lie on each side of the head
- ✓ 1 Occipital bone – form the back of the head and part of base of skull
- ✓ 1 Sphenoid bone – middle portion of the base of the skull
- ✓ 1 Ethmoid bone – anterior part of the base of the skull



b. Face

- ✓ The skeleton of the face is formed by 13 bones:
- ✓ 2 zygomatic – forms the prominence of the cheeks and parts of the floor and lateral wall of orbital cavity
- ✓ 1 maxilla – forms the upper jaw, the anterior part of mouth, lateral walls of the nasal cavity
- ✓ 2 nasal bone – form the greater part of the lateral and superior surfaces of the bridge of the nose.
- ✓ 2 lacrimal bone – posterior and lateral to the nasal bone, form part of the medial walls of the orbital cavities.
- ✓ 1 vomer – form the inferior part of the nasal septum.
- ✓ 2 palatine bones – form the posterior part of the hard palate and lateral walls of nasal cavity.
- ✓ 2 inferior nasal conchae bone – form the part of nasal cavity.
- ✓ 1 mandible – the lower jaw, the only movable bone of the skull.





14 facial bones

Functions of skull

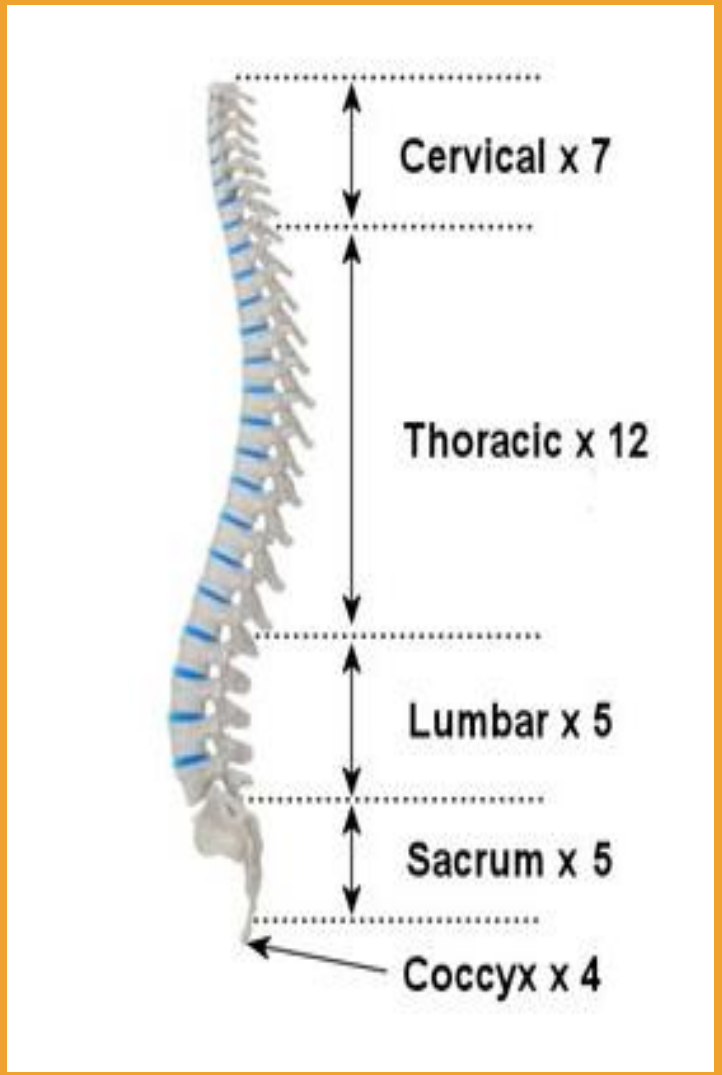
1. The various parts of the skull have specific and different functions:
2. The cranium protects the brain.
3. The bony eye socket protects the eyes and give attachment to the muscles that move them.
4. The temporal bone protects the delicate structure of the inner ear.
5. The maxilla and mandible provide alveolar ridges in which the teeth are embedded.
6. The mandible, controlled by muscles of the lower face, allows chewing.

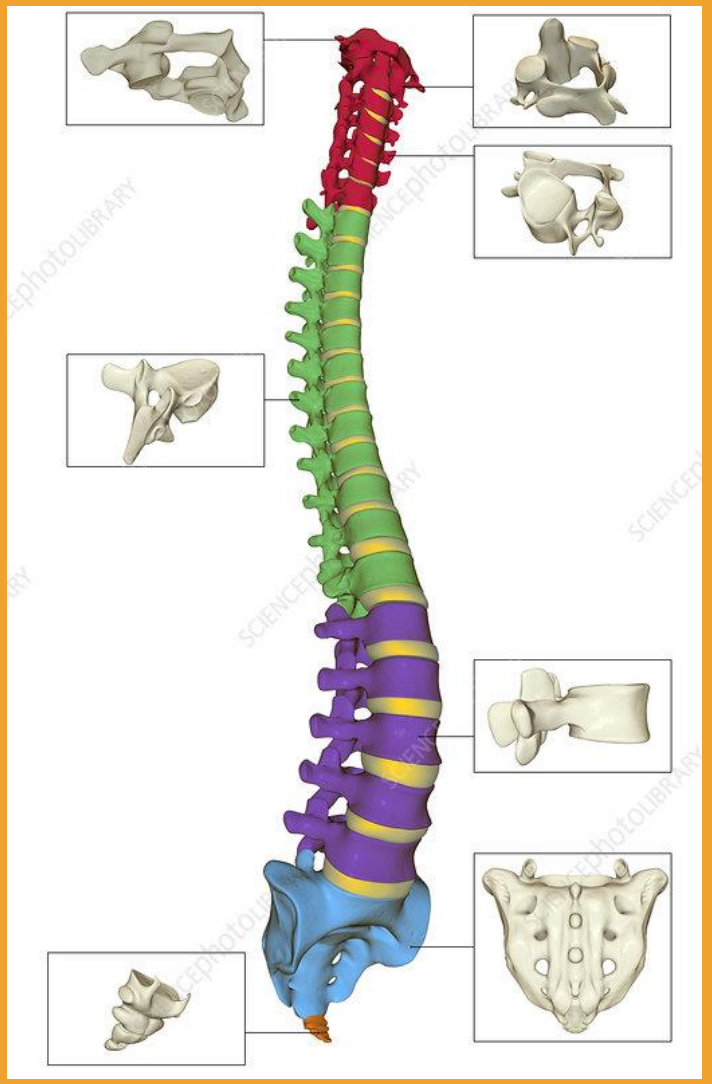
2. Vertebral column

There are 26 bones in the vertebral column.

The vertebral column is divided into different regions.

- ✓ The first 7 vertebrae in the neck form the cervical spine
- ✓ The next 12 vertebrae are the thoracic spine
- ✓ Next 5 lumbar spine
- ✓ The lowest vertebra of which articulates with the sacrum.
- ✓ And lastly the 1 coccyx

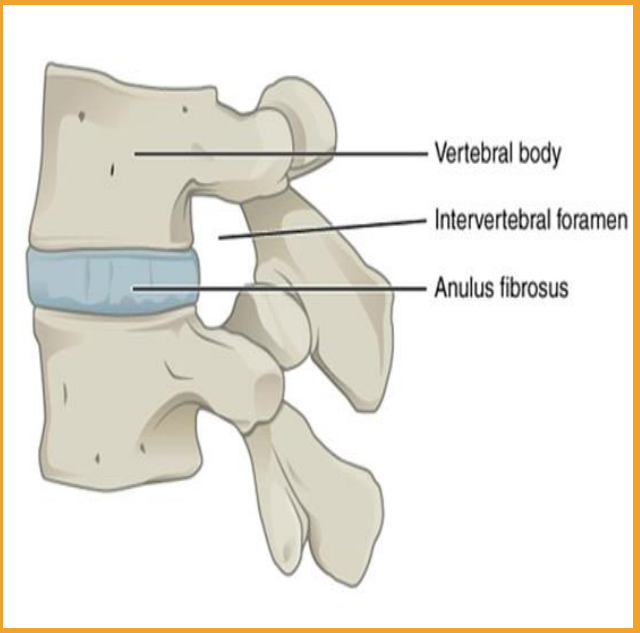




Features of vertebral column

1. Intervertebral disc

- ✓ The bodies of adjacent vertebrae are separated by intervertebral disc.
- ✓ It consist of an outer rim of fibrocartilage and a central core of soft gelatinous material.
- ✓ They are thinnest in the cervical region and become progressively thicker towards the lumbar region.
- ✓ They act as shock absorbers, and the cartilaginous joints they form contribute to the flexibility of the vertebral column as a whole.

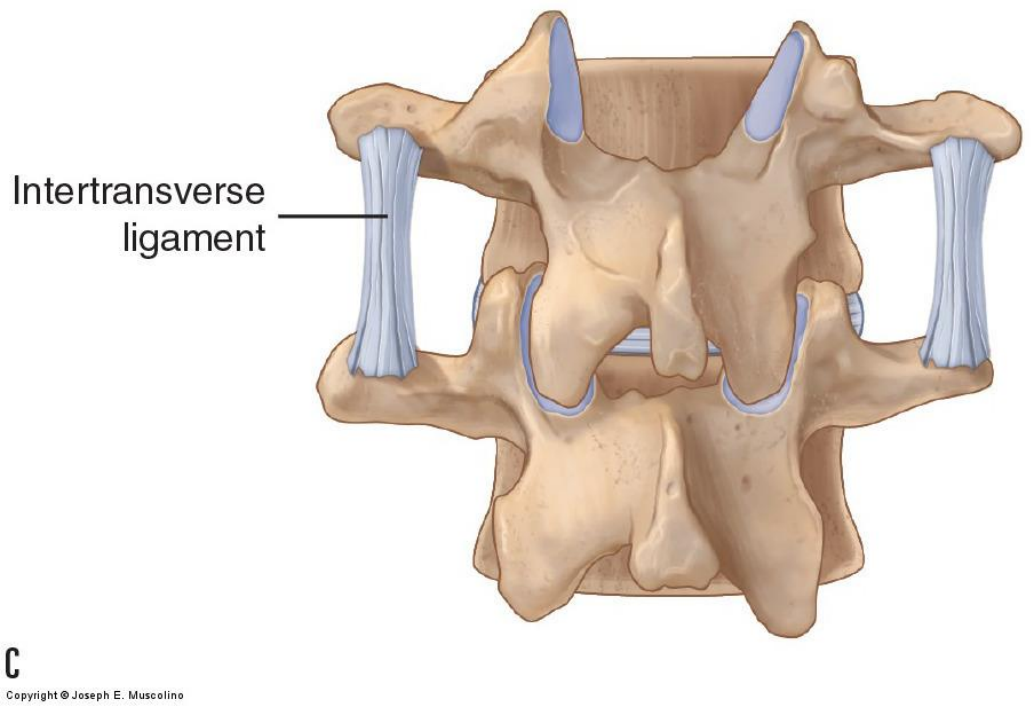


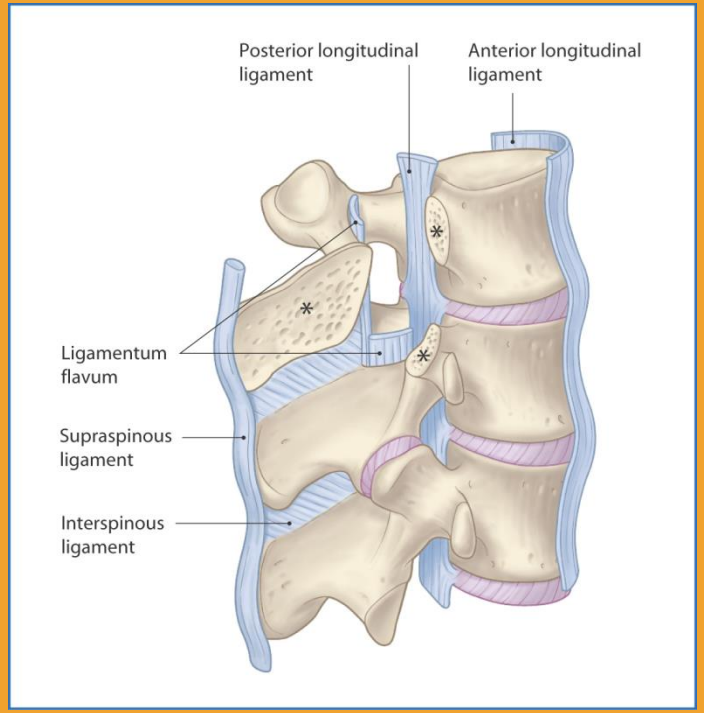
2. Intervertebral foramina

- ✓ When two adjacent vertebrae are viewed from the side, a foreman formed by a gap between adjacent vertebral pedicles can be seen.
- ✓ Throughout the length of the vertebral column there is an intervertebral foreman on each side between every pair of vertebrae, through which the spinal nerves, blood vessels and lymph vessels pass.

3. Ligaments of the vertebral column

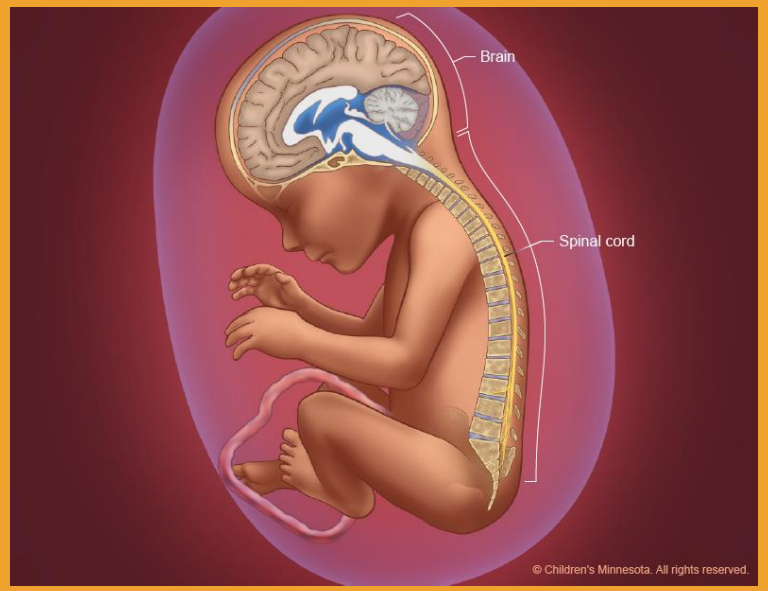
- ✓ These ligaments hold the vertebrae together and keep the intervertebral disc in position.
- ✓ **Transverse ligament** – holds the odontoid process of the axis in the correct position in relation to atlas.
- ✓ **Anterior longitudinal ligament** – it extends for the whole length of the column and lies in front of the vertebral bodies.
- ✓ **Posterior longitudinal ligament** – it lies inside the vertebral canal and extends for the whole length of the column in close contact with posterior surface of the bodies of the bones.

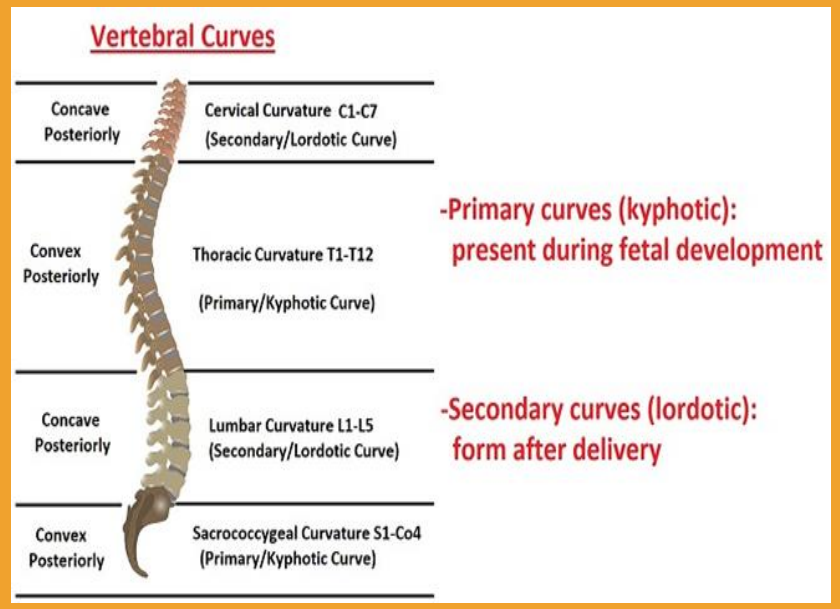




4. Curves of the vertebral column

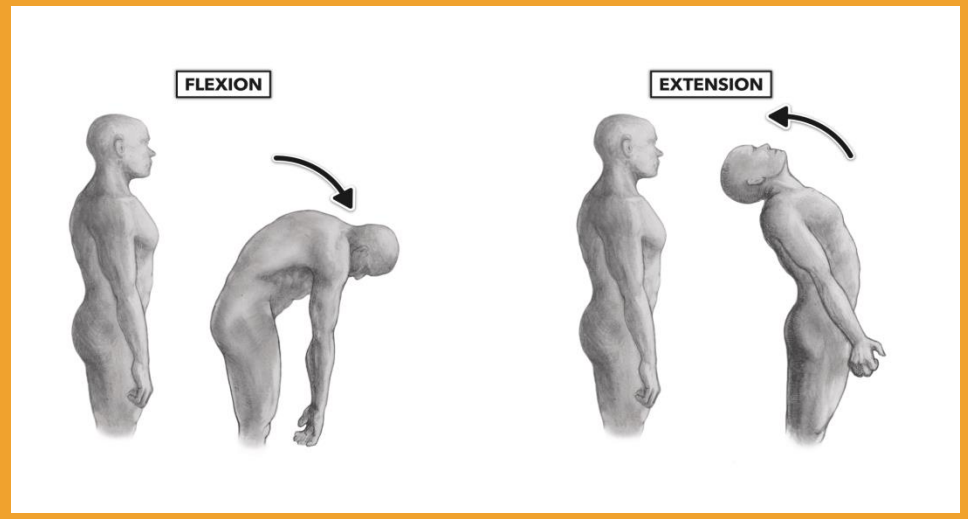
- ✓ When viewed from the side, the vertebral column presents four curves, two primary and two secondary.
- ✓ The fetus in the uterus lies curled up so that the head and the knees are more or less touching. This position shows the primary curvature.
- ✓ The secondary cervical curve develops when the child can hold up their head and the secondary lumbar curve develops when the child is able to stand.
- ✓ The primary thoracic and sacral curves are retained.

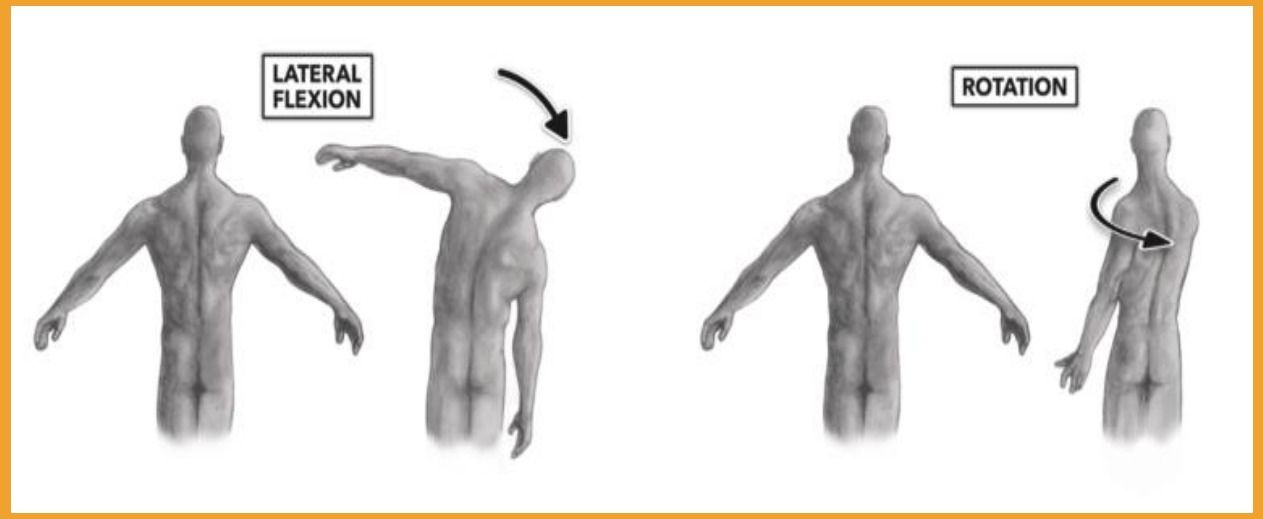




5. Movement of the vertebral column

- ✓ Movement between the individual bones of the vertebral column is very limited.
- ✓ However, the movement of the column as a whole are quite extensive and include:
- ✓ **Flexion** - Bending forward
- ✓ **Extension** – Bending backward
- ✓ **Lateral flexion** – Bending to the side
- ✓ **Rotation**
- ✓ There is more movements in the cervical and lumbar regions than elsewhere.

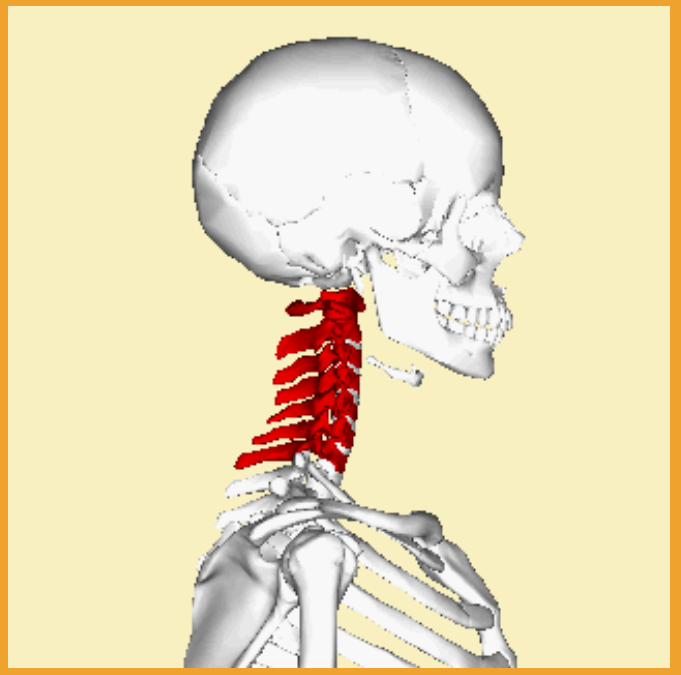


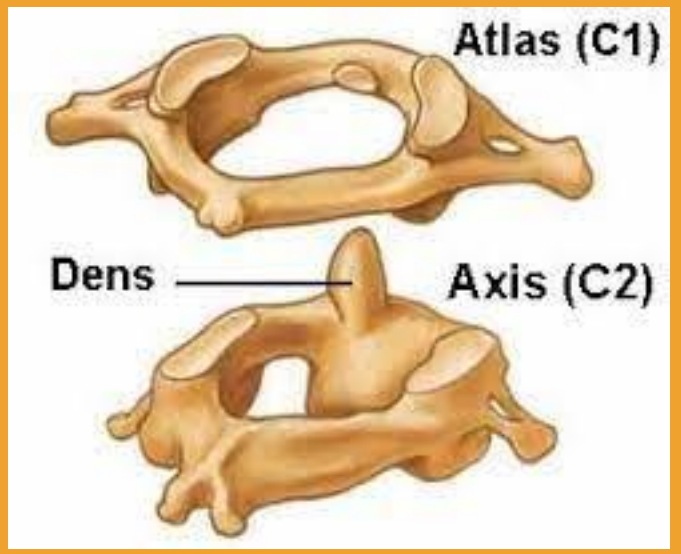


Region specific vertebral characteristics

Cervical vertebrae

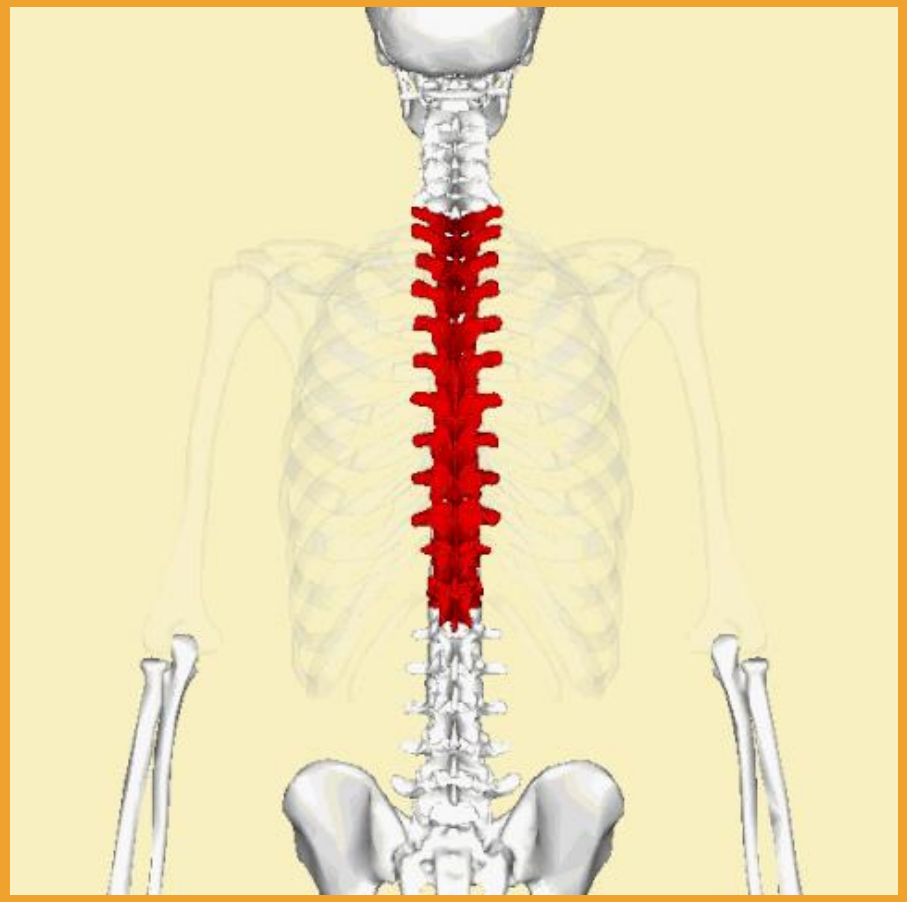
- ✓ Smallest vertebrae – they only have to support the head
- ✓ The first two cervical vertebrae, the atlas and the axis, The atlas is a essentially a ring of bone, with no distinct body or spinous process.
- ✓ It has two flattened facets that articulate with the occipital bone; these are condyloid joints and they permit nodding of the head.
- ✓ The axis sits below the atlas and has a small body with a small superior projection called the odontoid process.

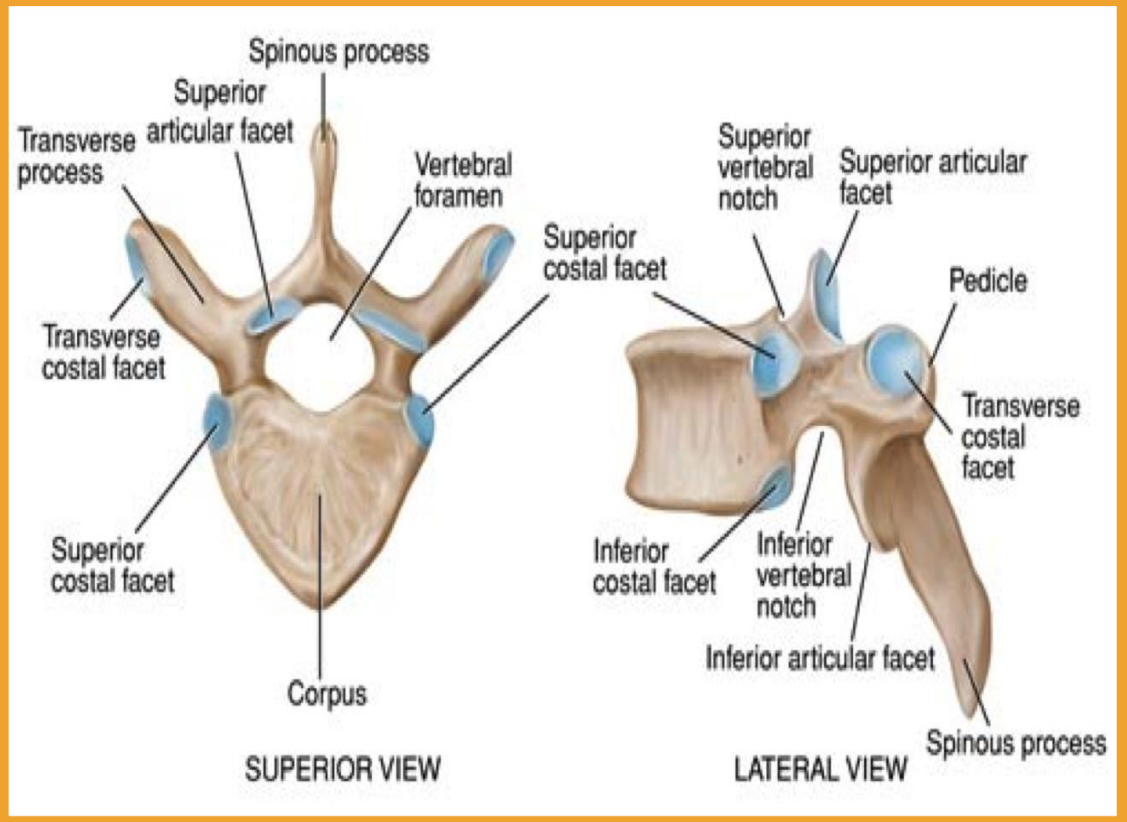




Thoracic vertebrae

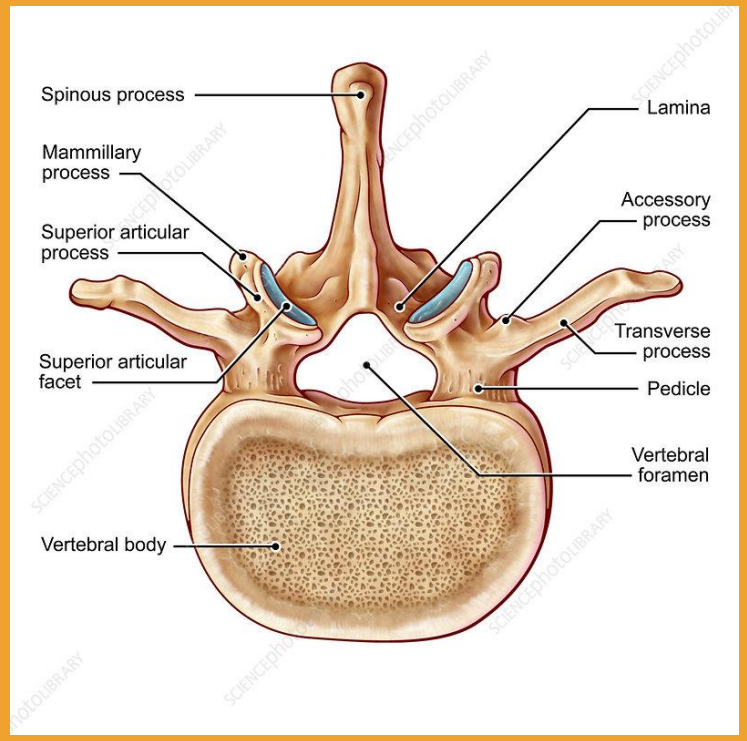
- ✓ The 12 thoracic vertebrae are larger than the cervical vertebrae
- ✓ This section of the vertebral column has to support more body weight.
- ✓ The bodies and transverse processes have facets for articulation with the ribs.

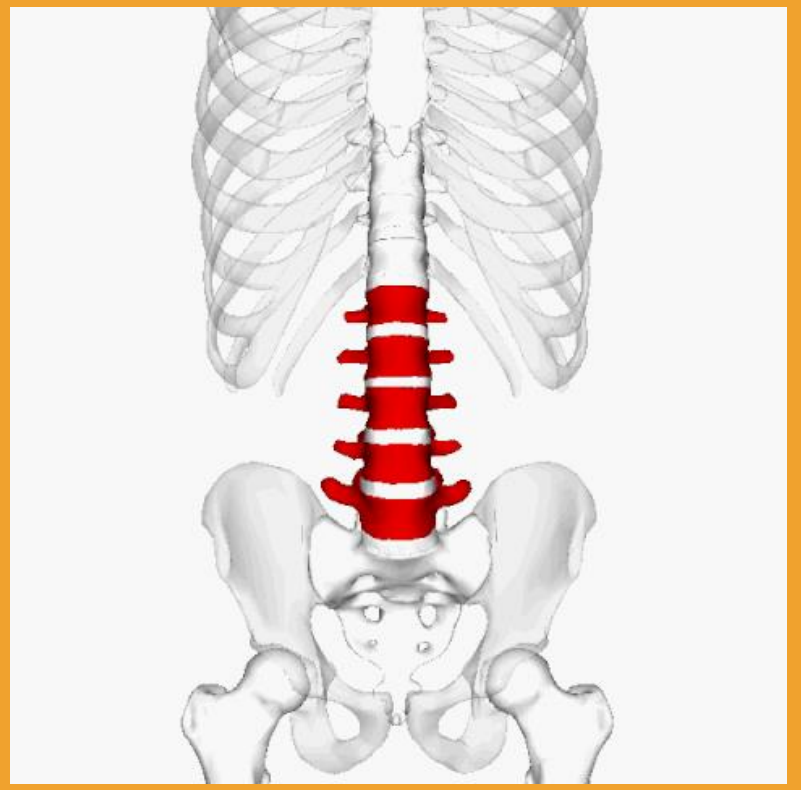




Lumbar vertebrae

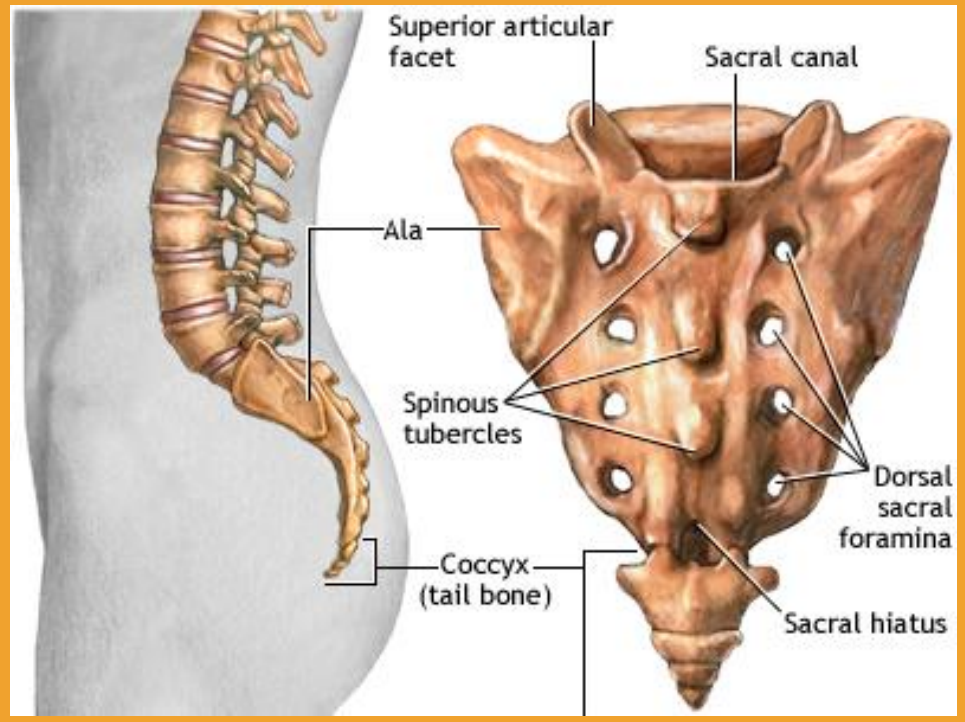
- ✓ The five vertebrae between the rib cage and the pelvis.
- ✓ These are the largest of the vertebrae – they have to support the weight of the entire upper body.
- ✓ They have substantial spinous processes for attachment of the muscles of the lower back.





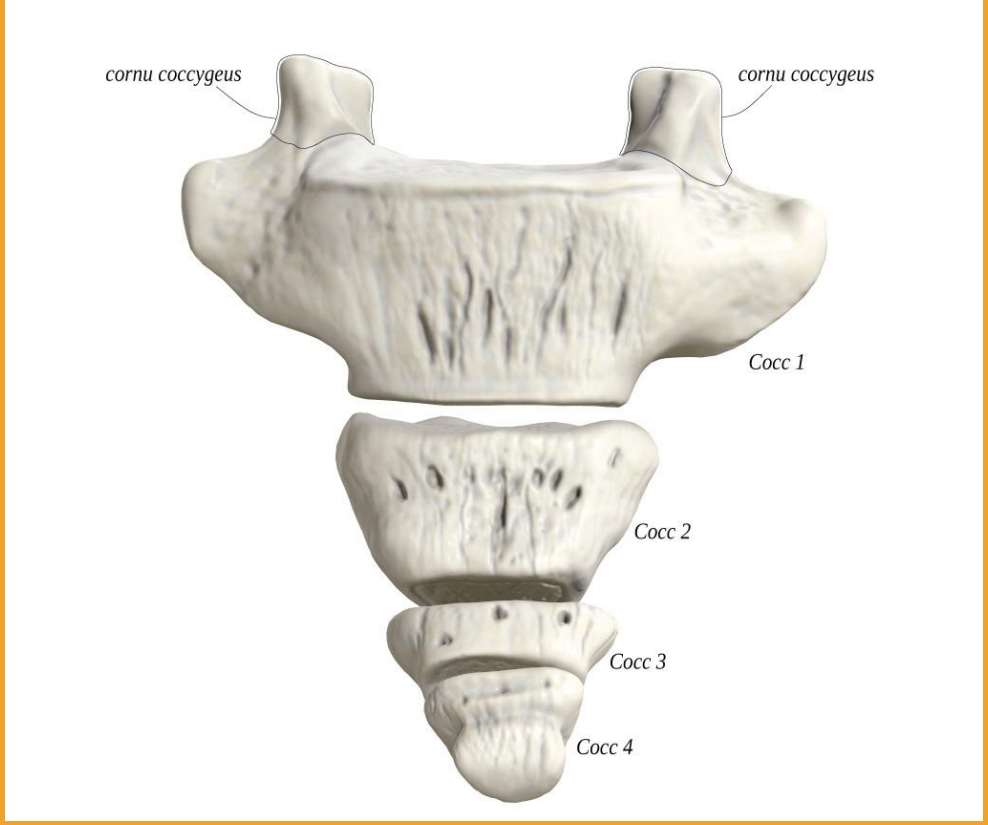
Sacrum

- ✓ Consist of five rudimentary vertebrae fused to form a triangular or wedge shape bone with a concave anterior surface.
- ✓ The upper part or base articulates with the 5th lumbar vertebrae.
- ✓ On each side it articulate with the ilium to form a sacroiliac joint, and at its inferior tip it articulates with the coccyx.



Coccyx

- ✓ These consist of the four terminal vertebrae.
- ✓ Fused to form a very small triangular bone, the broad base of which articulates with the tip of the sacrum

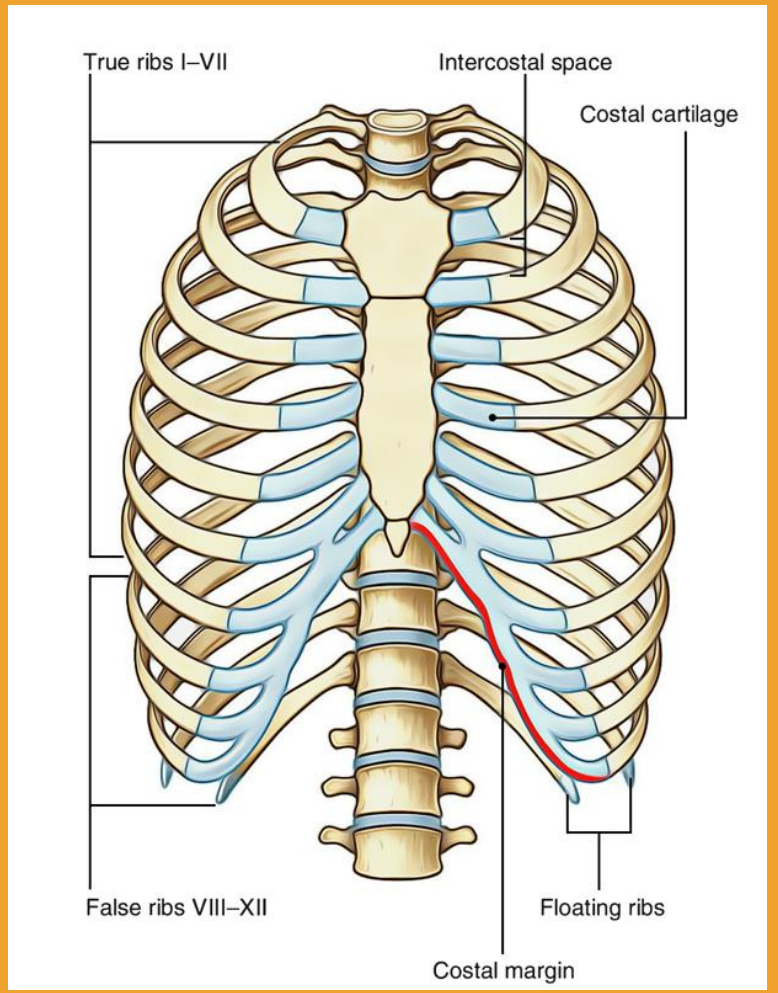


Functions of vertebral column

1. Collectively, the vertebral foramina form the vertebral canal, which provide strong bony protection for the delicate spinal cord lying within it.
2. The pedicles of the adjacent vertebrae form intervertebral foramina, one on each side, providing access to the spinal cord for spinal nerves, blood vessels and lymph vessels.
3. The numerous individual vertebrae with their intervertebral disc allow movements of the whole column.
4. Support is provided for the skull.
5. The intervertebral disc act as shock absorber, protecting the brain.

3. Ribs

- ✓ The 12 pairs of ribs form the lateral walls of the thoracic cage.
- ✓ They are elongated, curved bones that articulate posteriorly with the vertebral column.
- ✓ Anteriorly, the 1st seven pairs of the ribs articulate directly with the sternum and are known as the true ribs.
- ✓ The next three pairs articulate with only indirectly.
- ✓ In both cases, costal cartilages attach the ribs to the sternum.
- ✓ The lowest two pairs of ribs, referred to as floating ribs, do not join the sternum at all, their anterior tips being free.
- ✓ The inferior surface of the rib is deeply grooved, providing a channel along which intercostal nerves and blood vessels run.
- ✓ Between each rib and the one below are the intercostal muscle, which move the ribcage during breathing.

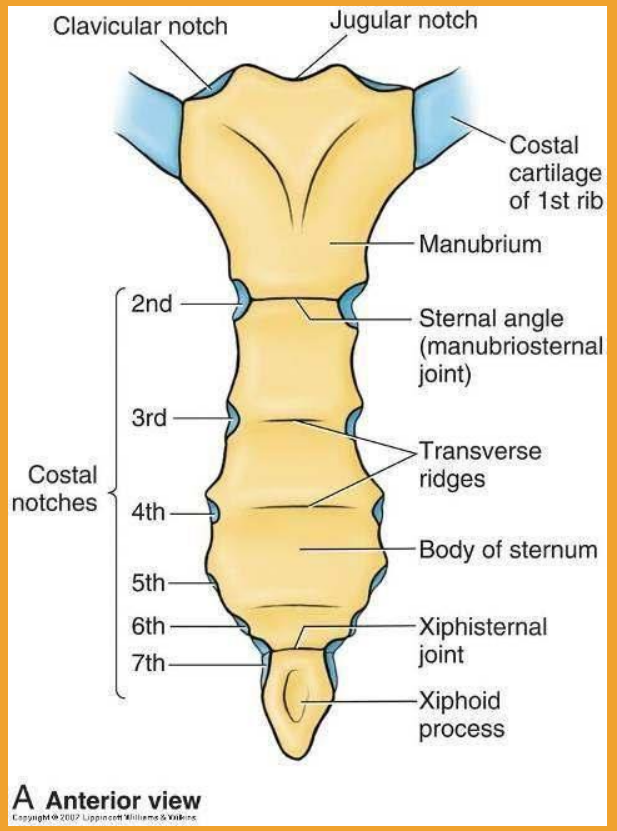


4. Sternum

This flat bone can be felt just under the skin in the middle of the front of the chest.

The manubrium is the uppermost section and articulate with the clavicles at the sternoclavicular joints and with the first two pairs of ribs.

The body or middle portion gives attachment to the ribs.



Appendicular skeleton

Appendicular skeleton consists of the:

1. Shoulder girdle with upper limbs
2. Pelvic girdle with lower limbs

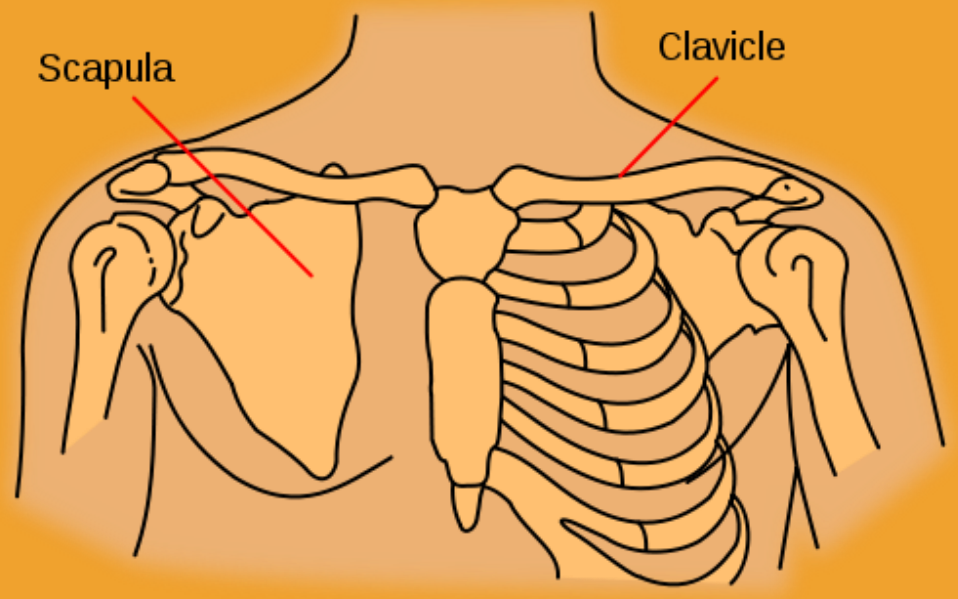
Shoulder girdle

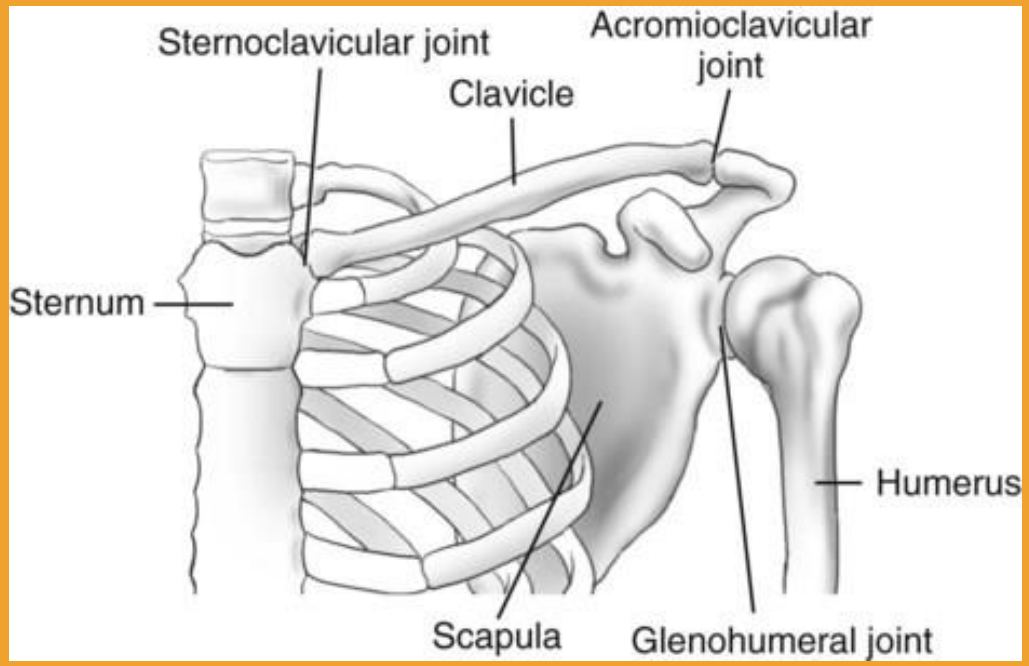
The shoulder girdle consists of two clavicles and two scapulae

- ✓ **Clavicle (collar bone)**
- ✓ The clavicle is an S-shaped long bone.
- ✓ Articulate with the manubrium of the sternum at the sternoclavicular joint and forms the acromioclavicular joint with the acromion process of the scapula.
- ✓ The clavicle provides only Bony link between the upper limb and the axial skeleton.

✓ Scapula (shoulder blade)

- ✓ Scapula is a flat triangular shaped bone, lying on the posterior chest wall superficial to the ribs and separated from them by muscles.
- ✓ At the lateral angle there is a shallow articular surface, the glenoid cavity, which, with the head of humerus, forms the shoulder joint.

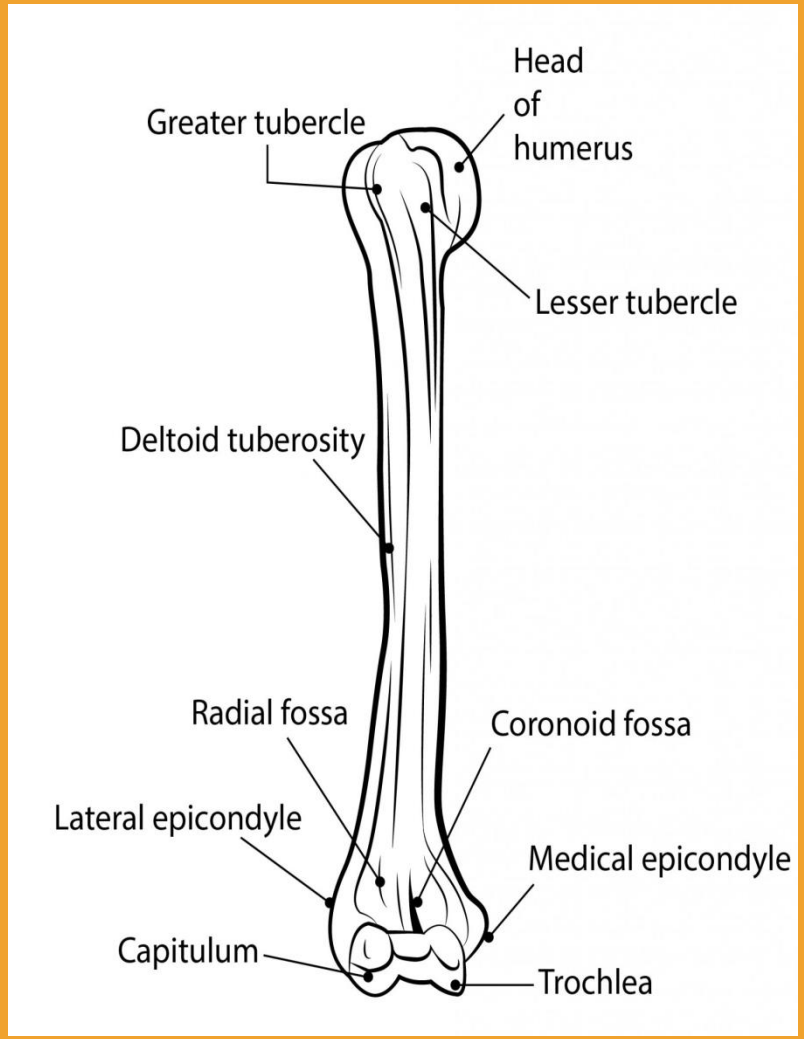




The upper limb

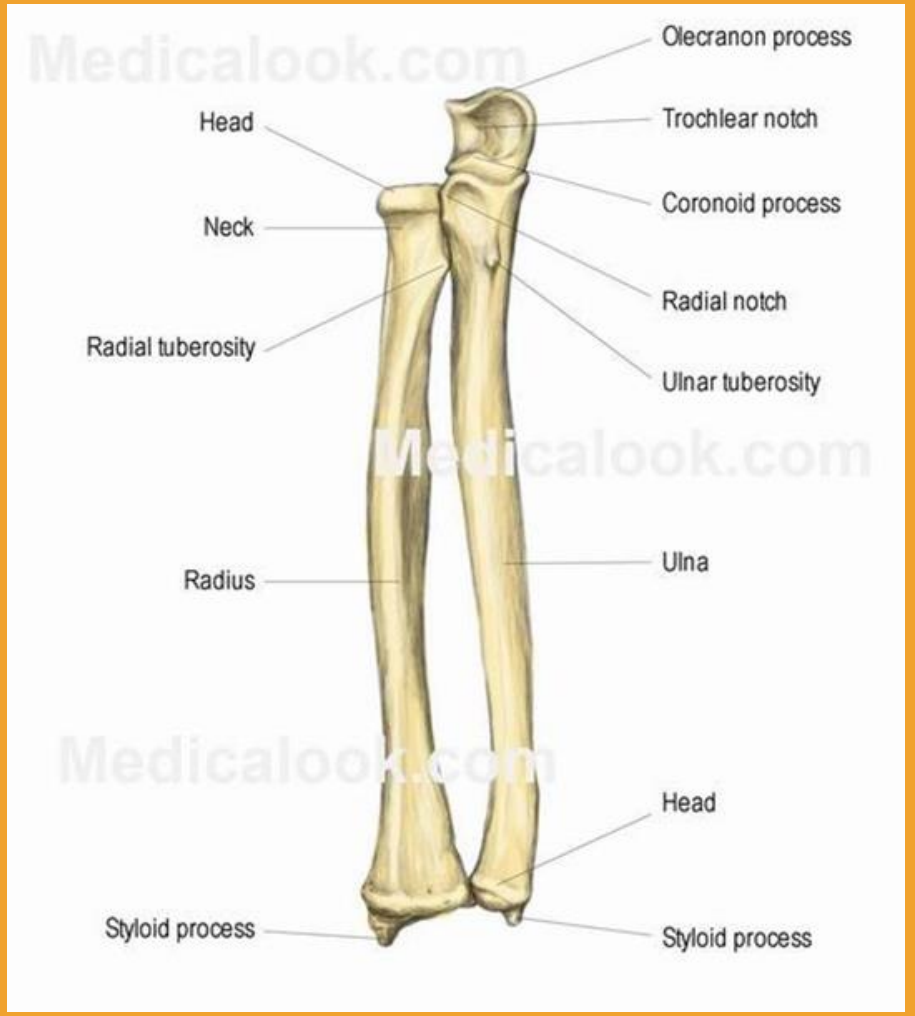
Humerus

- ✓ The humerus is the bone of upper arm.
- ✓ The head sits within the glenoid cavity of the scapula forming the shoulder joint.
- ✓ The distal end of the bone has two surfaces that are declared with the radius and ulna to form the elbow joint



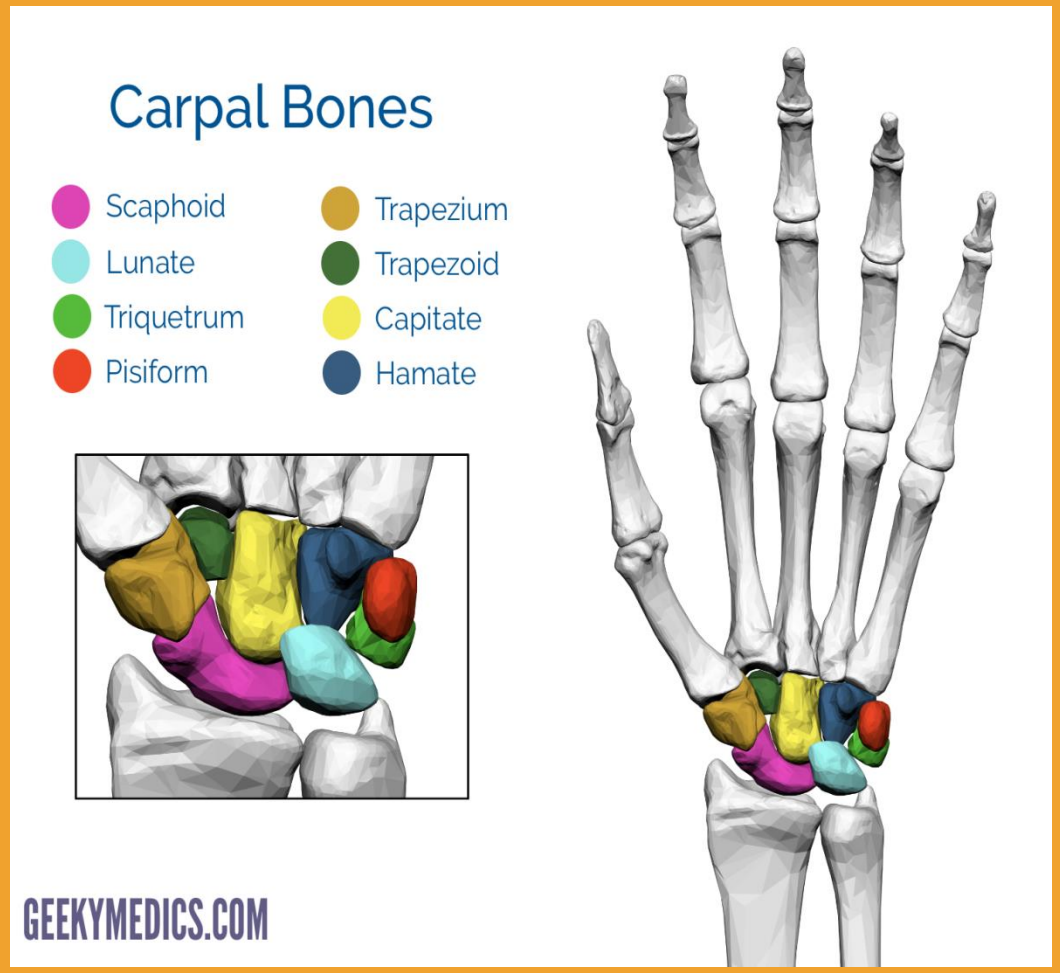
Ulna and radius

- ✓ These are the two bones of the forearm.
- ✓ The ulna is longer than the medial to the radius and when the arm is in the anatomical position that is with the palm of the hand facing forwards the two bones are parallel.
- ✓ They articulate with the humerus at the elbow joint with the carpal bones at the wrist joint and with each other at the proximal and distal radioulnar joints.



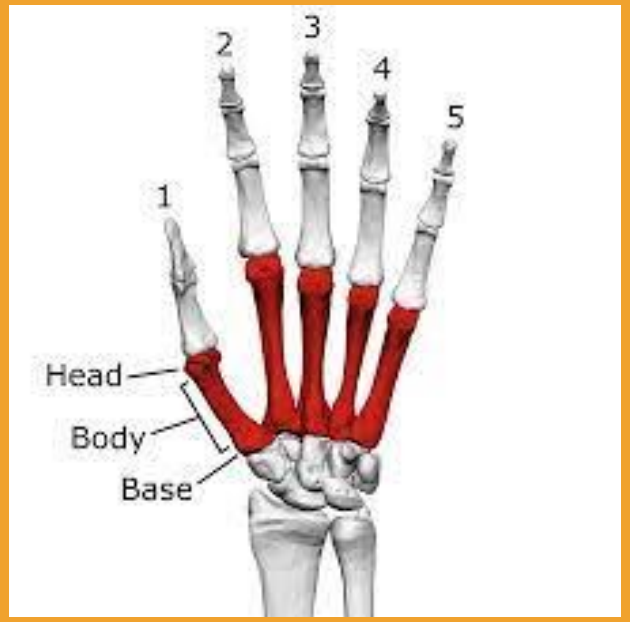
Carpal (wrist) bones

- ✓ There are 8 carpal bones arranged in two rows of four.
- ✓ From outside inwards they are;
- ✓ Proximal row: scaphoid, lunate, triquetrum, pisiform
- ✓ Distal row: trapezium, trapezoid, capitate, hamate.
- ✓ These bones fit closely together and are held in a position by ligament that allows a limited amount of movement between them.
- ✓ The bones of the proximal row are associated with the wrist joint and those of the distal row form joints with the metacarpal bones.



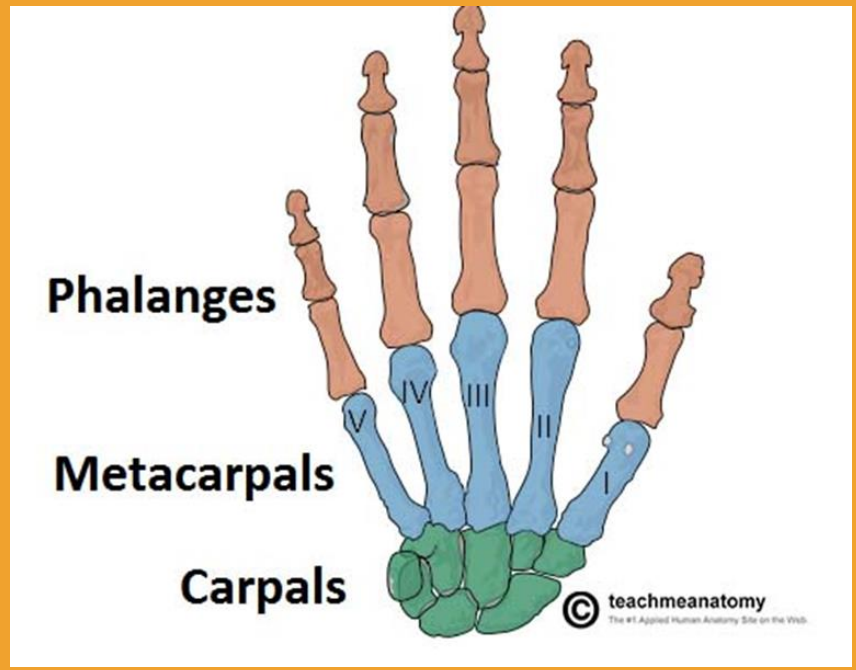
Metacarpal bones (bones of the hand)

- ✓ These five bones form the palm of the hand.
- ✓ They are numbered from the thumb side inwards. The proximal ends articulate with the carpal bones and the distal ends with the phalanges.



Phalanges (finger bones)

- ✓ There are 14 phalanges, three in each finger and to in the thumb.
- ✓ They articulate with the metacarpal bones and with each other by hinge joints.



Pelvic girdle and lower limb

The lower limb forms the trunk at the pelvic girdle.

Pelvic girdle

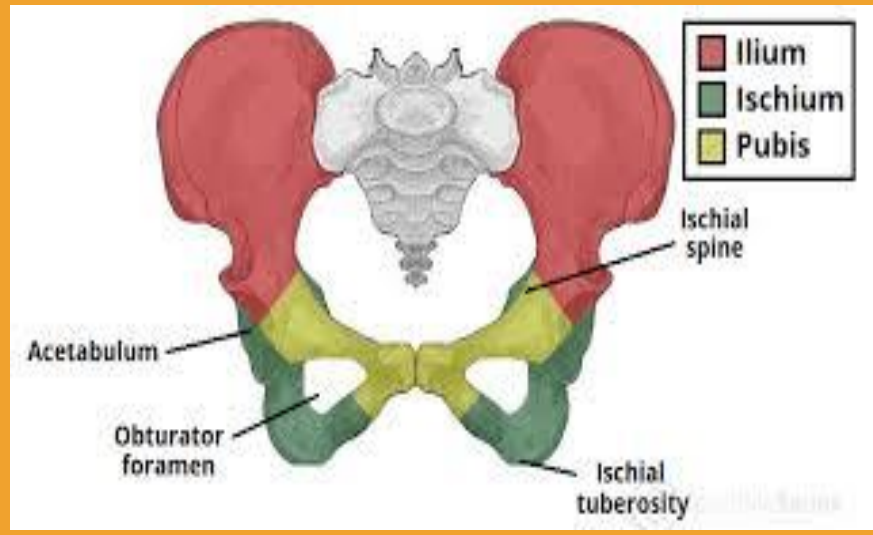
- ✓ The pelvic girdle is form from two innominate bones.
- ✓ The pelvis is the term given to the basin shaped structure formed by the pelvic girdle and its associated sacrum.

Innominate hip bones

- ✓ Each hip bone consists of three fused bones: the ilium, ischium and pubis.
- ✓ The ilium is the upper flattened part of the bone and its presents the iliac crest, the interior curve of which is called the anterior superior iliac spine.
- ✓ The ilium forms synovial joint with the sacrum this is the sacroiliac joint a strong joint capable of absorbing the stresses of weight bearing and which tends to become fibrosed in later life.

- ✓ The pubis is the interior part of the bone and is articulate with the pubis of the other hip bone at a cartilaginous joint the symphysis pubis.

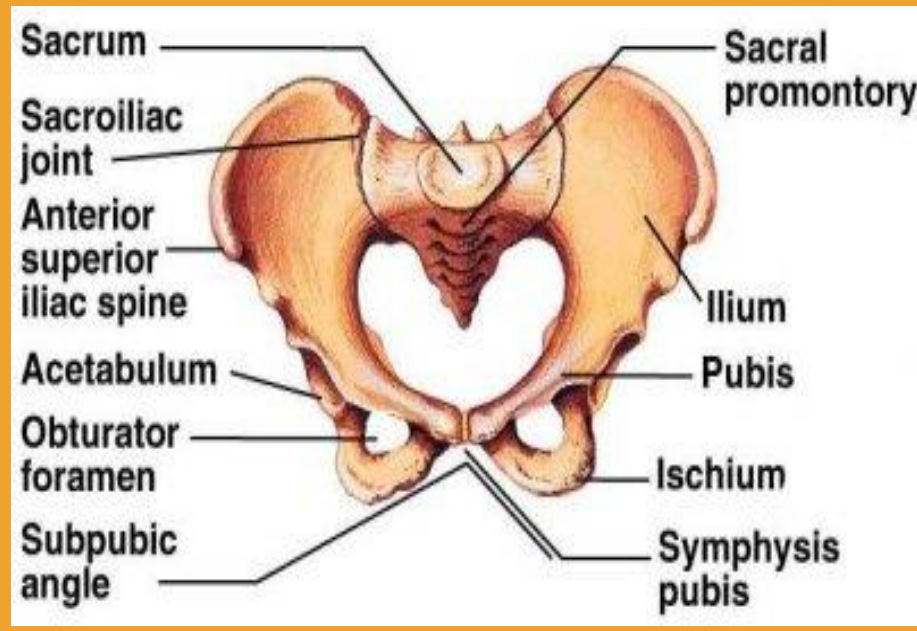
- ✓ The ischium is the inferior and posterior part. The rough inferior projections of the Ischia, the ischial tuberosities, bear the weight of the body when the individual is seated. These are also called sitting bones.



The pelvis

- ✓ The pelvis is formed by the hip bones the sacrum and coccyx.

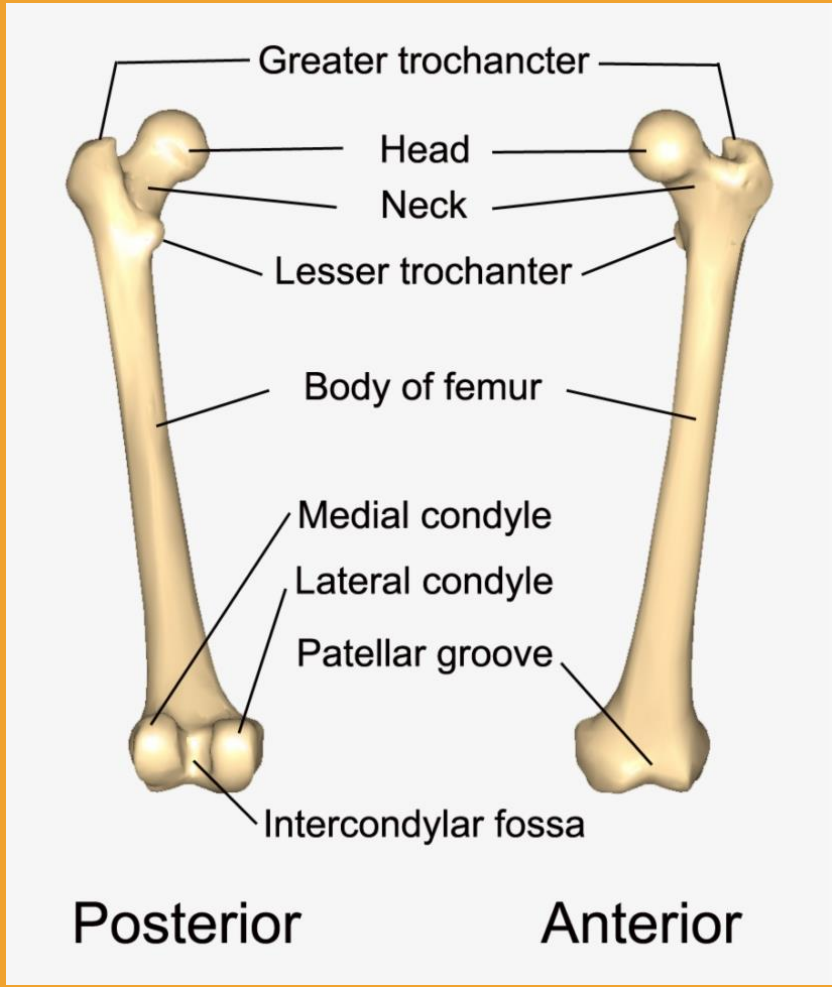
- ✓ It is divided into upper and lower parts by the brim of the pelvis consisting of the promontory of the sacrum and the iliopectineal lines of the innominate bones.



Lower limb

Femur (thigh bone)

- ✓ The femur is the longest and heaviest bone of the body.
- ✓ The head is almost spherical and fits into the acetabulum of the hip bone to form the hip joint.
- ✓ The neck extend out words and slightly downwards from the head to the shaft and most of it is within the capsule of the hip joint.
- ✓ The posterior surface of the lower third forms a flat triangular area called the popliteal surface.
- ✓ The distal extremity has two articular condyles which with the tibia and patella form the knee joint.
- ✓ The femur transmits the weight of the body to the bone below the knee to the foot.

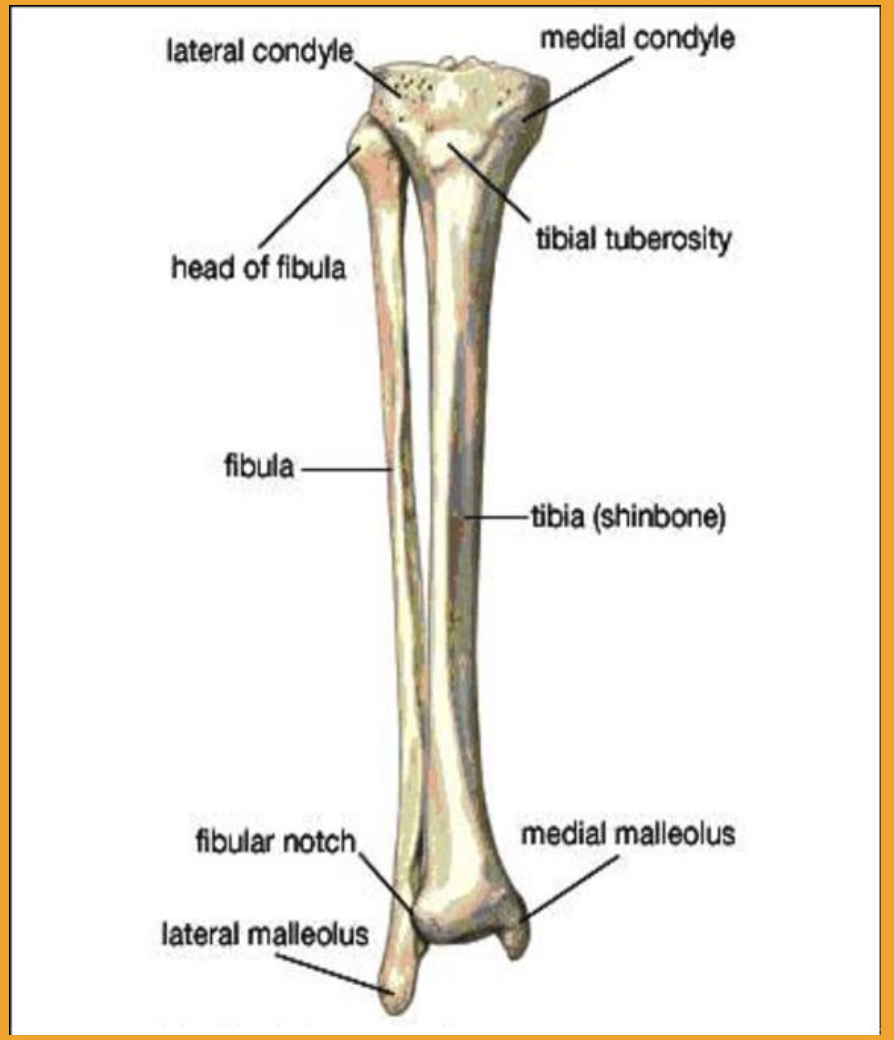


Tibia (shin bone)

- ✓ The tibia is the medial of the two bones of the lower leg.
- ✓ The proximal extremity is broad and flat and has two condyles for articulation fit the inferior aspect of the lateral condyle forming the proximal tibiofibular joints.

Fibula

- ✓ The fibula is the long slender lateral bone in the leg.
- ✓ The head or upper extremity articulates with the lateral condyles of the tibia forming the proximal tibiofibular joints and the lower extremity articulates with the tibia and project beyond it to form the lateral malleolus.
- ✓ This helps to stabilized ankle joint.
- ✓ It is easily felt through the skin on the outer aspect of the ankle.



Patella (knee cap)

- ✓ This is a roughly triangular shaped sesamoid bone forming part of the anterior wall of the knee joint.
- ✓ Its posterior surface articulates with the patellar surface of the femur in the knee joint and its anterior surface is in the patellar tendon i.e the tendon of the quadriceps femoris muscle.

Tarsal (ankle) bones

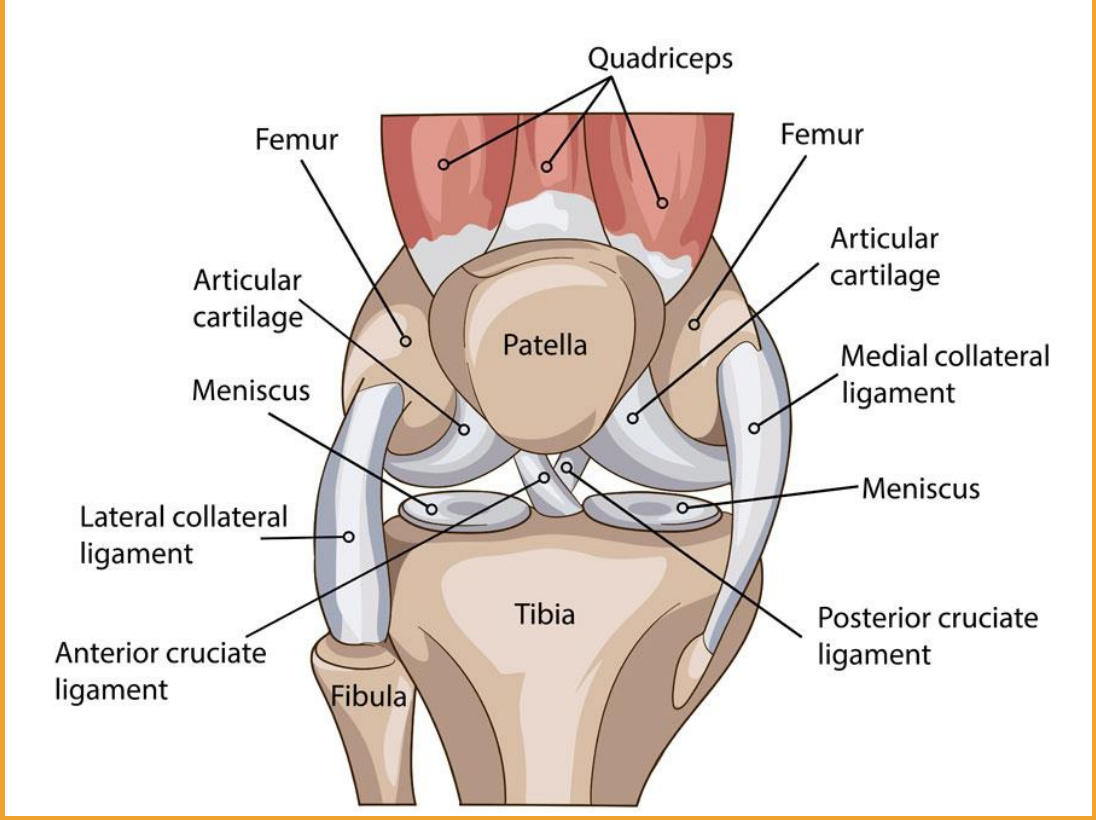
- ✓ The 7 tarsal bones forming the posterior part of the foot and the talus, calcaneus, navicular, cuboid and 3 cuneiform bones.
- ✓ The talus articulates with the tibia and fibula at the ankle joint the calcaneus forms the heel of the foot the other bones articulate with the each other and it with the metatarsal bones.

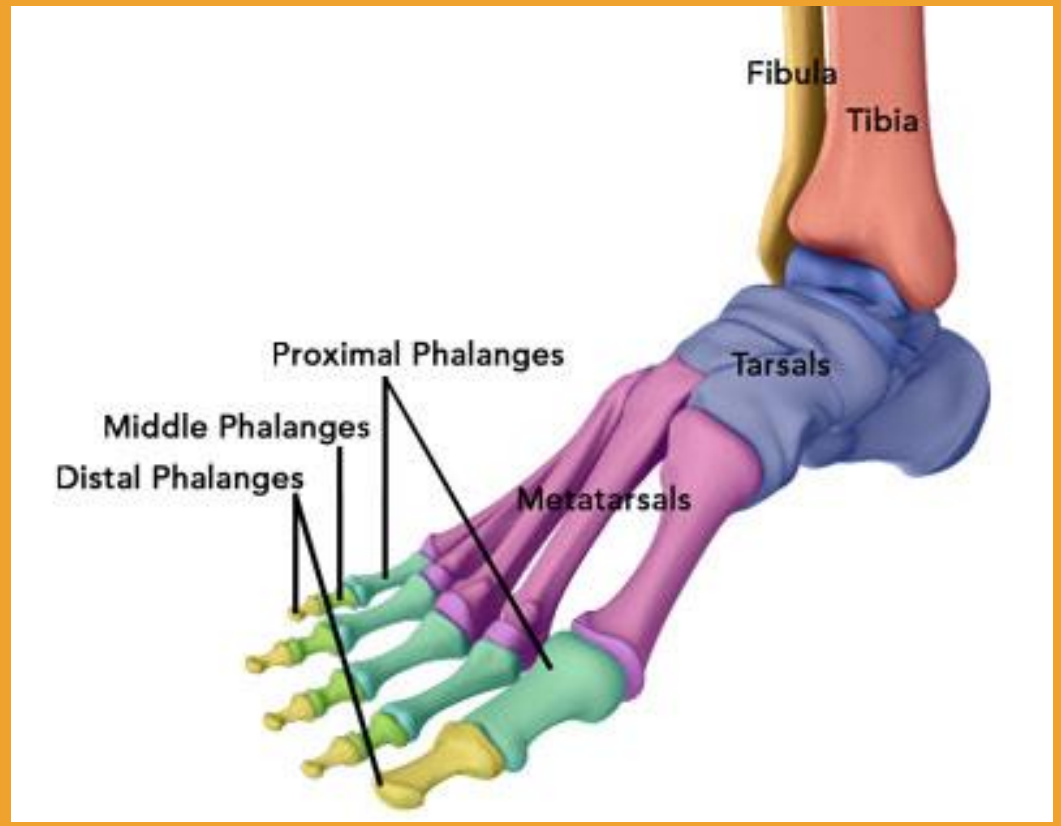
Metatarsal (bones of the foot)

- ✓ These are five bones numbers from inside out which form the greater part of the dorsum of the foot.
- ✓ At their proximal ends the articulate with the tarsal bone and at their distal ends with the phalanges.
- ✓ The enlarged distal head of the first metatarsal bone the ball of the foot.

Phalanges (toe bones)

There are 14 phalanges arranged in a similar manner to those in the fingers, i.e two in the great toe and 3 in each of the other toes.





Joints

- ✓ A joint is the side at which any two or more bones articulate or come together meaning the end or edges of the bones are held together by connective tissue.
- ✓ Joints may allow flexibility and movement of the skeleton.
- ✓ In some joints, however, the participating bones are fastened together so firmly that no moment between them is possible.
- ✓ There are three types of joints
- ✓ Fibrous joints
- ✓ Cartilaginous joints
- ✓ Synovial joints

Fibrous joints

- ✓ The bones forming the joints are linked with tough fibrous material.
- ✓ Such an arrangement often permits no moments.
- ✓ For example, the joints between the skull bones, the sutures, are completely immovable and the healthy tooth is cemented into the mandible by the periodontal ligament.
- ✓ The tibia and fibula in the leg are held together along their shaft by a state of fibrous tissue called the interosseous membrane.
- ✓ This fibrous joint allow a limited amount of movement and stabilizers the alignment of the bones.

Cartilaginous joint

- ✓ This joint are formed by a pad of tough fibrocartilage between the bones that act as shock absorber.
- ✓ The joints may be immovable as in the cartilaginous epiphyseal plates which in the growing child link the diaphysis of a long bone to the epiphysis.
- ✓ Some cartilaginous joints permit limited movement has between the vertebrae which are separated by the intervertebral disc or at the symphysis pubis which is softened by circulating hormones during pregnancy to allow for expansion during childbirth.

Synovial joints

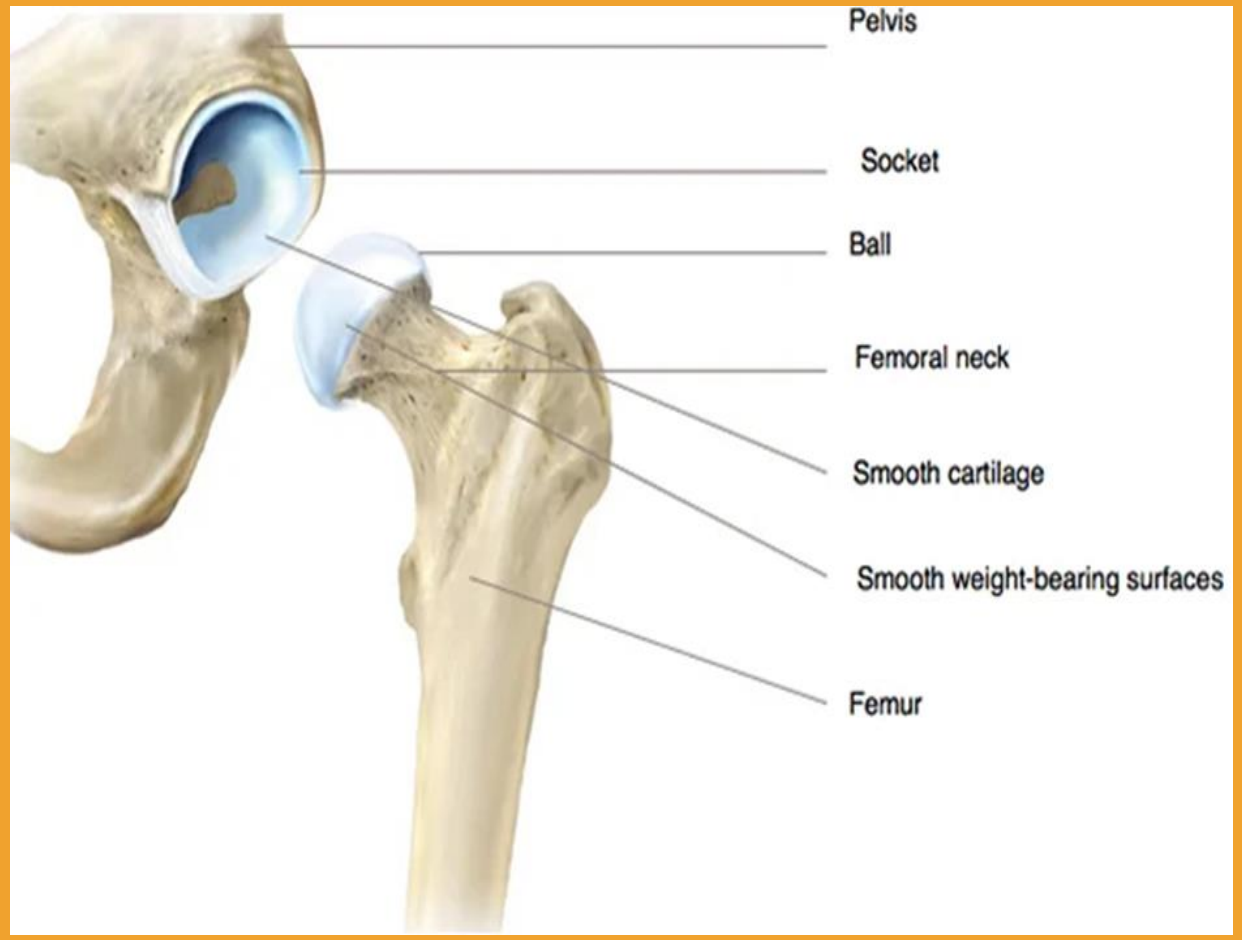
- ✓ Synovial joints are characterized by the presence of space or a capsule between the articulating bones.
- ✓ The ends of the bones are held close together by a sleeve of fibrous tissue and lubricated with a small amount of fluid. Synovial joints are the most movable of the body.

Types of synovial joint

Synovial joints are classified according to the range of movement possible or the shape of the articulating parts of the bones involved.

Ball and socket joint

- ✓ The head of one bone is ball shape and articulates with a Cup shaped socket of another.
- ✓ This joint allows a wide range of moments including flexion, extension, rotation.
- ✓ Examples include the shoulder and hip.



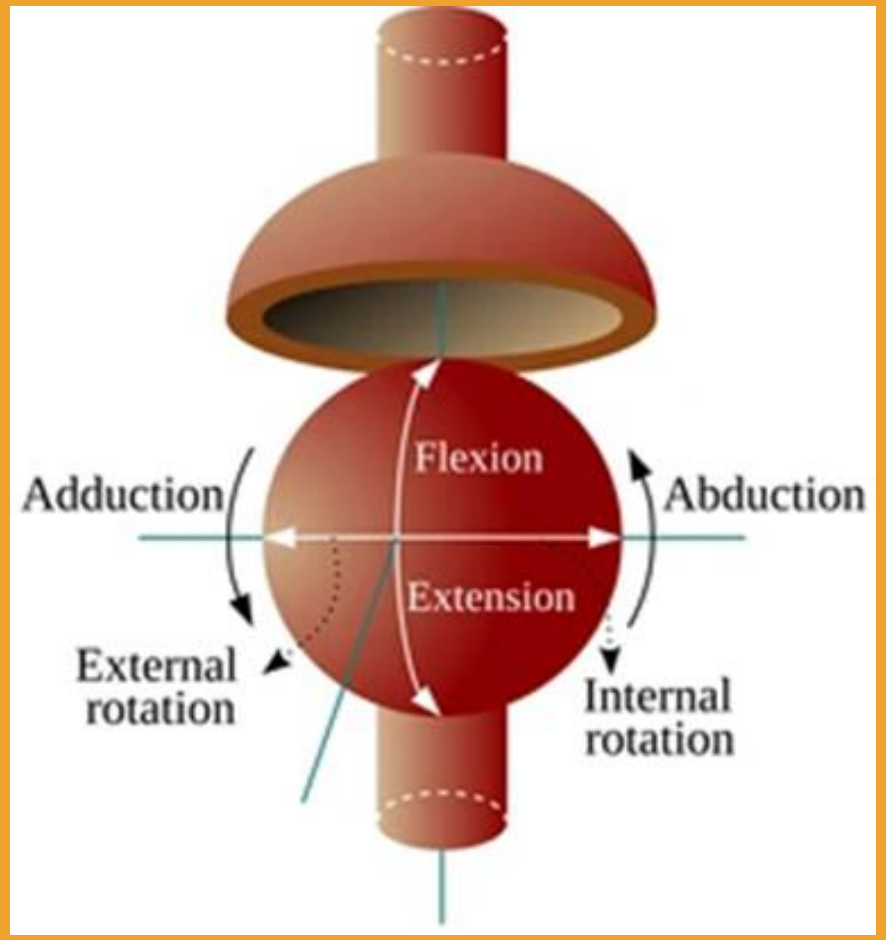


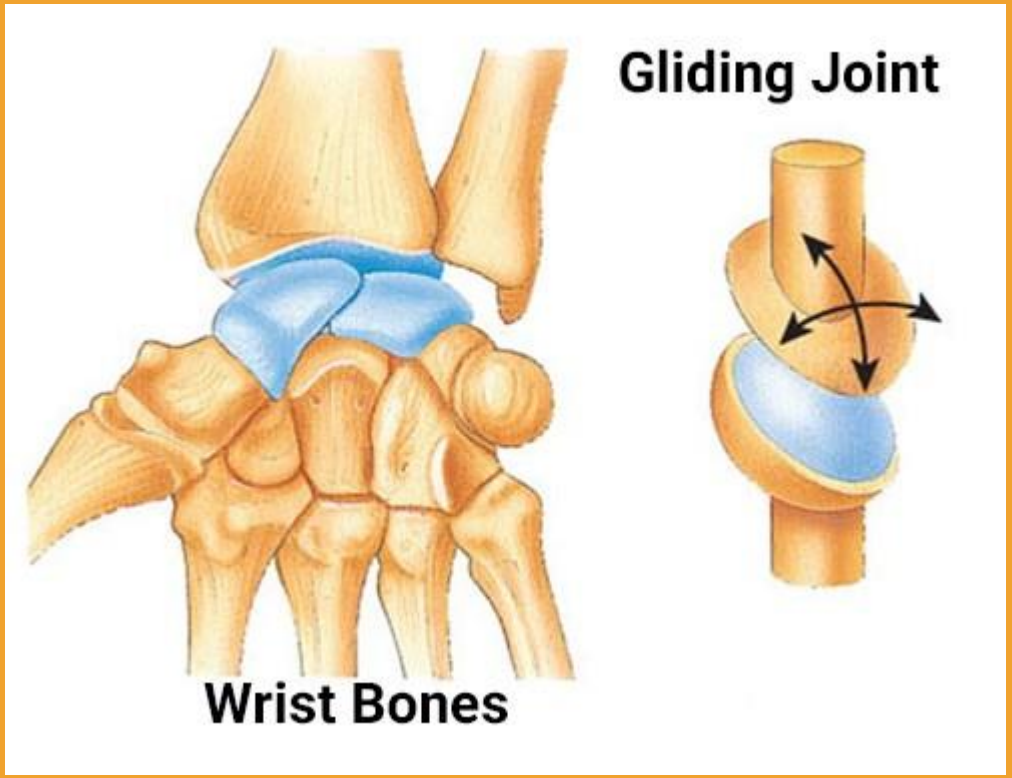
Fig. Hip joints

Hinge joints

- ✓ The articulating ends of the bones fit together like a hinge on a door and movement is there for restricted to flexion and extension.
- ✓ The elbow joint is one example permitting only flexion and extension of the forearm.
- ✓ Other hand joints include the knee, ankle and the joints between the phalanges of the fingers and toes.

Gliding joints

- ✓ The articular surface are flat or very slightly curved and glide over one another but the amount of moment possible is very restricted this group of joints is the least movable of all the synovial joints.
- ✓ Examples include the joints between the carpal bones in the raised the tarsal bones in the food and processes of the spinal vertebrae.

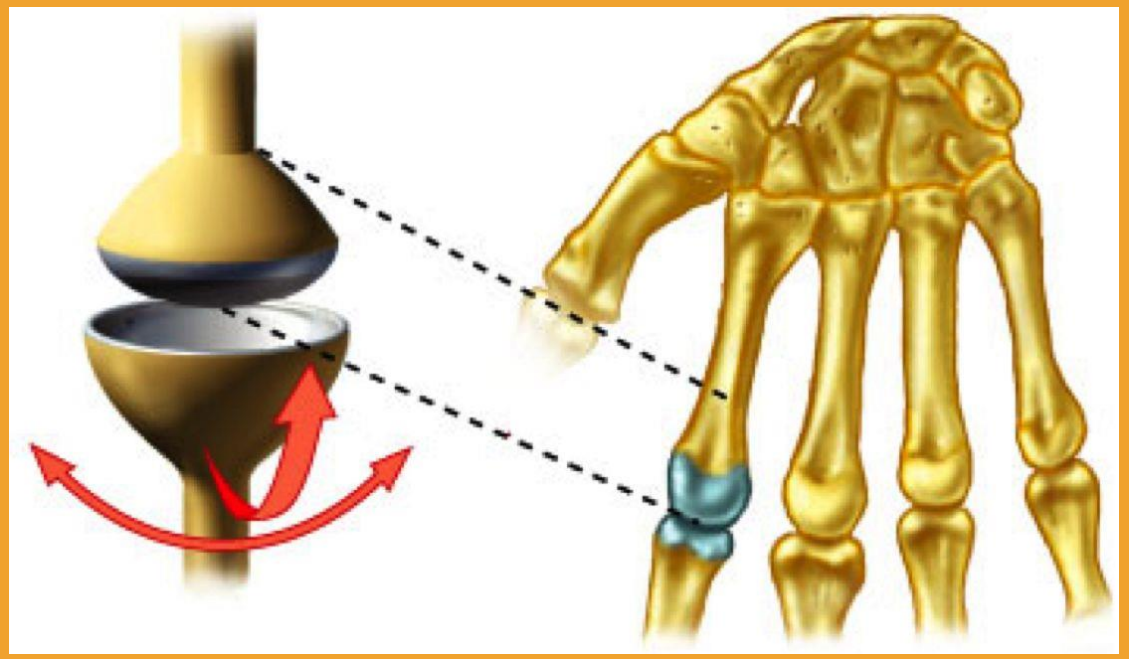


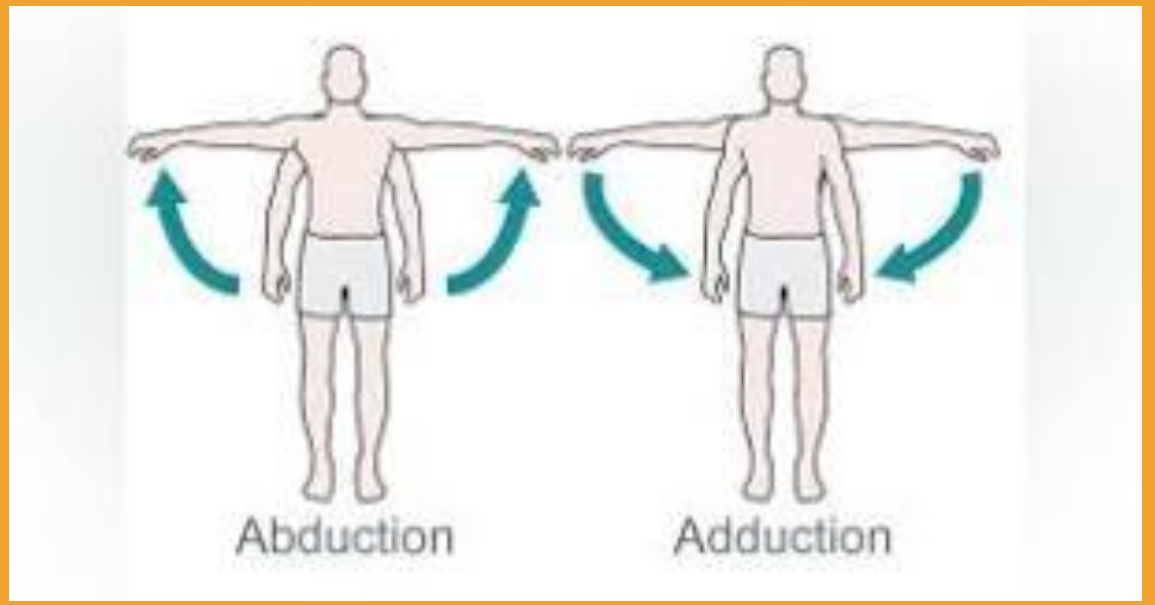
Pivot joints

- ✓ This joints allow a bone or a limb to rotate.
- ✓ One bone fits into a hoop shaped ligament that holds it close to another bone and allow it to rotate in the ring thus formed.
- ✓ For example the head rotates on the pivot joint formed by the dense of the excess held within the rain formed by transverse ligament and the dense of the Atlas.

Candyloid joints

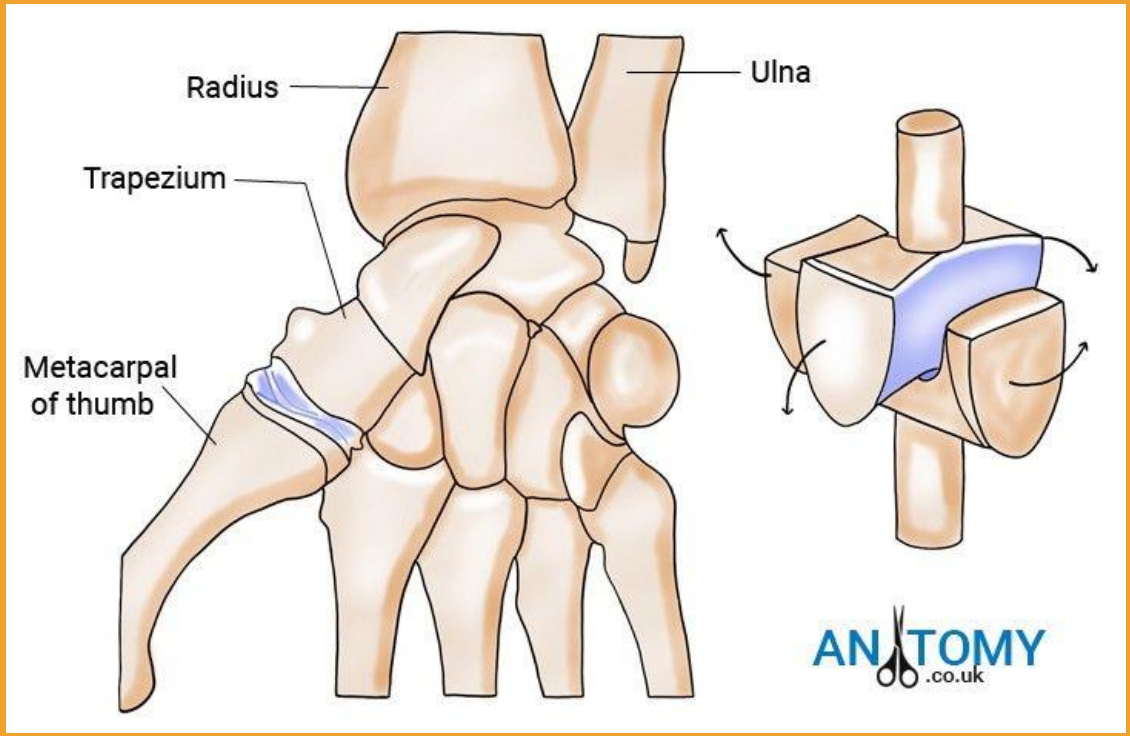
- ✓ A candyle is a smooth rounded projection on a bone and in a condyloid joint it sits between a Cup shaped depression on the other bone.
- ✓ Examples include the joints between the condylar process of the mandible and the temporal bone, these joints permit flexion, extension, abduction, adduction and circumduction.





Saddle joints

- ✓ The articulating bone fit together like a person sitting on a saddle.
- ✓ The most important saddle joint is at the base of the thumb between the trapezium of the wrist and the first metacarpal bone.
- ✓ The range of movement is similar to that of a condyloid joint but with additional flexibility; opposition of thumb the ability to touch each of the finger tips on the same hand is due to the nature of the thumb joint.



Disorders of Joints

A. HEMATOID ARTHRITIS

- ✓ Is an autoimmune disease in which there is joint inflammation, synovial proliferation and destruction of articular cartilage.
- ✓ It is characterized by inflammation of joints, which causes swelling, pain and loss of functions.
- ✓ The primary symptoms of RA is inflammation of the synovial membrane.
- ✓ In inflammation of synovial membrane remains untreated, the membrane thickness increases, and synovial fluid accumulates.
- ✓ The resulting pressure causes pain and tenderness.

Rheumatoid factor (antibodies of their own immunoglobulins IgG)

↓

RF react with IgG to form immune complex

↓

Activate complement system

↓

Inflammatory response

↓

Leukocytes, monocytes, lymphocytes are attracted by chemotaxis process. Phagocytes the immune complex

↓

Lysosomal enzymes are release. This enzymes are capable of destroying joint cartilages

↓

Inflammatory process

↓

Start cycle again

Treatment

Disease modified anti-rheumatic drug:

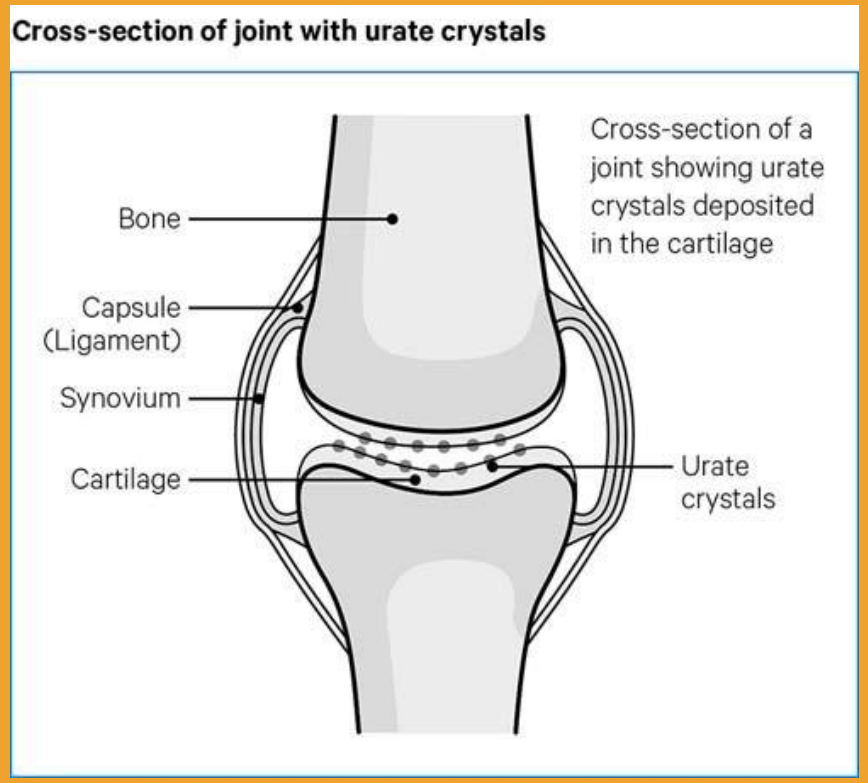
1. Gold salt- auranopnin
2. Penicillamine
3. Antimalarial- chloroquine, hydroxyquine
4. Immunosuppressant- methotrexate, azathioprine

B. GOUT

- ✓ Gout is a type of arthritis that causes pain and swelling in your joints.
- ✓ Gout happens when high levels of a substance called serum urate build up in your body. When this happens, needle-shaped crystals form in and around the joint. This leads to inflammation and arthritis of the joint.

- ✓ Symptoms in the affected joint(s) may include:

1. Pain, usually intense
2. Swelling
3. Redness
4. Heat



Pathogenesis

Purine from excess nucleus acid or increase cell death.

↓

Hypoxanthine

↓

Xanthine

↓

Uric acid (ureate)

↓

Purely soluble ureate crystals deposit in skin and joints where inflammatory responses causes attack of gout

↓

Deposition of ureate crystal

Classification of drugs used in gout

ACUTE GOUT **:**

1. NSAIDS
2. Corticosteroids
3. Colchicine

CHRONIC GOUT:

- Inhibit uric acid synthesis:- Allopurinol, febuxostate (Urostatic)
- Increase uric acid excretion:- Probencid, Sulphinpyrazole (Urosuric)

Colchicine

- Alkaloid from ***colchium autumnale***. *(1973)*
- Neither analgesic nor anti inflammatory, but specific for gouty inflammation.
- It is only effective in prophylaxis of acute gout
- It has no effect on synthesis or promote excretion
- MOA
- Colchicine binds to intracellular protein 'Tubulin' and causes depolymerisation and disappearance of microtubules in granulocytes & Inhibit granulocyte migration so dec phagocytic activity

NSAIDs

- Strong anti inflammatory drugs
- Use in patients without contraindication
- Use maximum dose/potent NSAID

  e.g., **Indomethacin** 50 mg po t.i.d.

  Diclofenac 50 mg po t.i.d.

  Ketorolac 10 mg q4-6hrsr,

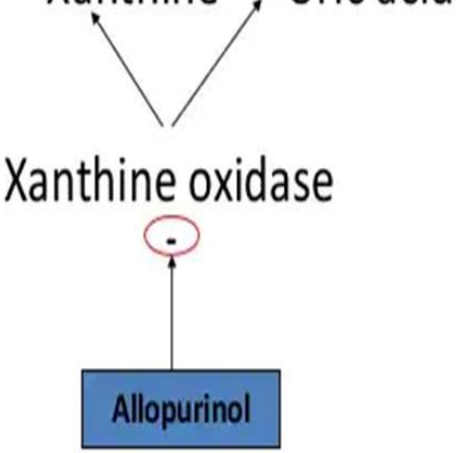
  Napoxen, Piroxicam
- continue until pain/inflammation absent for 48 hours
- MOA: inhibit urate crystal phagocytosis and chemotatic migration of leukocytes into inflammed joints.
- NSAIDs are not recommended for long term.

- (Salicylates are not used , have tendency to raise uric acid)

Drugs for chronic gout

- Uric acid synthesis inhibitors:- Allopurinol (Xanthine oxidase inhibitor)

- Hypoxanthine → Xanthine → Uric acid



- Allopurinol prevents the synthesis of uric acid by inhibiting the enzyme Xanthine oxidase, result reduce plasma ureate levels.
- Inc. xanthine ,hypoxanthines are excreted through urine
- Allopurinol short acting competitive inhibitor
- Metabolite alloxanthine is long acting $t_{1/2}$ 24hr.

Uricosuric drugs: (probencid)

•Highly lipid soluble benzoic acid.

•It blocks reabsorption of urate in proximal tubule by blocking transport (Bidirectional transport)

•PK: Dose dependent t1/2 life

•Dose -250- 500mg b.d. with plenty of fluids, alkalinization of urine.

Uses :

chronic gout along with NSAIDs / colchicine for initial 1-2 months.

Sulfinpyrazone

- It is a Pyrazolone derivaties related to Phenylbutazone.
- Inhibits tubular reabsorption of uric acid at therapeutic doses.
- Its action is additive with probenecid.
- Use -chronic gout
- Dose :100-200mg BD gradually increase according to the response.

Exam Oriented Questions

1. Give the classification of bone. (3M)
2. Write a note on thoracic vertebra. (3M)
3. Describe the structure and functions of pelvic girdle. (3M)
4. Write note on humerus. (3M)
5. Describe the structure of ribs. (3M)
6. Describe the different bone of cranium. (5M)
7. Write a note on atlas and cervical vertebra. (5M)
8. Describe the anatomy and physiology of bones of vertebral column. (10M)
9. Describe the bones of upper limb. (10M)
10. Describe the anatomy and physiology of bones of lower limb. (10M)

11. Define and classify joints. (3M)
12. Describe structure of typical synovial joints. (3M)
13. Write a note on ball and socket joint. (5M)
14. Describe structure and function of pivot and gliding joint. (5M)
15. Write a note on fibrous joint. (5M)
16. Classify joints and describe different types of joints. (10M)