

Skeletal system

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Movement

- Is an action by an organism or part of an organism that changes its position or place.
- Plants are fixed to one place.
 - Growth
 - Mimosa (sensitive touch)
 - Venus fly trap (carnivorous plant)

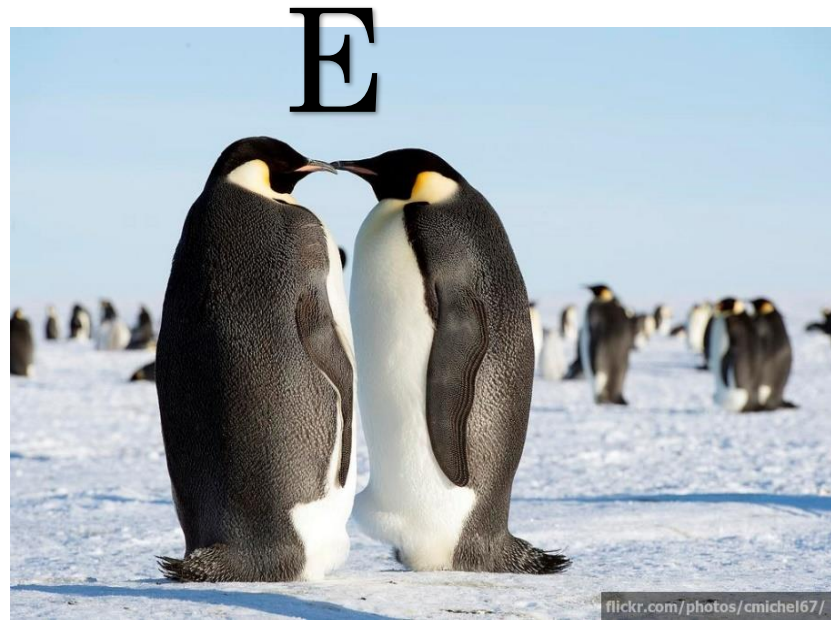
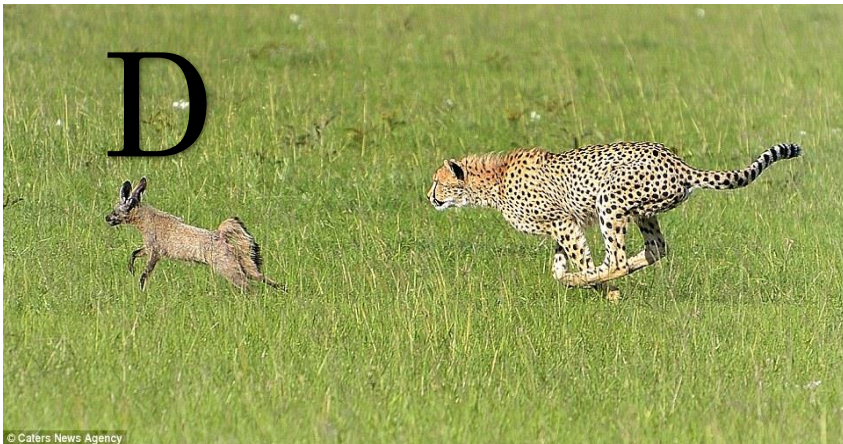
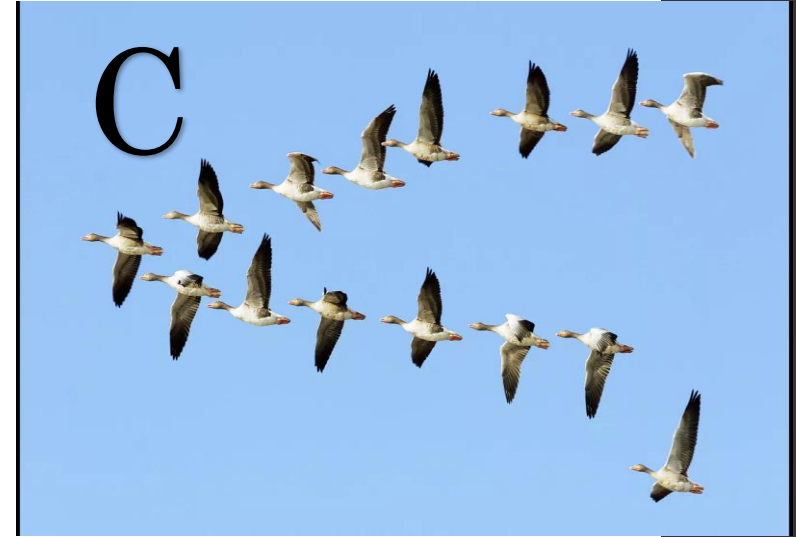
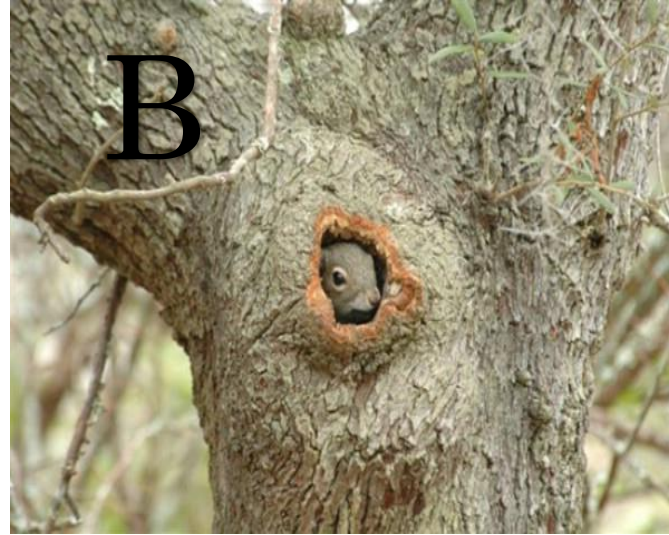


Locomotion

- Not fixed to one place, as animals move their whole body through contractions of muscles.
- Some animals are fixed and move part of their bodies.
 - Coral polyps, [sea anemones](#), barnacles
 - Move to gain food or defend from predators.

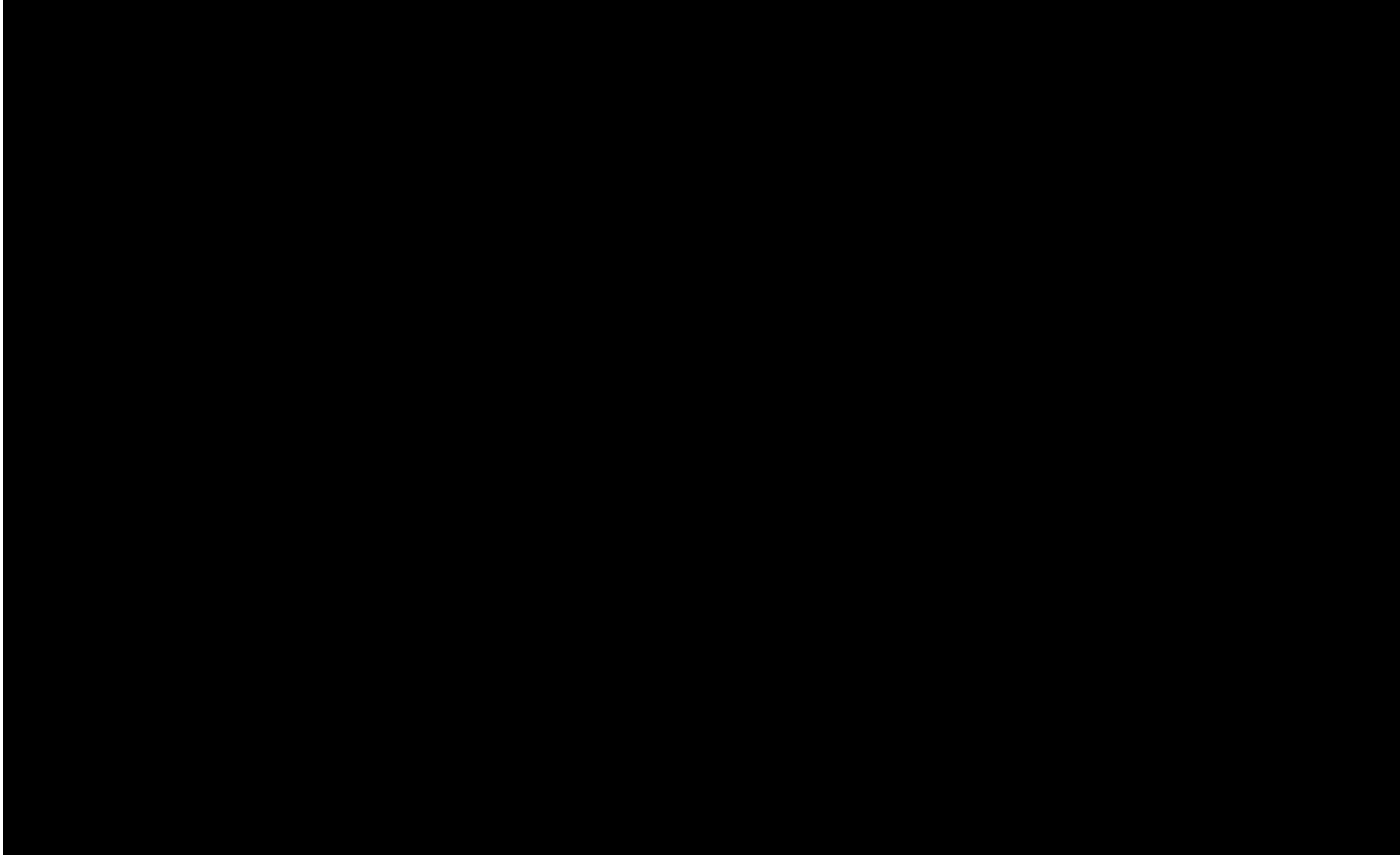


Reasons for locomotion?



- A: search food
- B: Hide from predators
- C: Migration
- D: escape from predators
- E: mating or nesting

List and identify 5 functions



<https://www.youtube.com/watch?v=J8x6tZI2hVI&t=75s>

Functions of the skeletal system

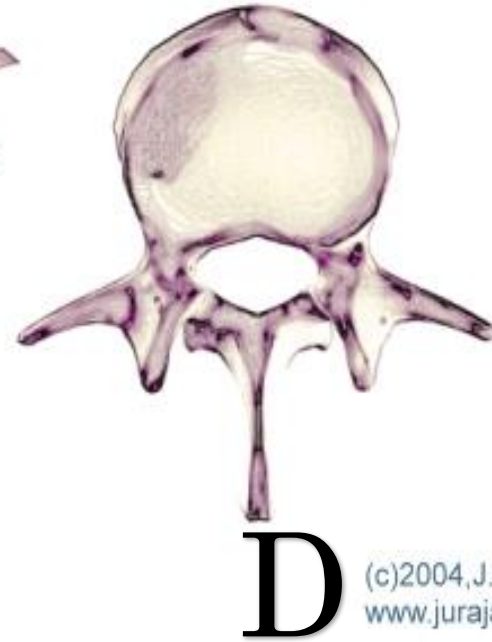
Function	Comments
Locomotion	<ul style="list-style-type: none">- Bones are a firm structure for muscle attachment by tendons- The skeleton has systems of levers to move the whole body from place to place, or move parts of the body relative to one another.
Protection	<ul style="list-style-type: none">- the cranium protects the brain, the eyes, and ears.- The ribcage protects the lungs and heart.- The vertebral column protects the spinal cord.- the pelvis protects the internal urinary and genital organs, e.g. uterus, ovaries and bladder.`
Support	<ul style="list-style-type: none">- the bones provide a framework for all the other systems of the body such as the digestive, excretory, nervous, endocrine and muscular systems.- the backbone provides support for the limbs and the head.- the jawbones support the teeth.
Breathing	<ul style="list-style-type: none">- the ribcage is moved up and down by the intercostal muscles to increase and decrease the volume of the thorax.
Production of red blood cells	<ul style="list-style-type: none">- redbone marrow in the interior of the short bones and at the ends of long bones have stem cells, that divide by mitosis to produce red blood cells to replace those that are removed from the circulation.

Review

- With a partner quickly mention at least 10 bones in your body. (scientific names)
- What are the reasons for locomotion?
- What are some functions of the skeletal system?

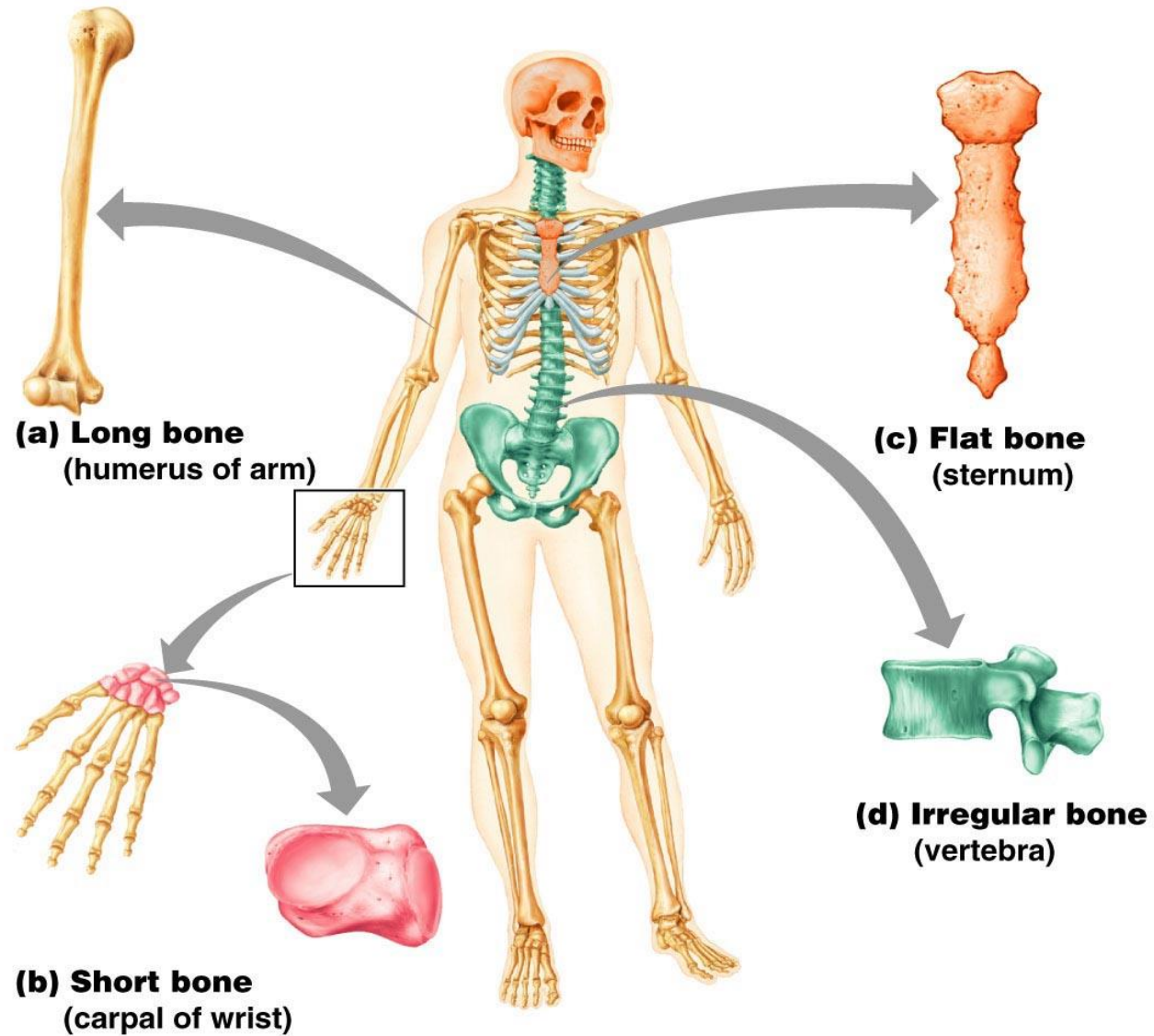
Introduction: types of bones?

ATLASOFANATOMY.COM



(c)2004, J. Artner, MD
www.jurajartner.com

- A: Long bone
- B: Short bone
- C: Flat Bones
- D: Irregular Bones



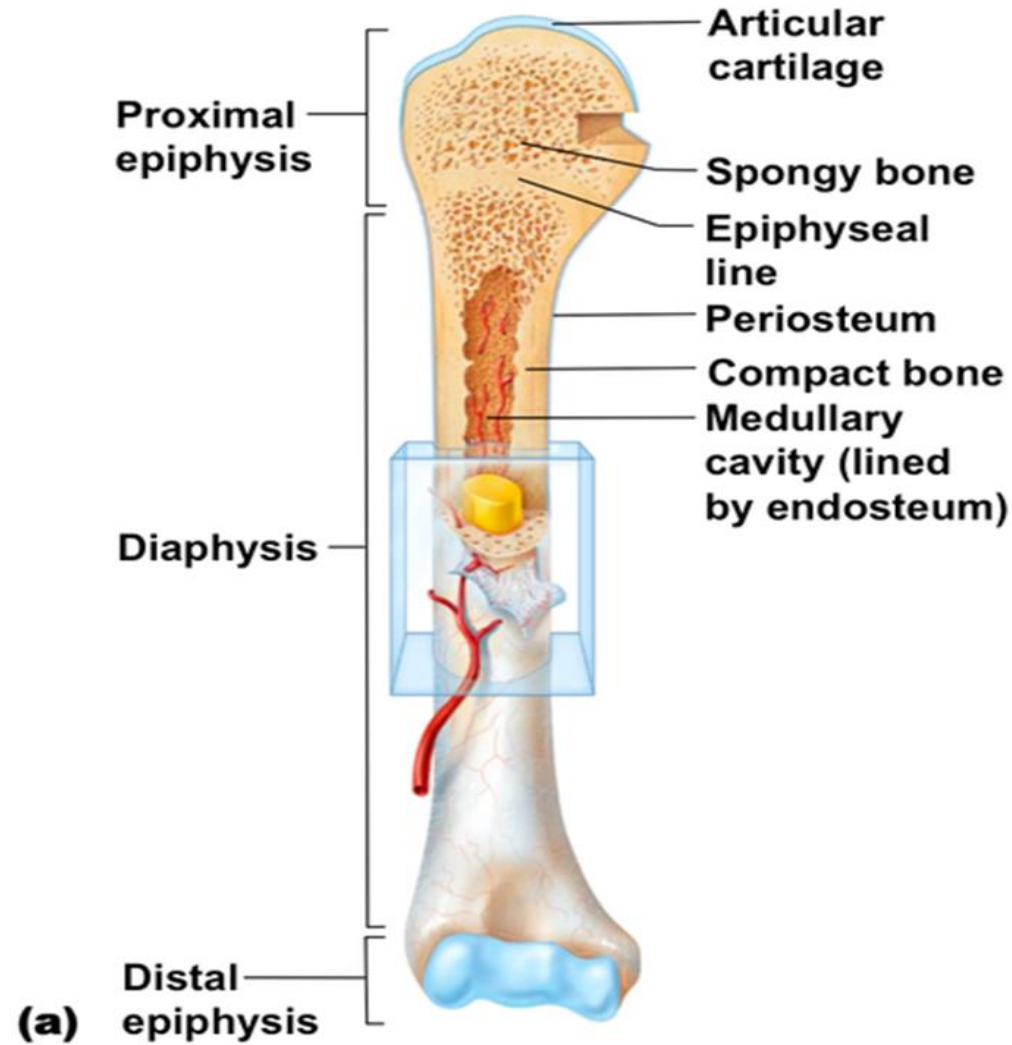
(a) Long bone
(humerus of arm)

(c) Flat bone
(sternum)

(b) Short bone
(carpal of wrist)

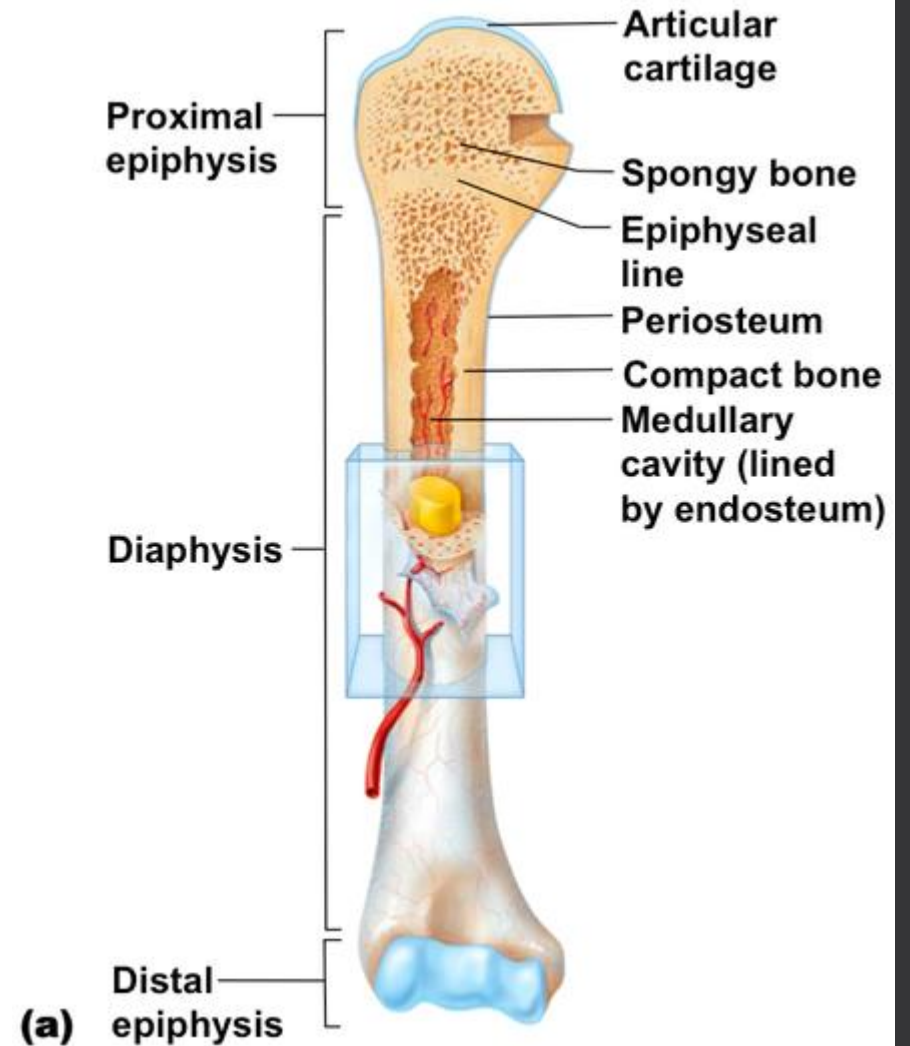
(d) Irregular bone
(vertebra)

Explore: Functions of long bone

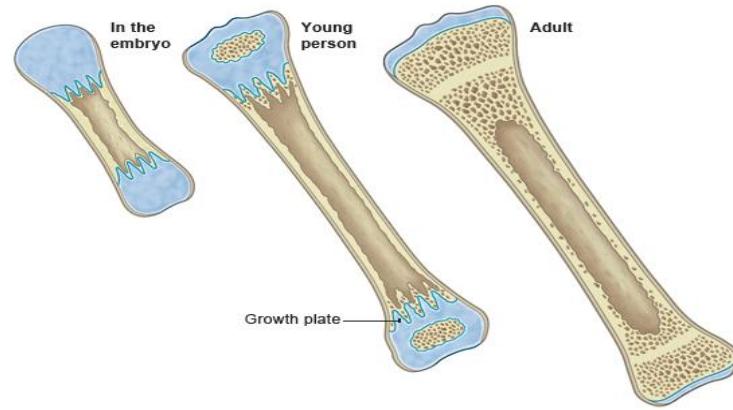


Bone

- Hard substance, contains calcium salts (Calcium phosphate)
- Made of cells called: **osteocytes**.
- Middle of the bone: **Spongy bone**.
 - Spaces are filled with bone marrow.
- Marrow stores fat and produces red blood cells.
- **Compact bone**: outside of bone made of harder material.



- **Ossification:** bone start made of cartilage but as embryo grows the cartilage is gradually replaced by bone.

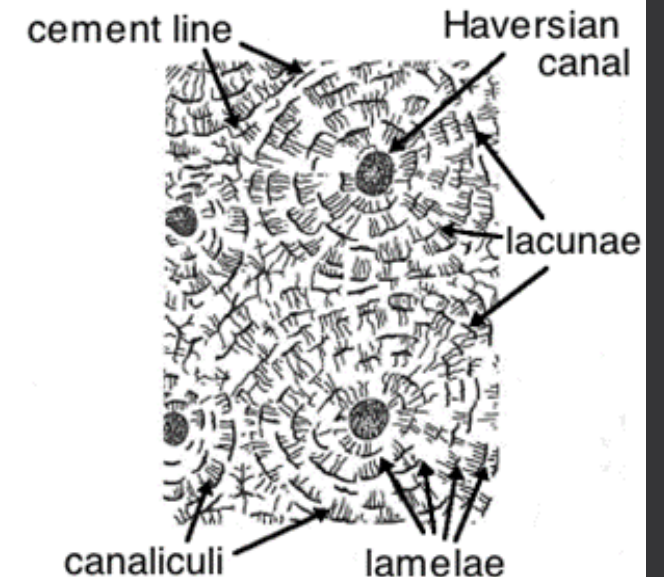


Cartilage present at the ends of long bones, where it acts as cushion between two bones at a joint. It is tough and flexible tissue containing cells called chondrocytes.

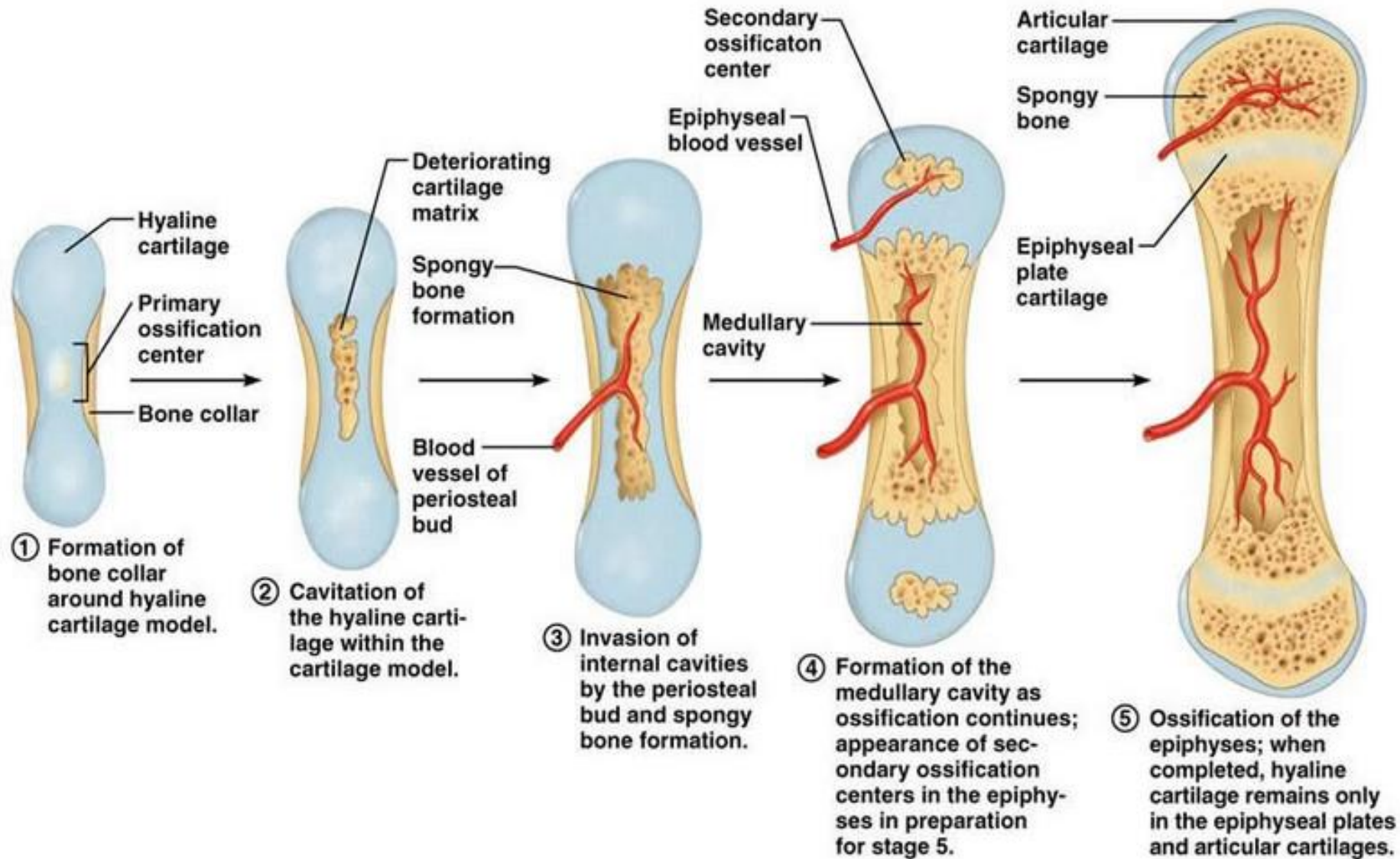
Cartilage: contains chondrocytes

Periosteum: outer surface of bone.

- **Haversian system:** osteocytes arrange themselves in rings, around canals containing blood vessels and nerves.
 - They secrete **calcium phosphate salts** with protein fibres make up bone matrix.



Ossification

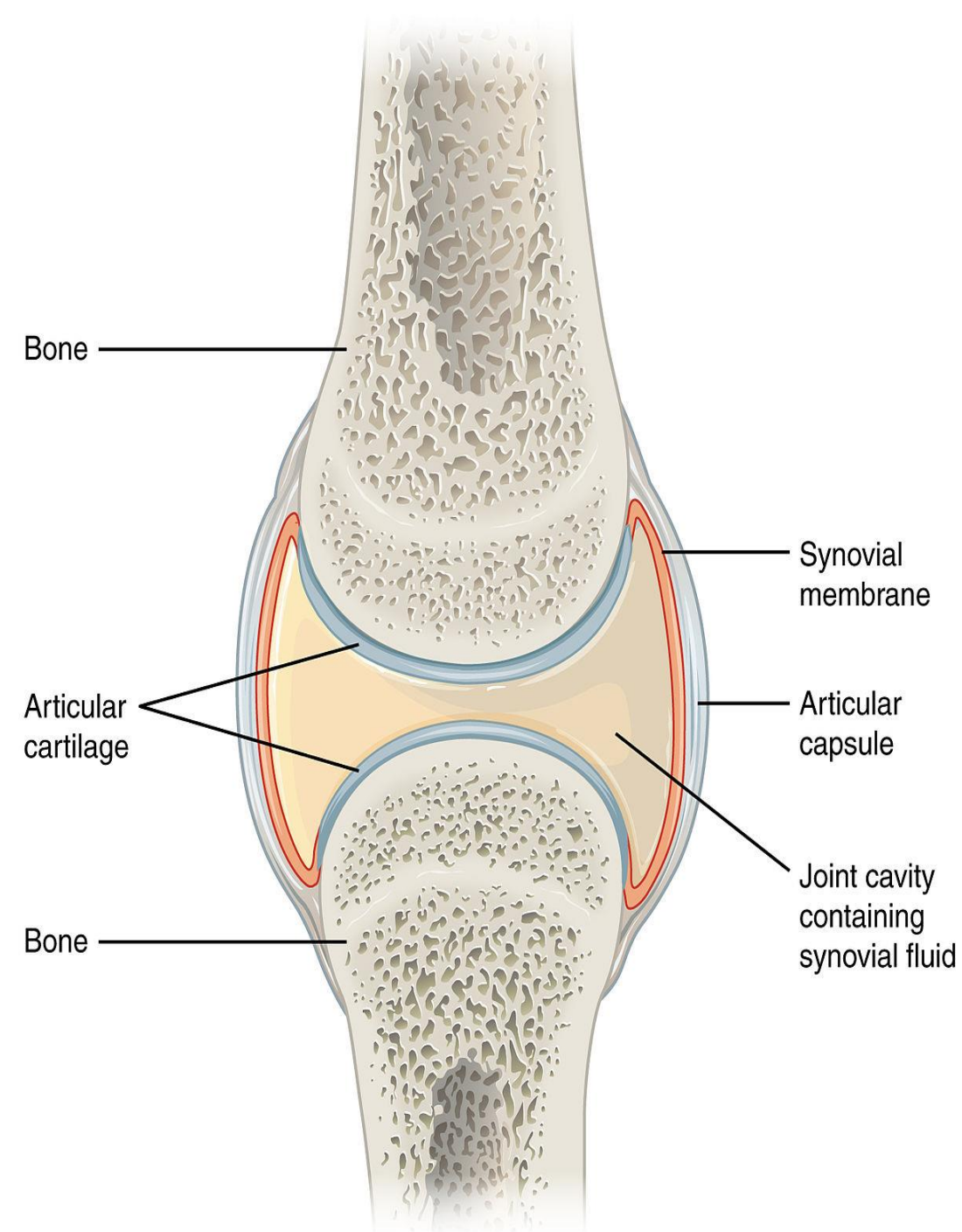


Questions:

- Distinguish between bone and cartilage.
- Explain the importance of cartilage.
- Distinguish between tendons and ligaments.

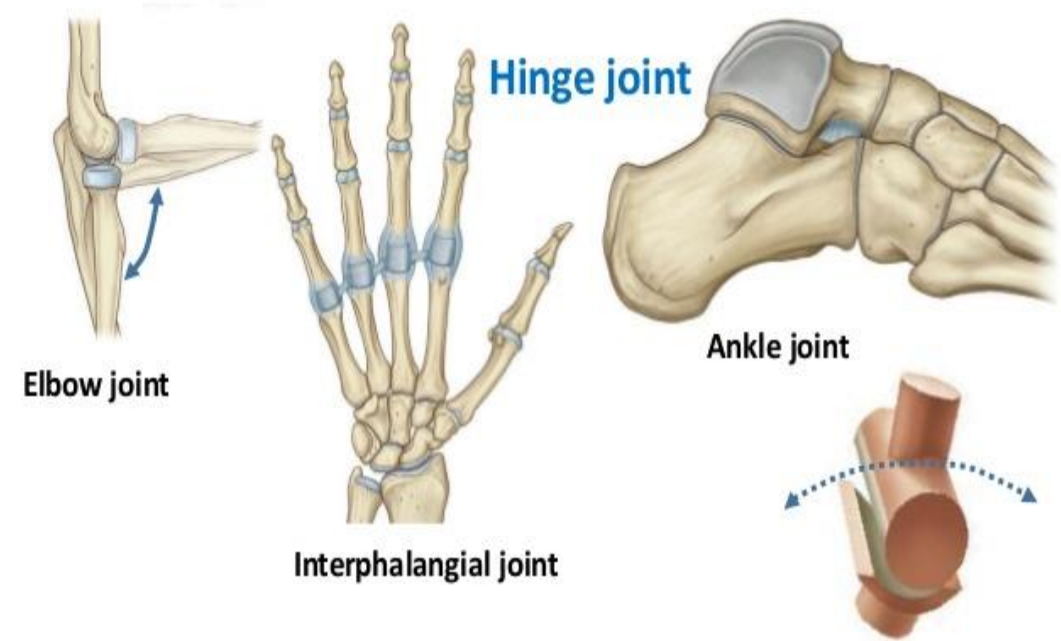
Point where two bones meet is called?

- Joint
- Features include:
 - A way to keep the ends of the bones held together, so that they don't separate. (dislocate)
 - A means of reducing friction between the ends of the moving bones.
 - A shock-absorbing surface between the two bones.



Types of joints:

- Three types:
 - Freely movable (synovial) (hinge joint & Ball and socket)
 - Partially movable (disc of cartilage between vertebrae can be squashed to allow some movement)
 - Immovable (fixed) (between the bones of the cranium)

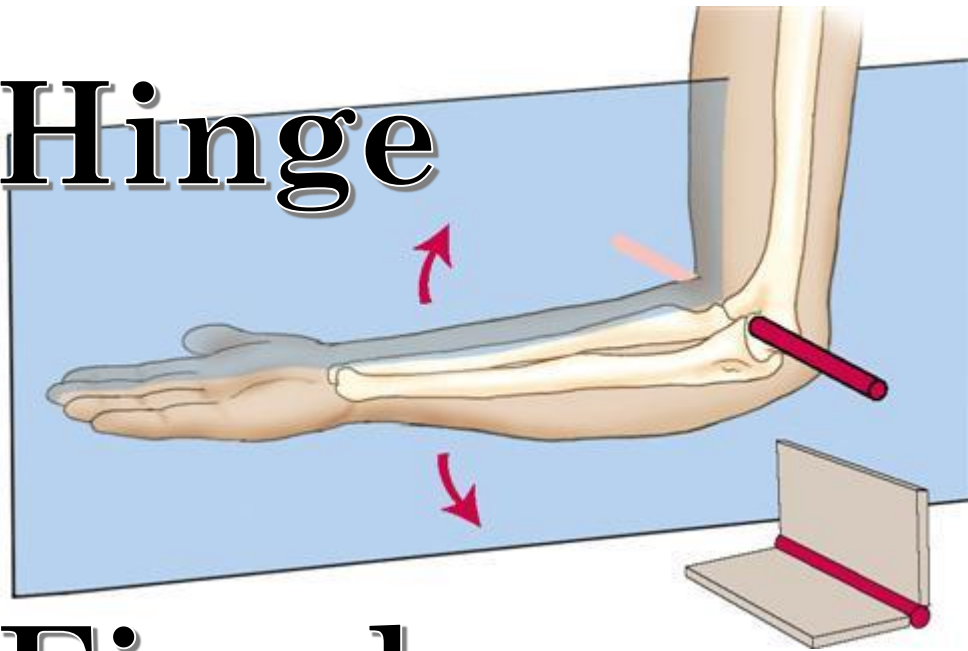


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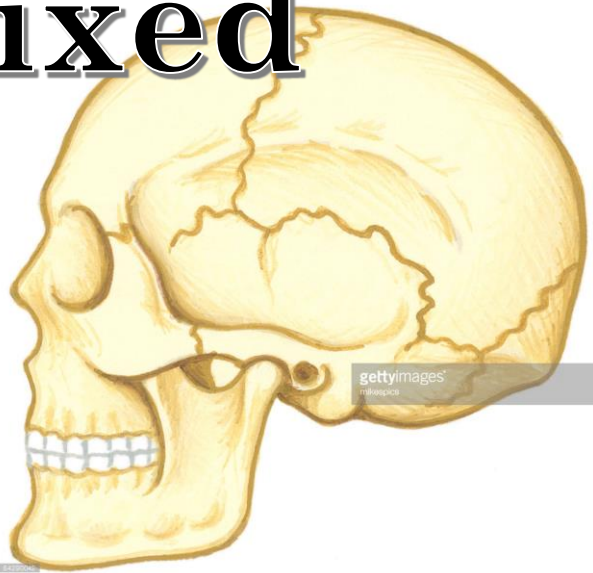
anatomy of joints - MBBS/BDS first year

Joints:

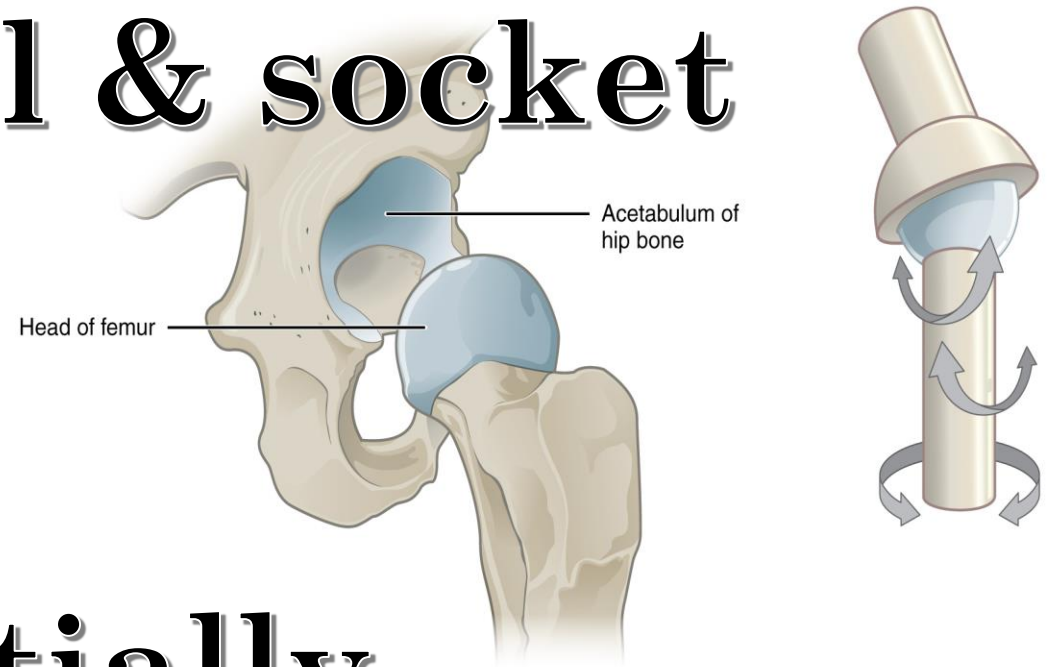
Hinge



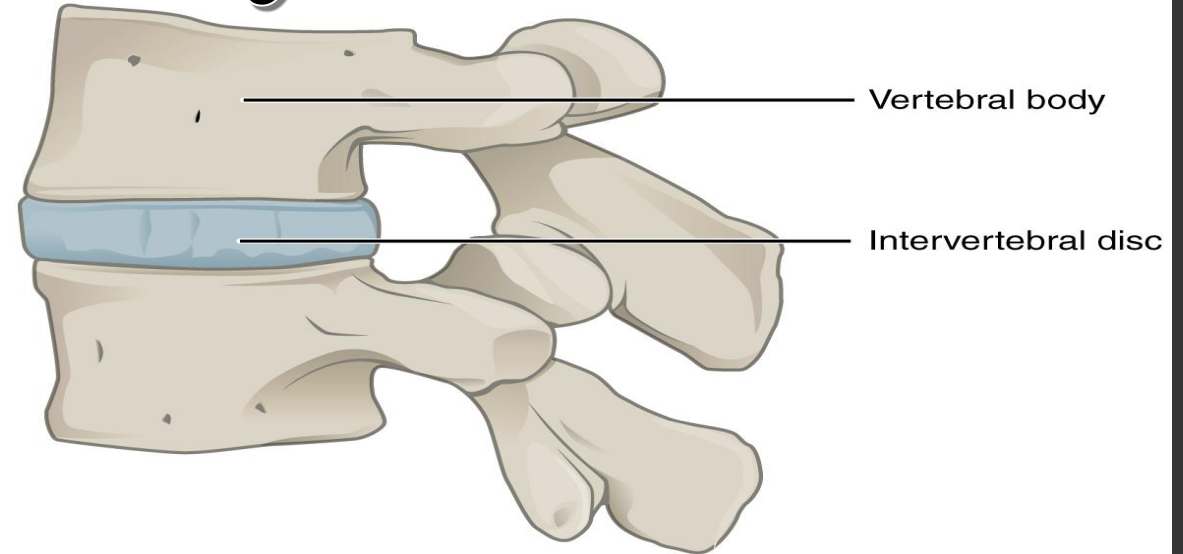
Fixed



Ball & socket



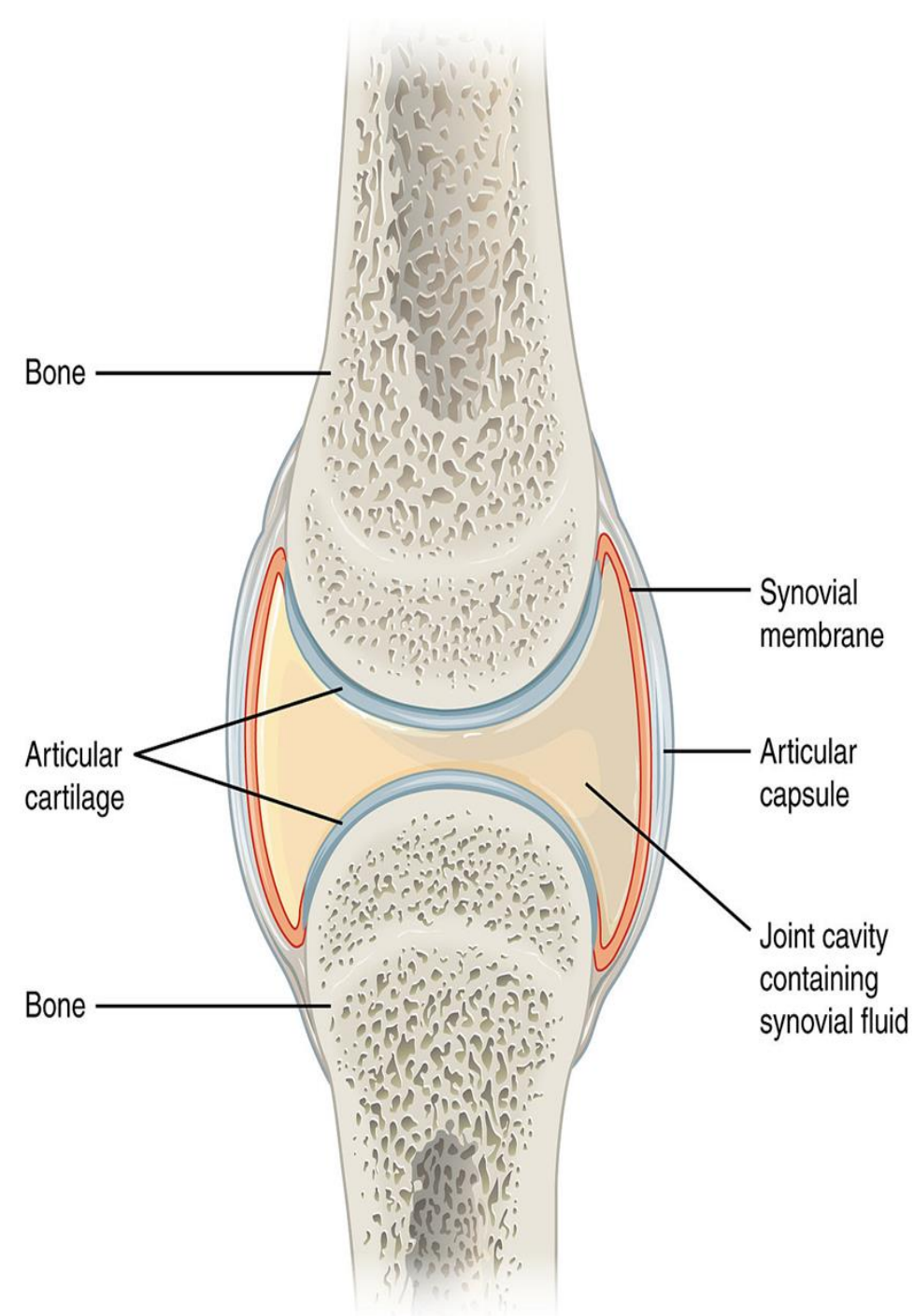
Partially



Lateral view

Movable joints

- Contain a liquid: Synovial fluid
- Oily and acts as a lubricant reducing friction between the ends of bones.
- Cartilage at each end of bone. (strong material but not brittle)
 - Shock absorber
- Joint held together by ligaments (run from one bone to the other across the joint)
 - resist stretching called **TENSILE** strength. Prevents dislocation at some point!



Muscles:

- Are organs that are attached to bones and move them by contracting, pulling on the bone.
- Tendons are found at the ends of muscles. It attaches muscle to bone.
 - have very high tensile strength, like ligaments. BUT ligaments are not very elastic. (DON'T stretch when muscle contracts).
- Muscles ONLY pull not push, they are not able to expand.
- When it is stretched it is relaxed (opposite of contracted)
- Work in pairs, Antagonistic muscles (BICEPS and TRICEPS.
- Place where muscles are attached to stationary bone is the ORIGIN.
- Where it is attached to the moving bone is called the INSERTION, when it contracts the insertion moves towards the origin.



