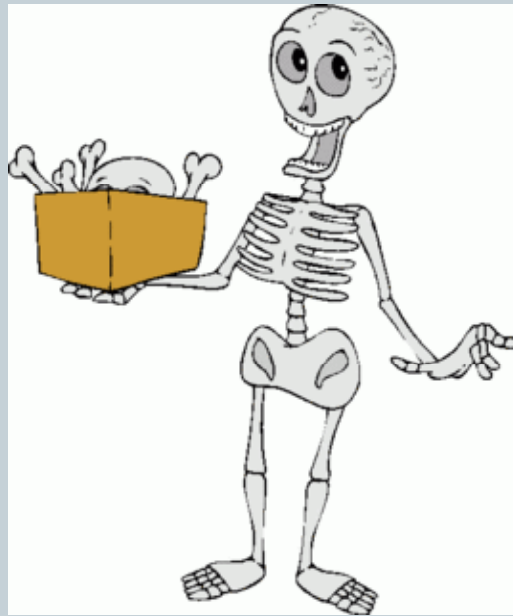
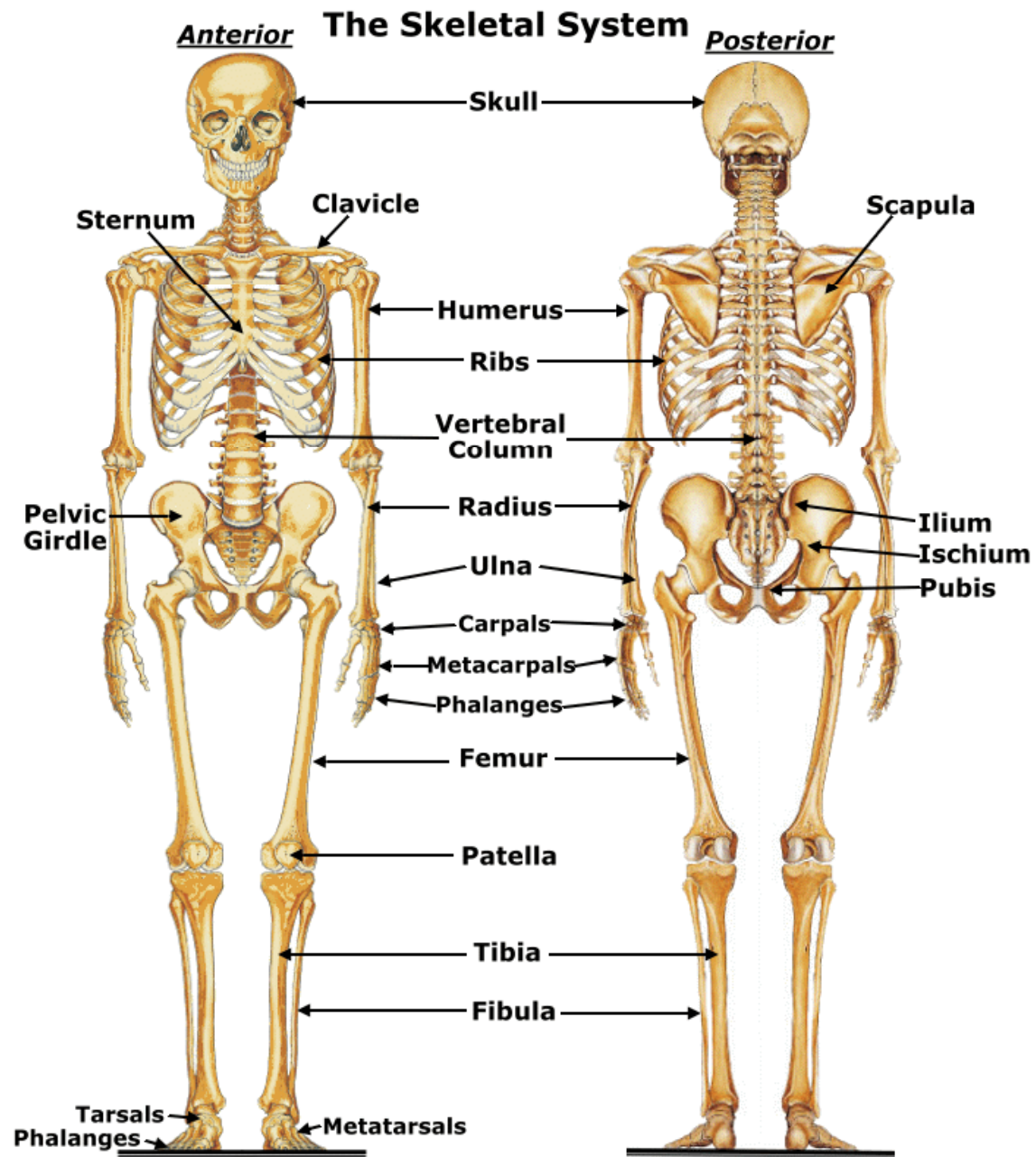


Osteology

1

BONES & CARTILAGES





Function

3

- Body shape
- Special organs protection
- Muscle attachments
- Ca & P elements storage
- Blood cell production



FRAMEWORK SUPPORT

MOVEMENT

PROTECTS

STORAGE

NEW BLOOD CELLS



Bone

5

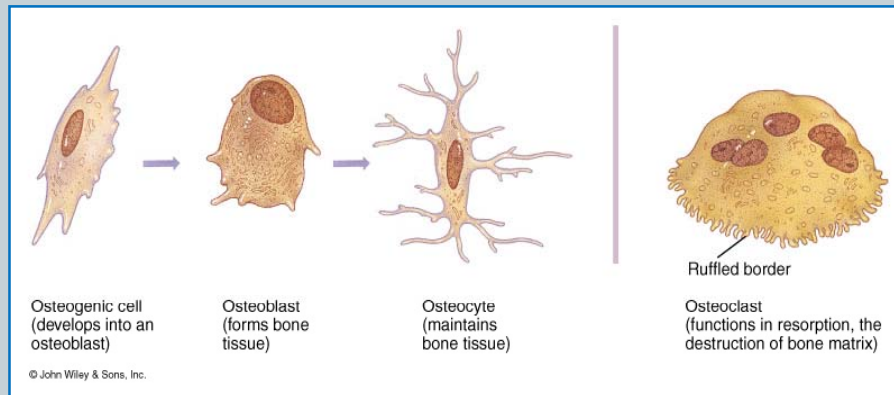
- Mineralized connective tissue

- Cells

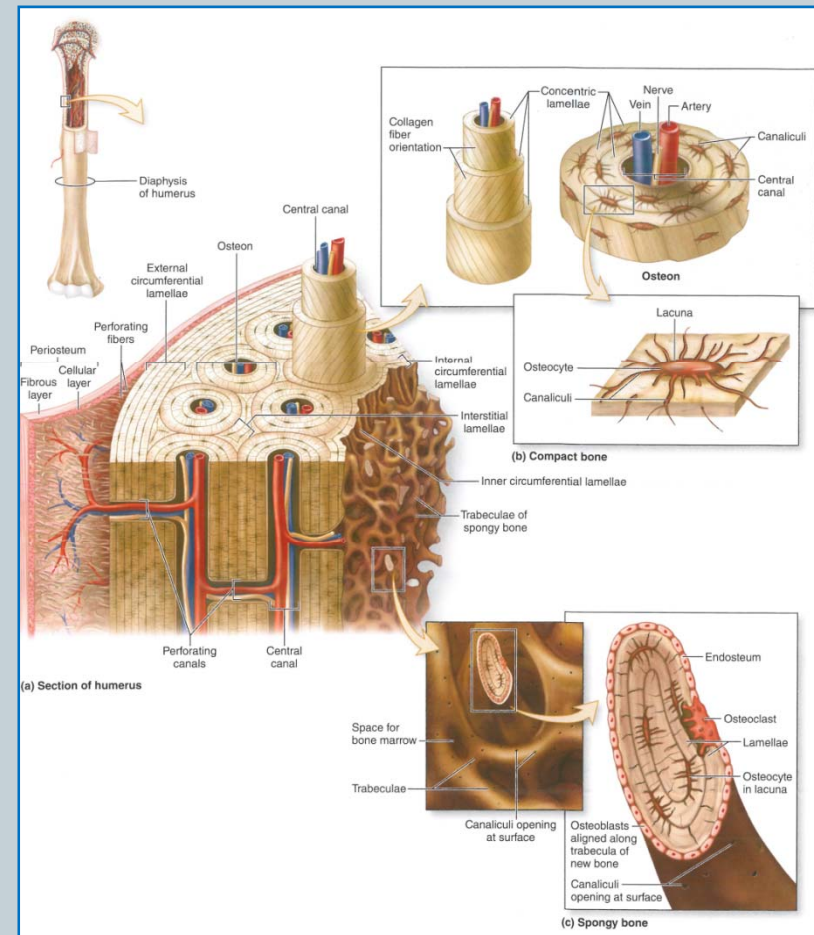
Osteocyte

Osteoblast

Osteoclast



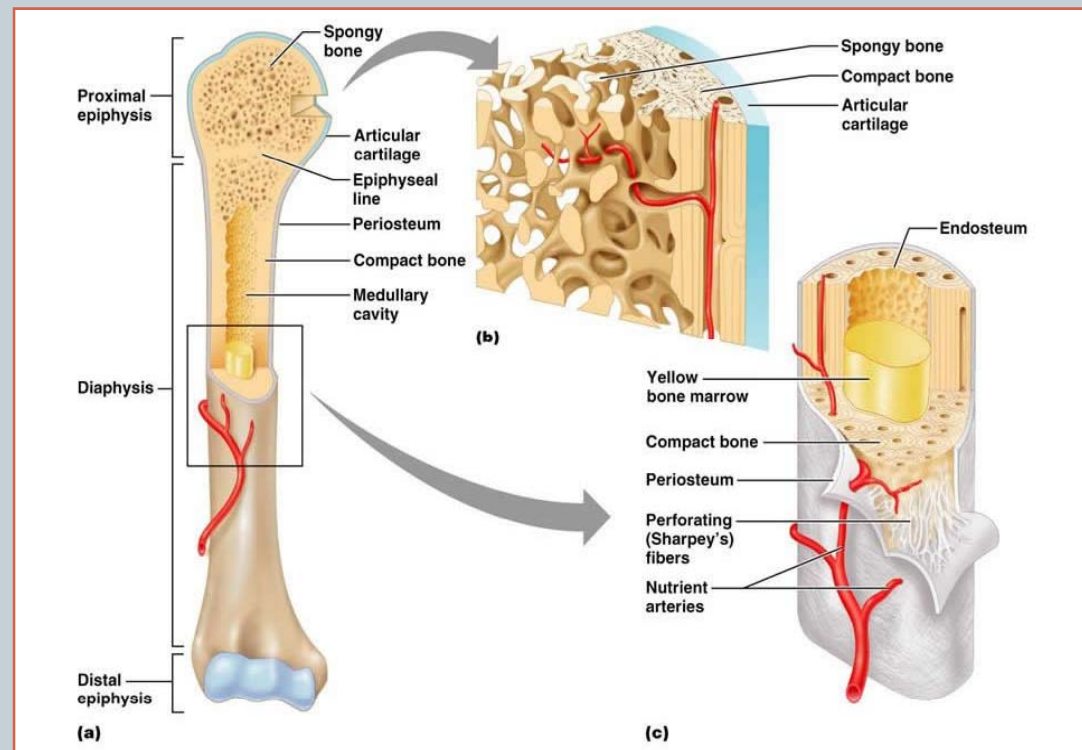
- High regeneration potential



Macroscopic classification

6

1. Compact Bone
 2. Spongy Bone
- **Long bone morphology**



Classification by Growth & development

7

- **Membranous**

Mesenchymal origin

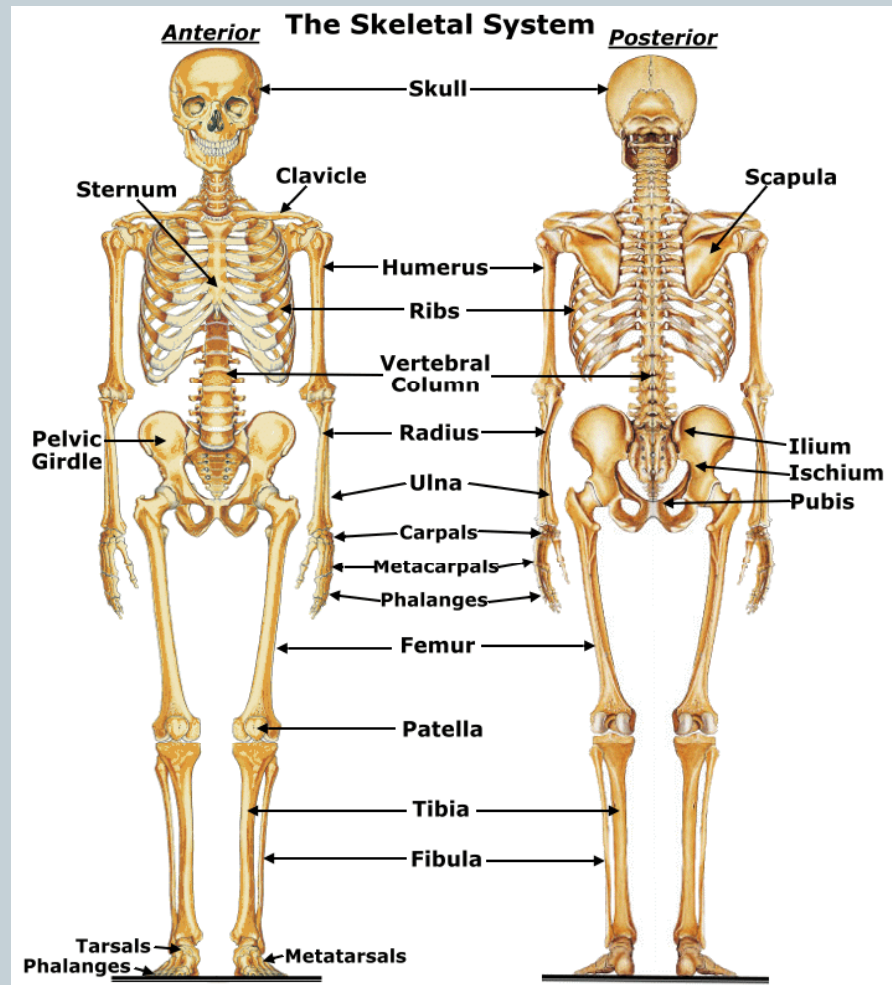
Face & calvaria

- **Cartilaginous**

Limb, vertebrate, ...

- **Membranous- Cartilaginous**

Sphenoid, clavicle, mandible



Classification by position

Axial Skeleton

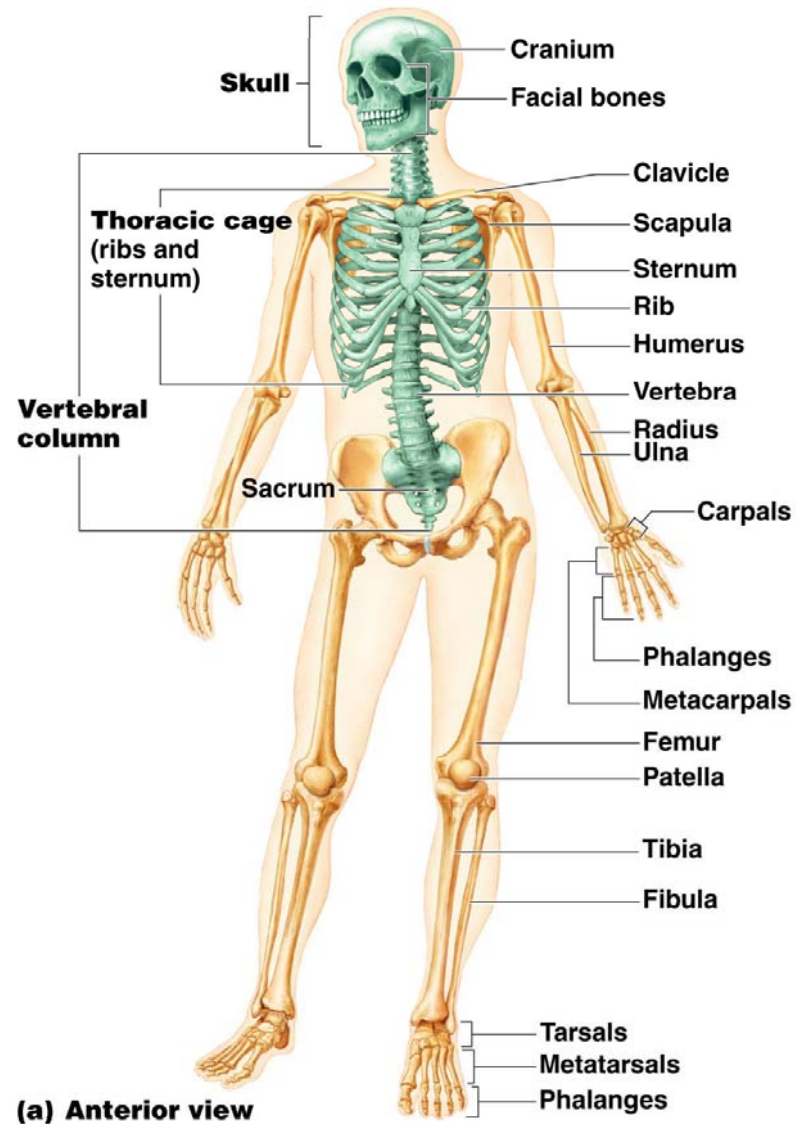
Appendicular



Classification by position

Axial Skeleton

Appendicular

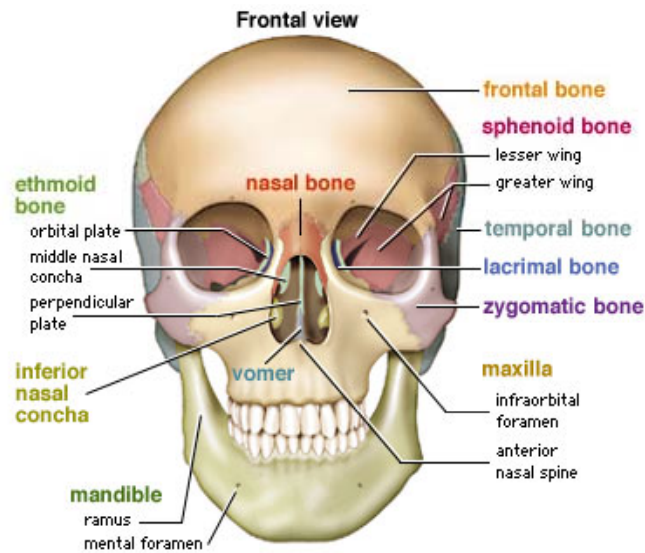


Copyright © 2009 Pearson Education, Inc., publishing as Pearson Benjamin Cummings.

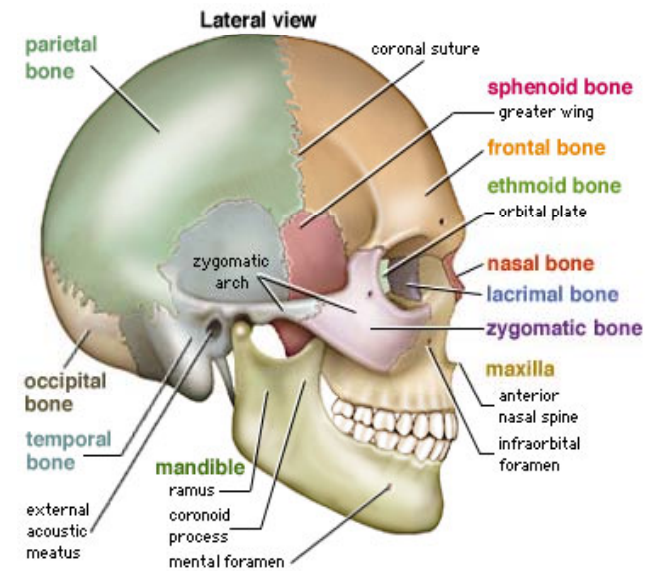
Skull

10

- Brain
- Eye
- Ear
- Olfactory cells



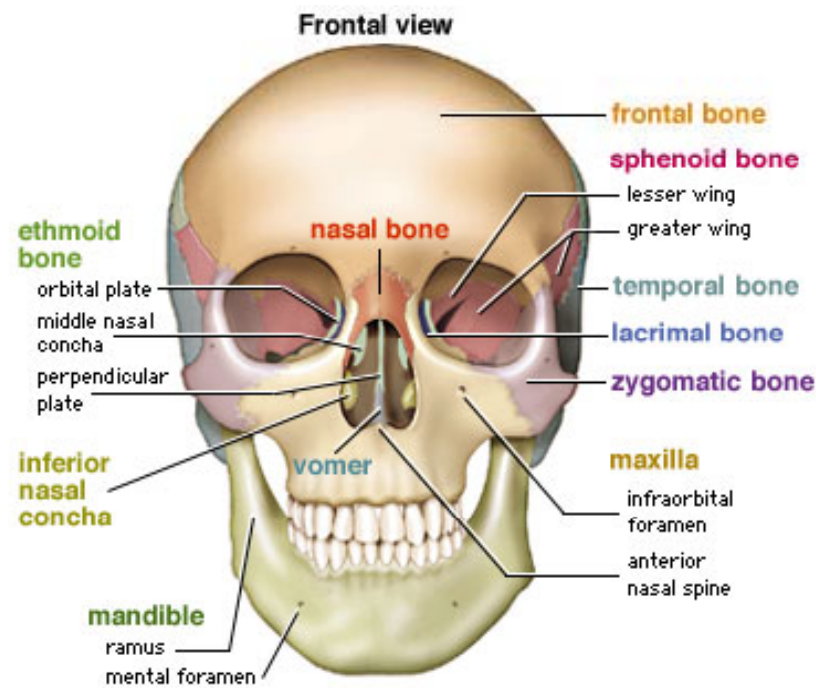
© 2003 Encyclopædia Britannica, Inc.



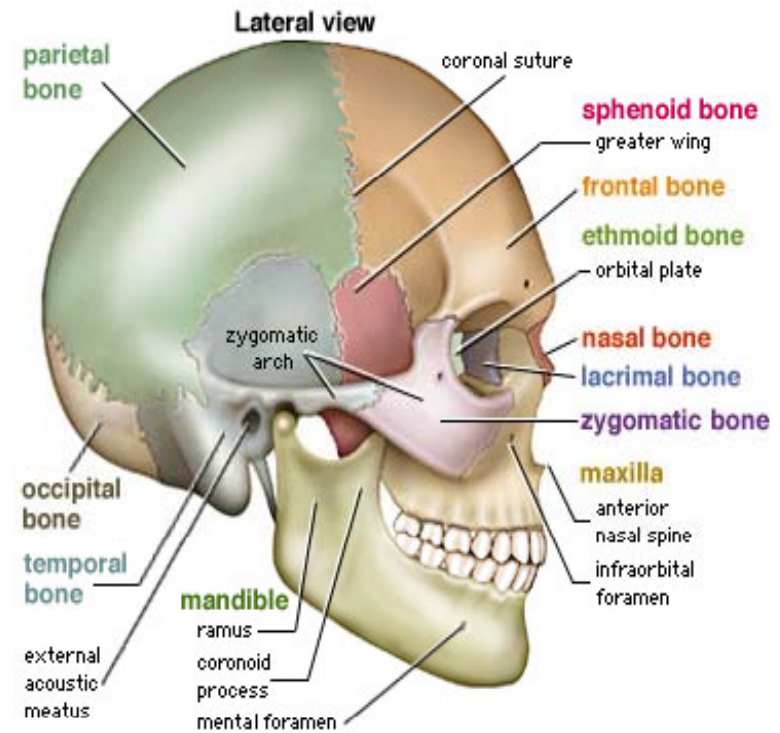
Skull

11

1. Viscero cranium (14 bones)
2. Neuro cranium (8 bones)



© 2003 Encyclopædia Britannica, Inc.



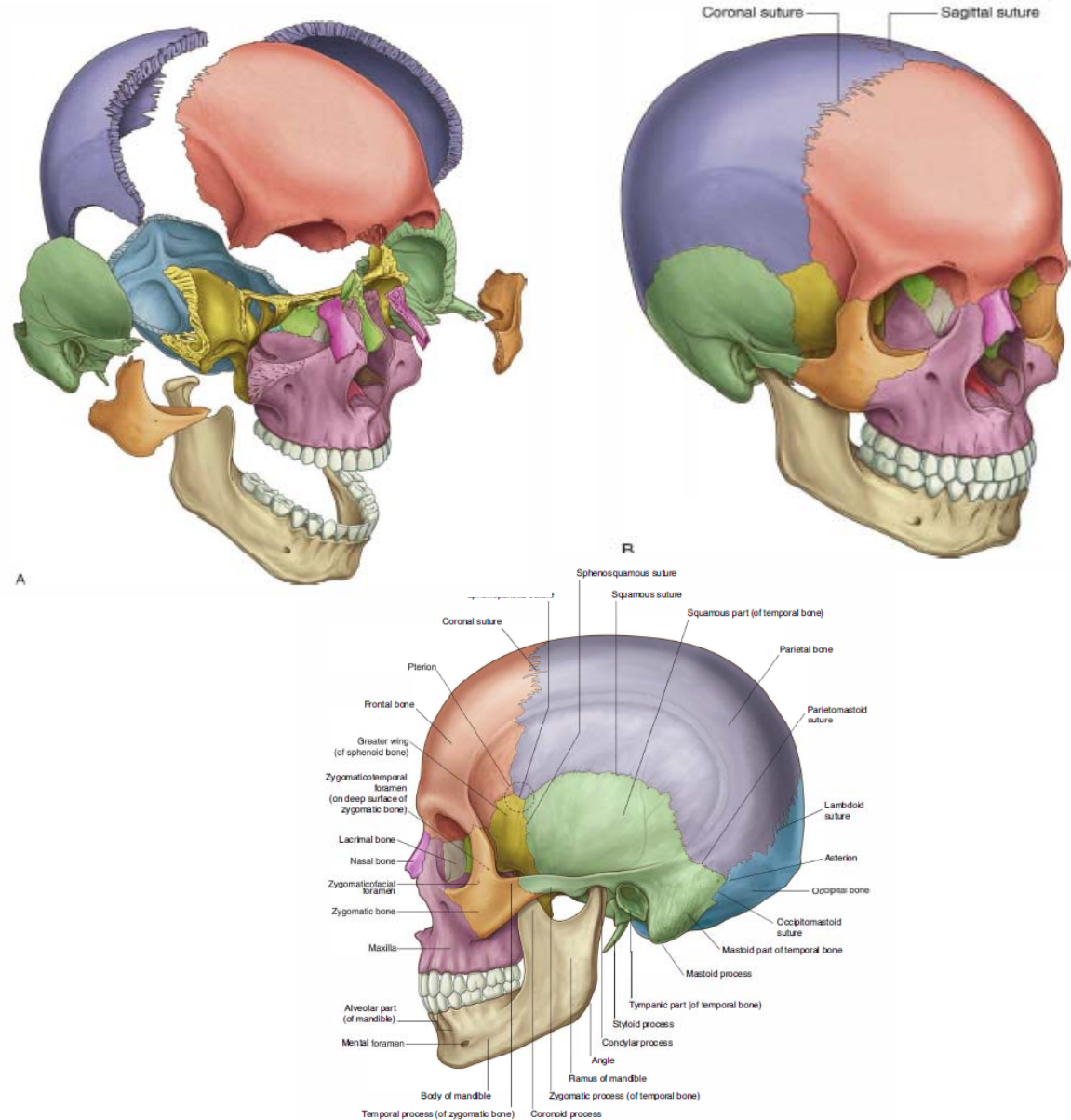
Skull bones

Even bones

- Parietal
- Temporal

Odd bones

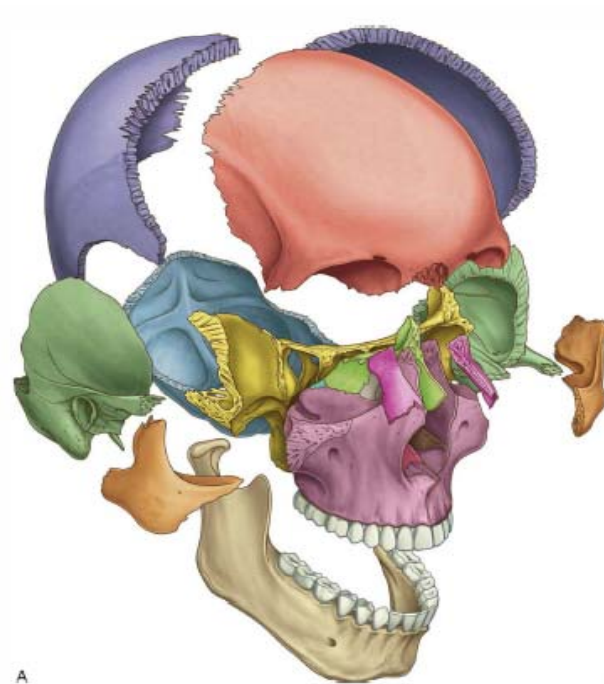
- Frontal
- Occipital
- Sphenoid
- ethmoid



Face even bones

13

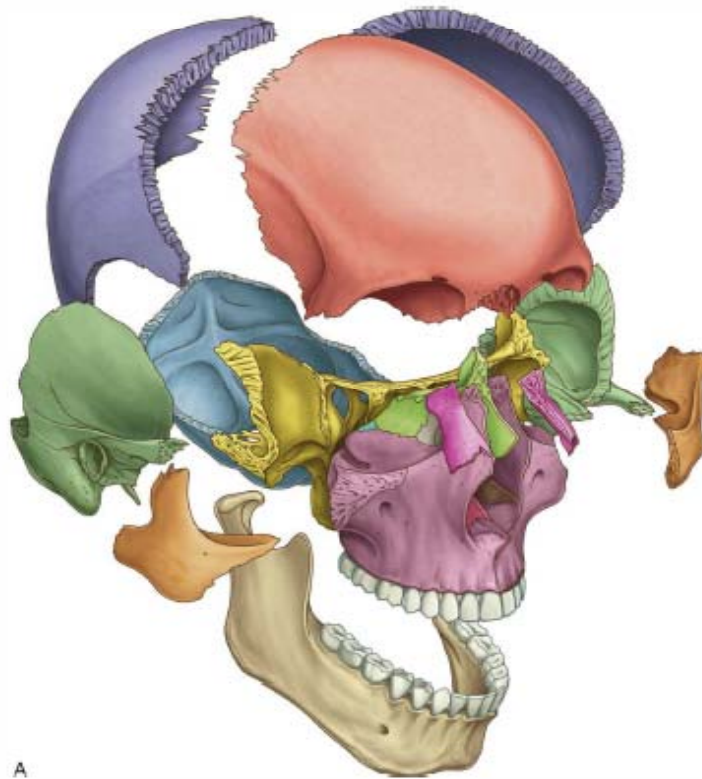
- Maxilla
- Zygomatic
- Nasal
- Palatine
- Lacrimal
- Inferior concha



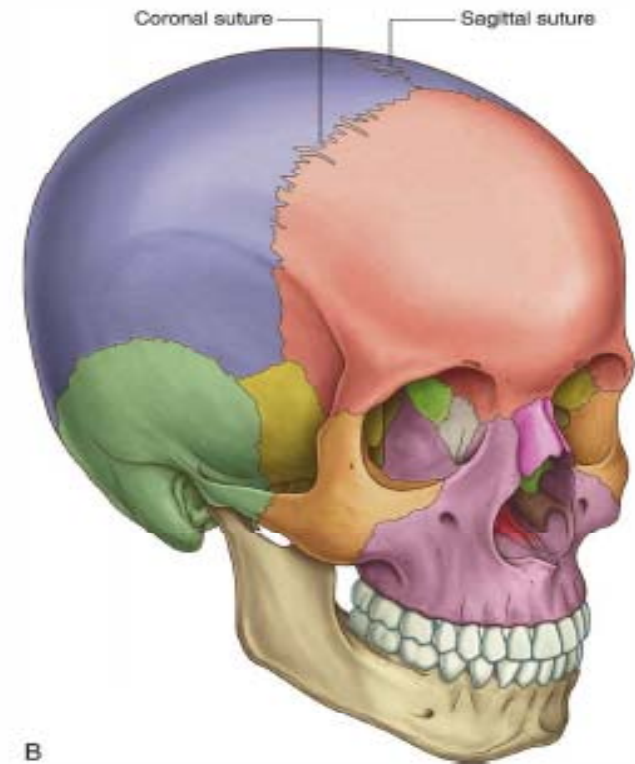
Face odd bones

14

- Mandible
- Vomer



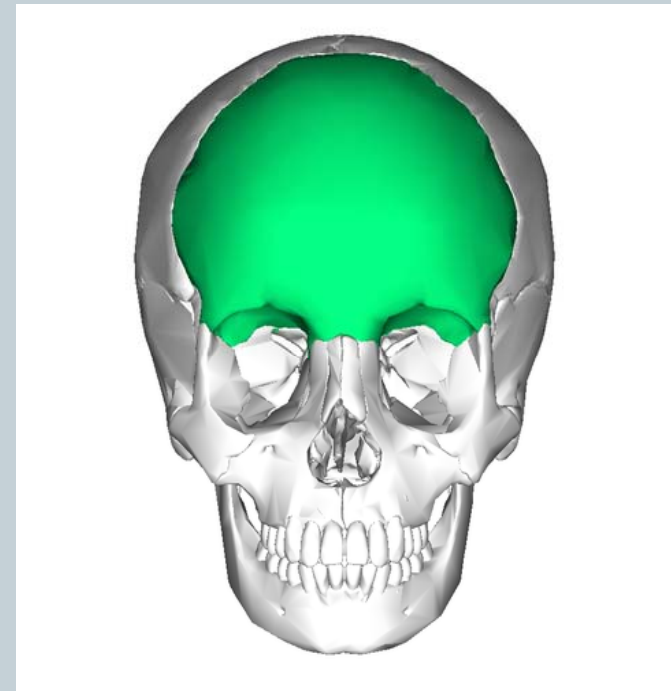
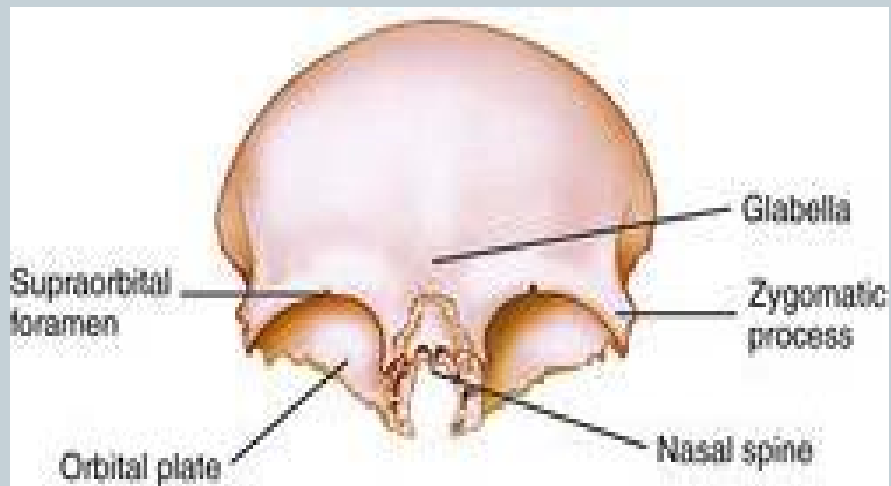
A



B

Frontal bone

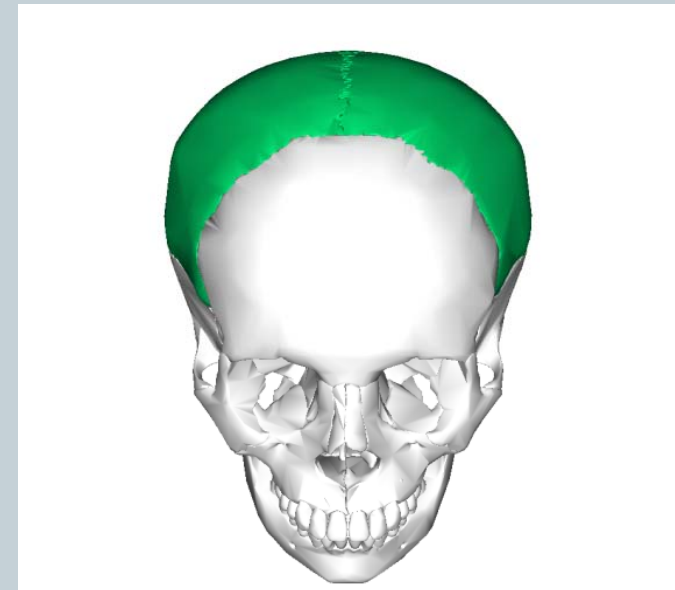
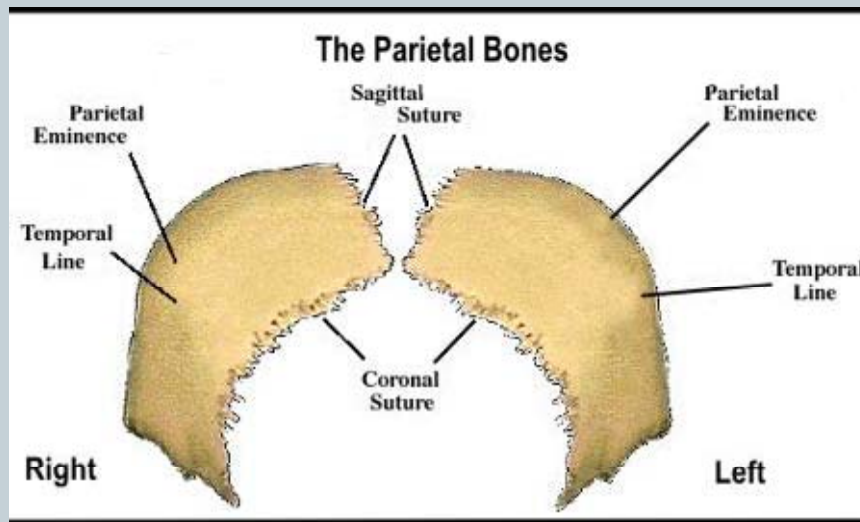
1. Vertical (squamous) part
2. Horizontal (orbital) part
3. Nasal part



- Horizontal plate (orbit roof & ant. Cranial fossa)

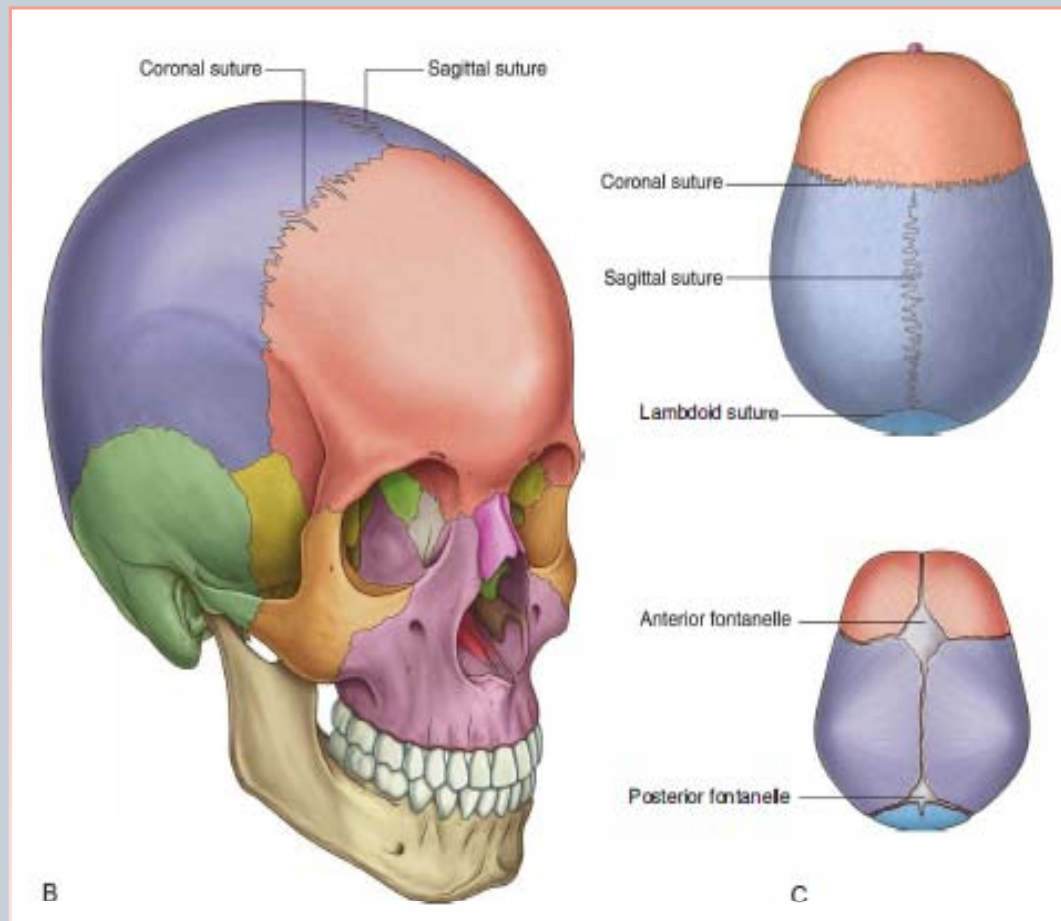
Parietal bone

- Roof & lateral part of skull
- Surface (internal & external)
- 4 borders
- 4 angles



Parietal bone

- Sagittal suture
- Frontal suture
- Lambdoid suture



Occipital bone

- Posterior part of skull
- skull floor (Posterior part)

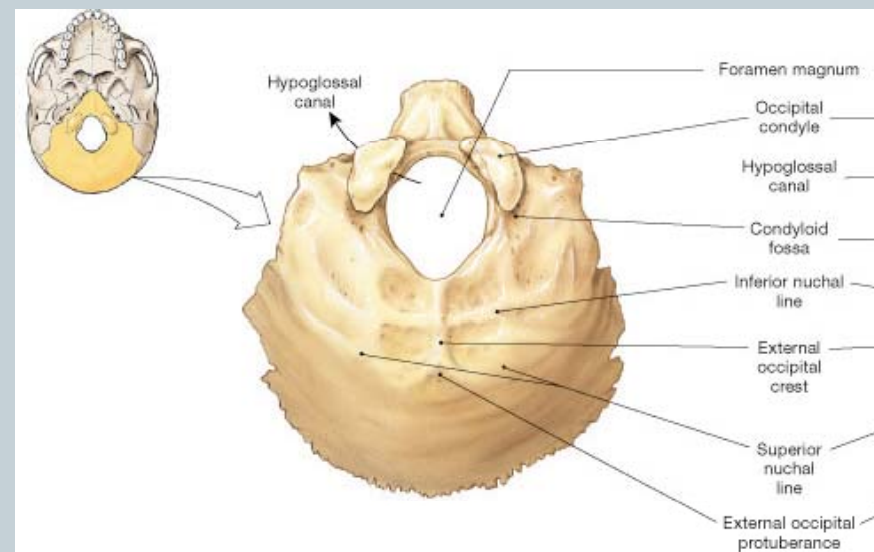
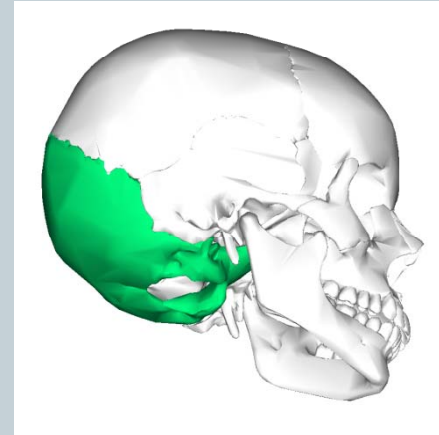
Squamous part

Basilar part

- Foramen magnum

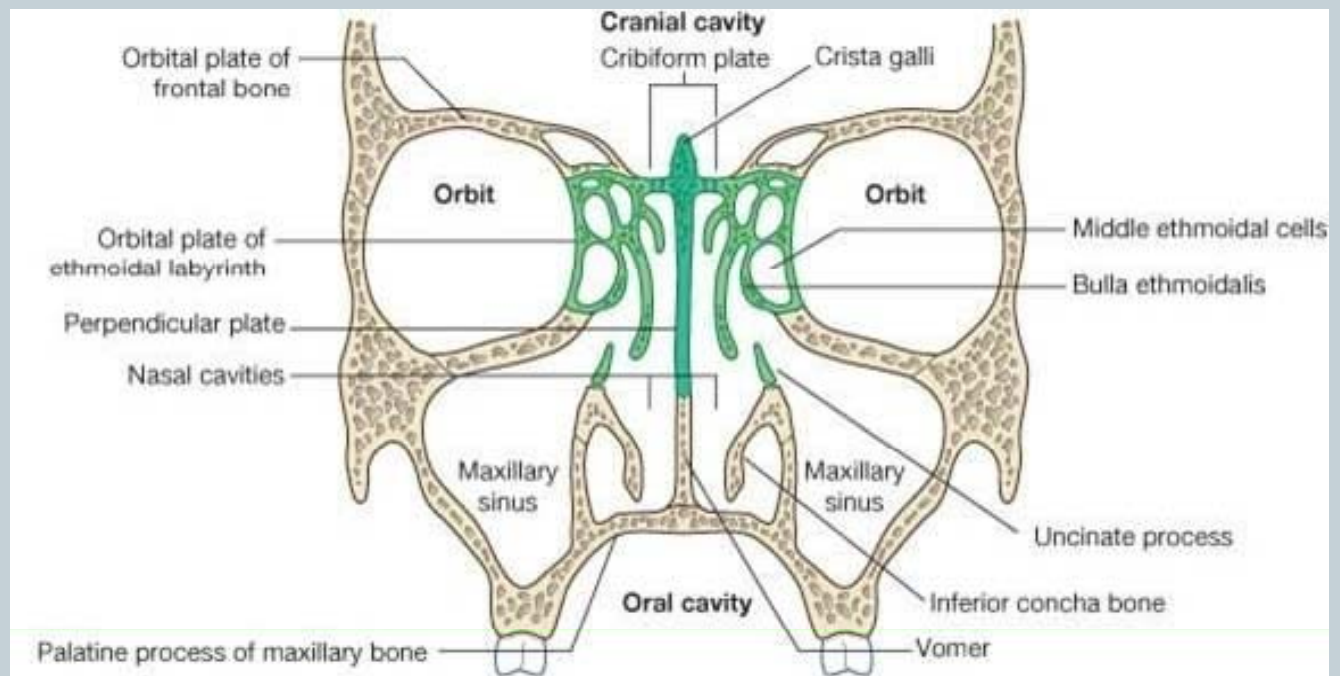
Lateral part

- Superior surface
- Inferior surface (condyle)



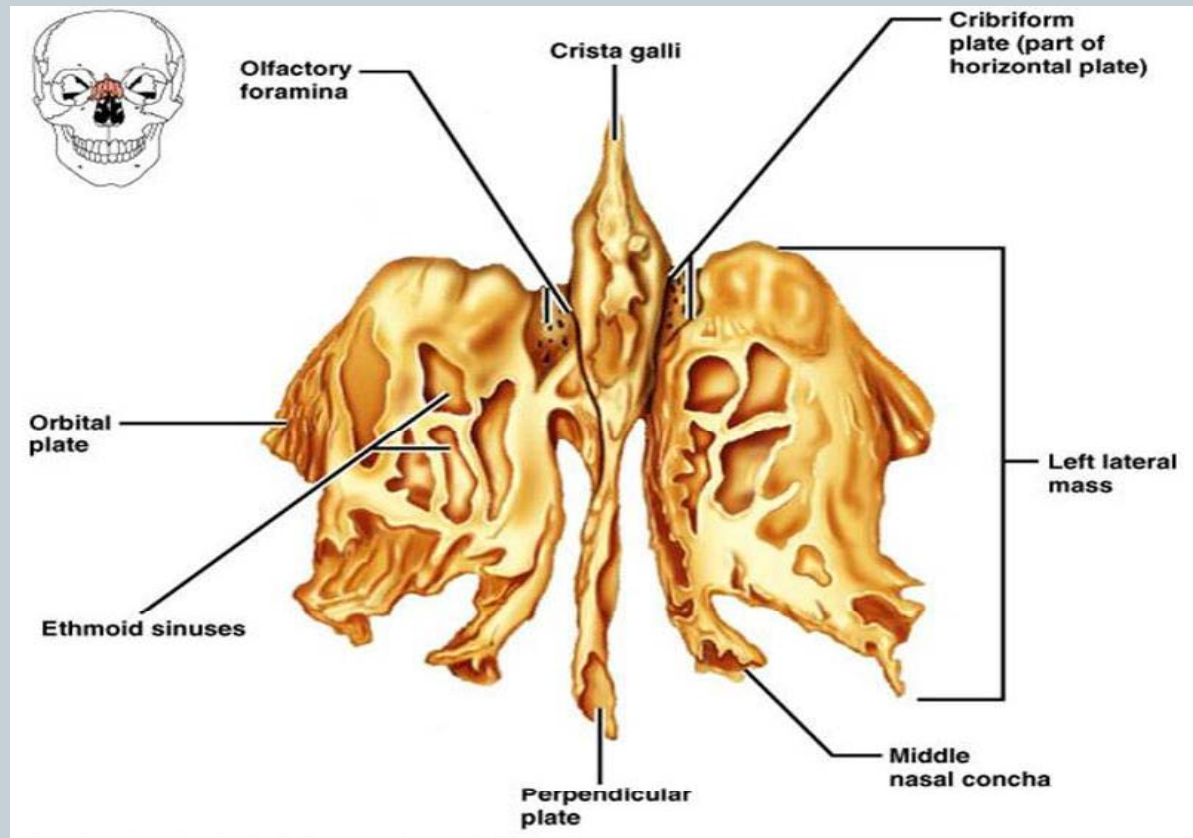
Ethmoid bone

- Between frontal & sphenoid bones
- Skull floor
- Interior wall of Orbit
- Nasal wall



Ethmoid bone

1. Cribriform (horizontal) plate
2. Perpendicular plate
3. Labyrinths

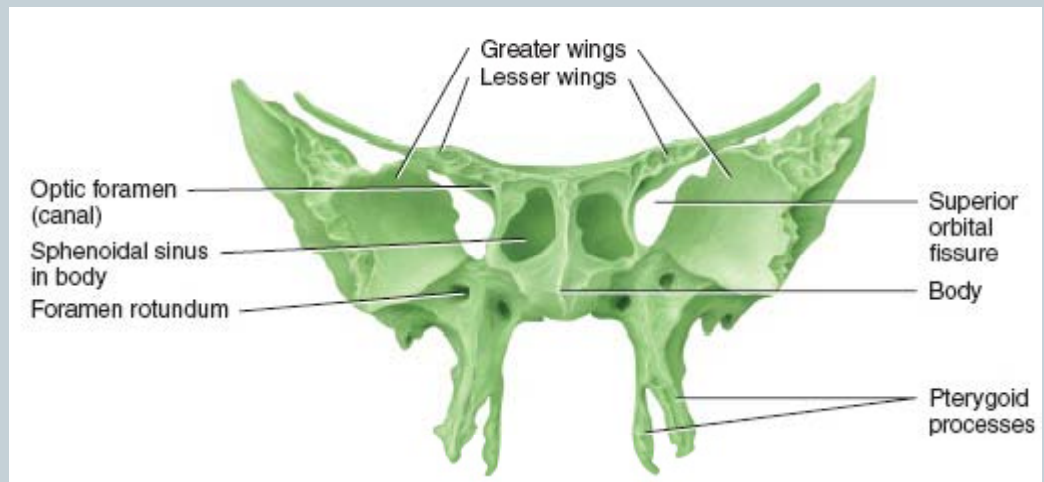


Sphenoid bone

- Basal part of skull
- Temporal & Infra temporal
- Orbit

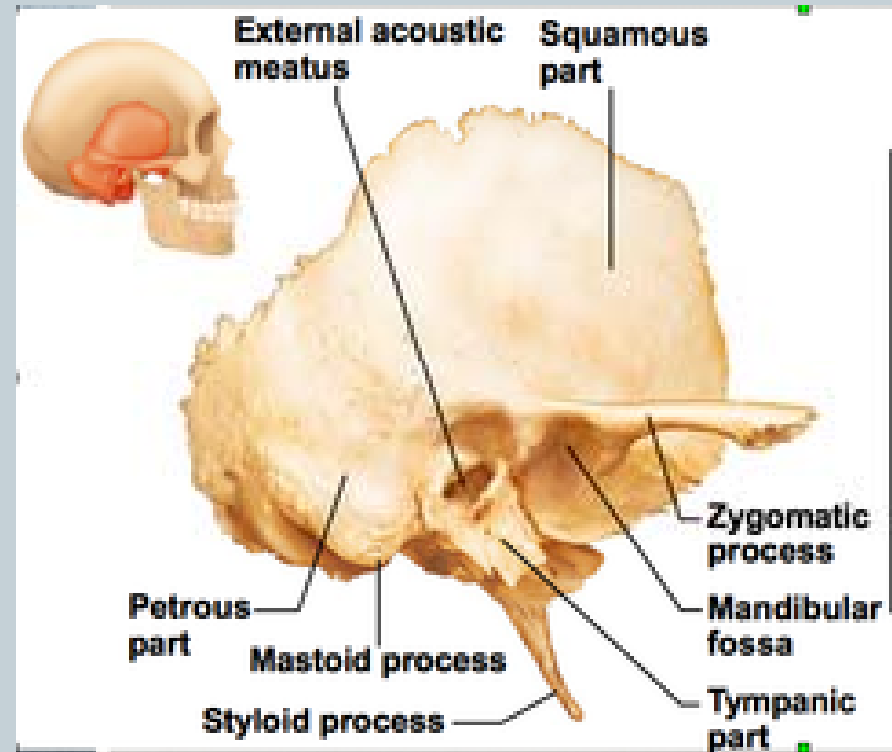
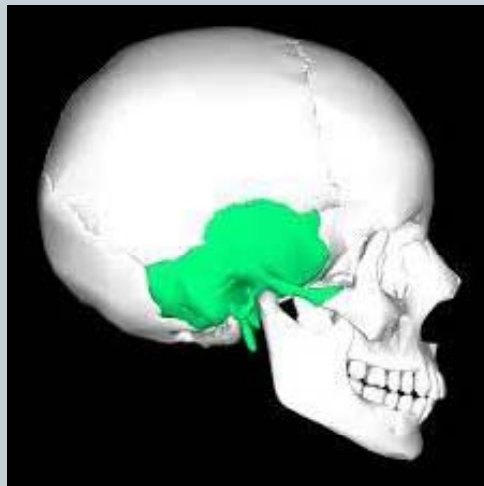
- Body
Sella turcica (hypophis)
sphenoid synus

- Greater wings
- Lesser wings
- Pterygoid process



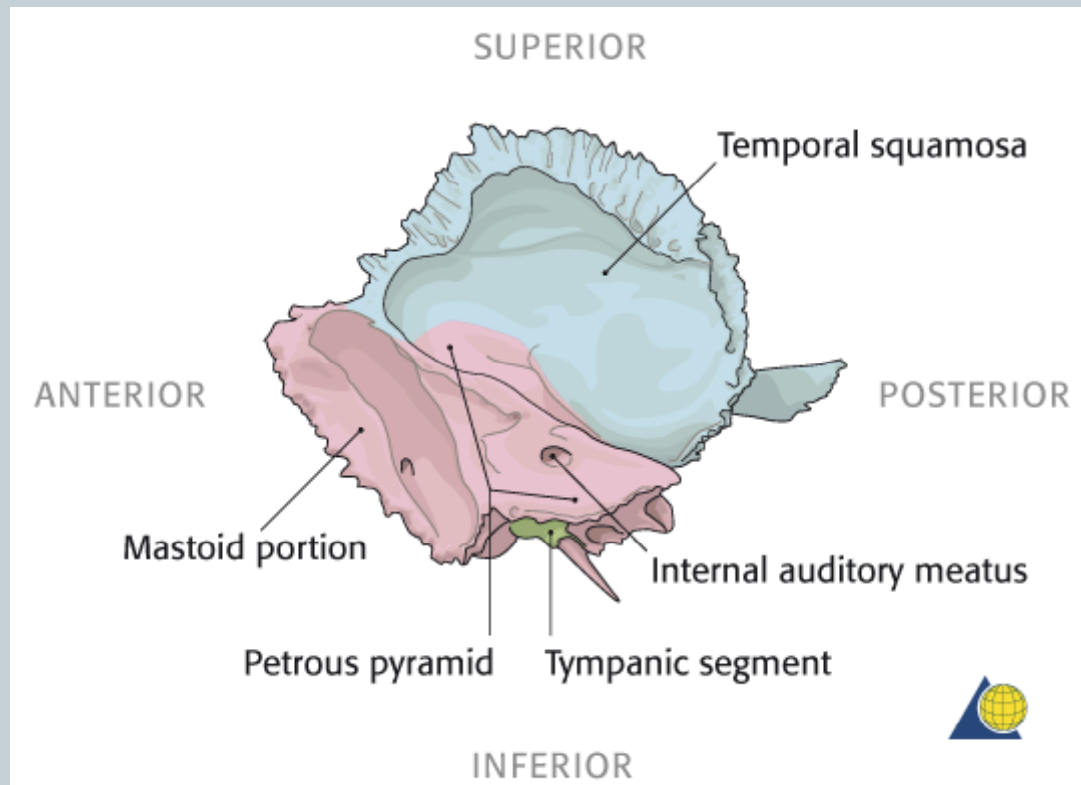
Temporal bone

- Lateral & basal part of skull
1. Squamous part (zygomatic process)
 2. Petrous part
 3. Mastoid part
 4. Tympanic part
 5. Styloid part



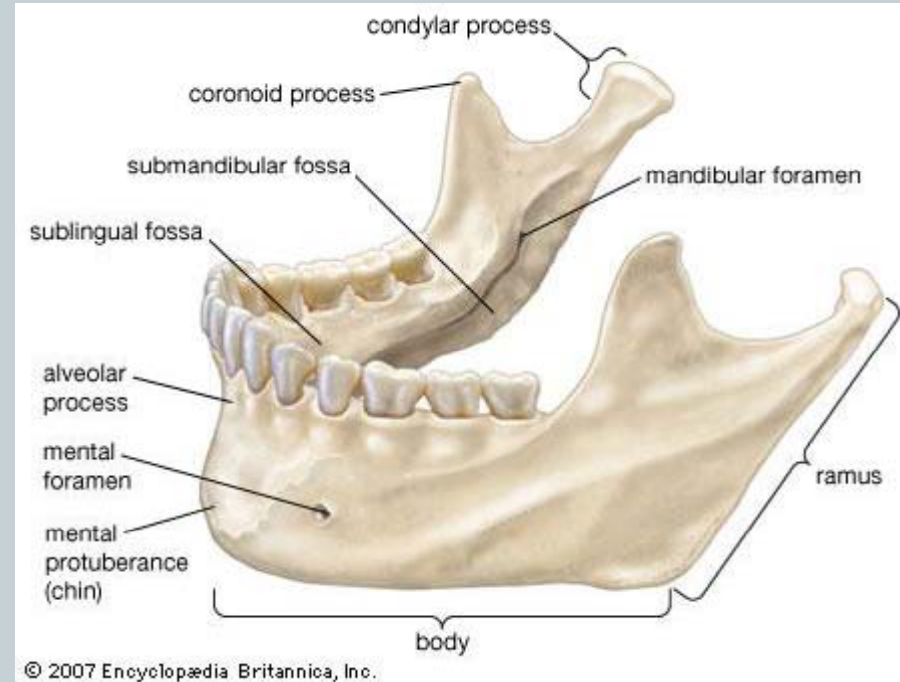
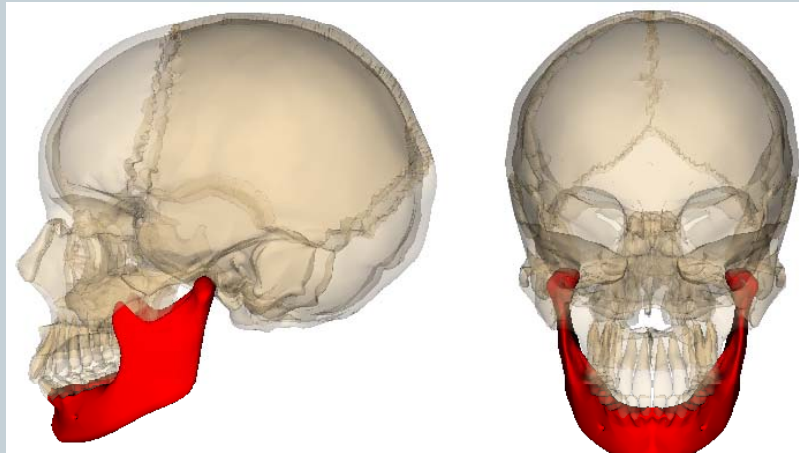
Temporal bone

- Lateral & basal part of skull
1. Squamous part (zygomatic process)
 2. Petrous part
 3. Mastoid part
 4. Tympanic part
 5. Styloid part



Mandible bone

- Body
- Ramus



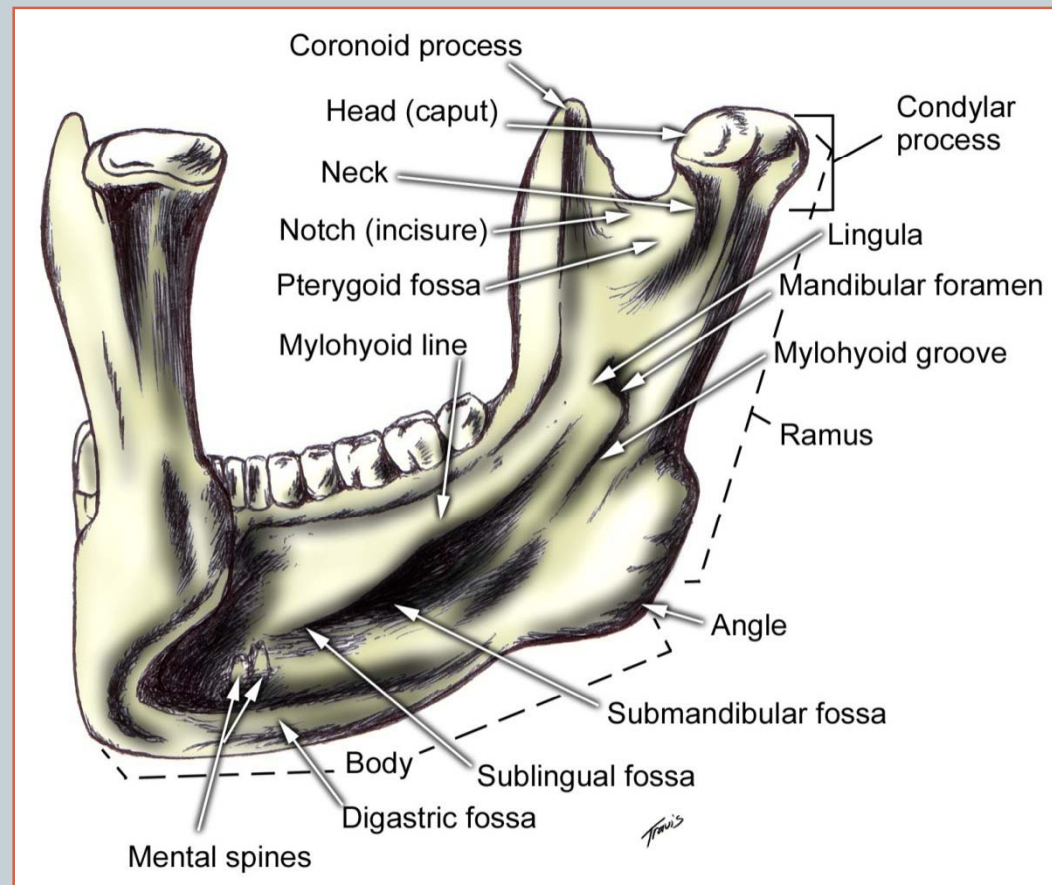
Mandible bone

Ramus

Masseter muscle

Temporal muscle

Condylod (TMJ)



Maxilla bone

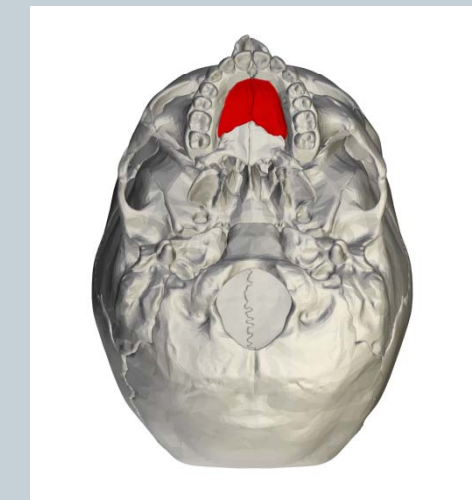
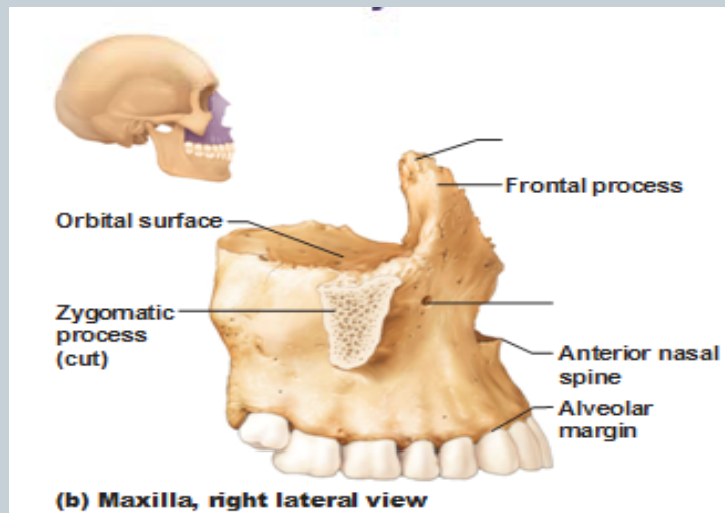
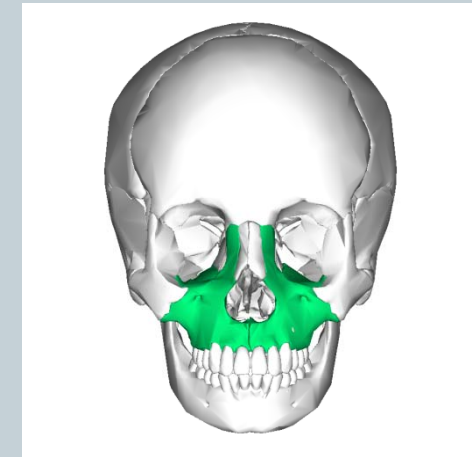
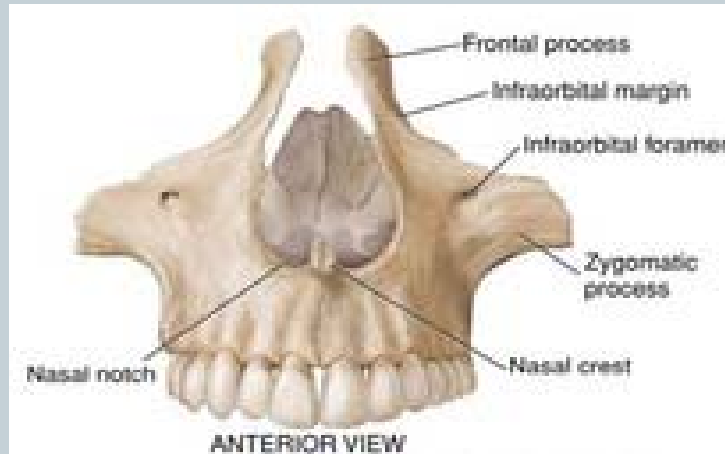
- Body
- 4 processes

- **body**

Maxillary sinus

Processes:

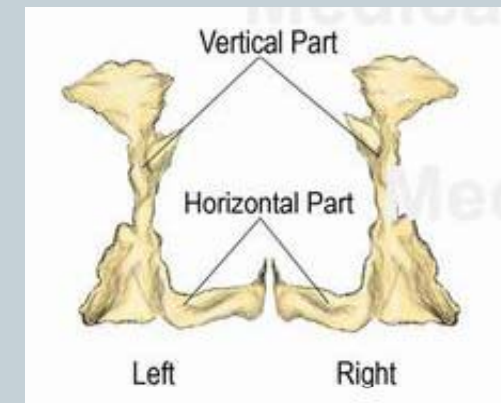
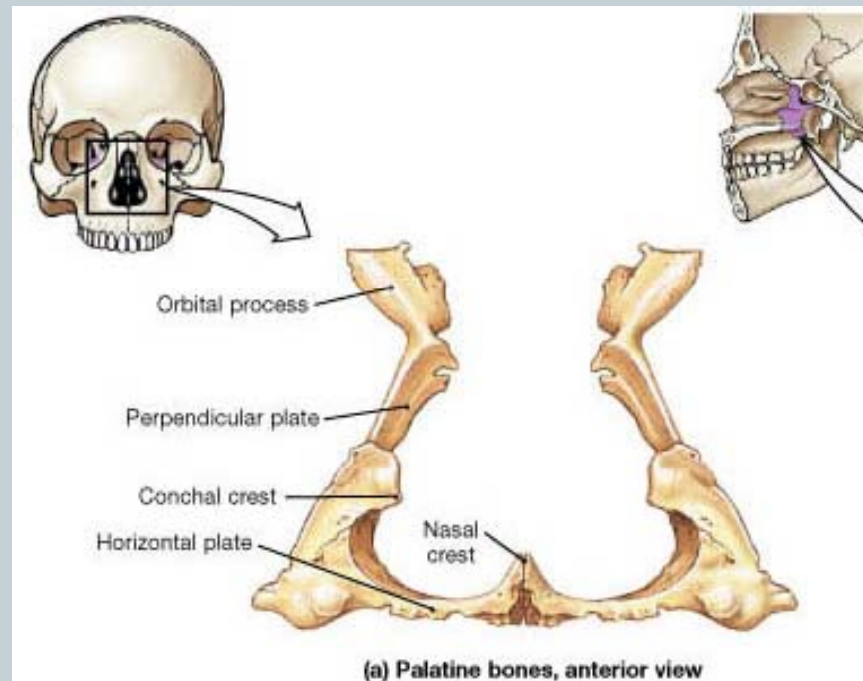
- Frontal process
- Zygomatic process
- Alveolar process
- Palatine process



Palatine bone

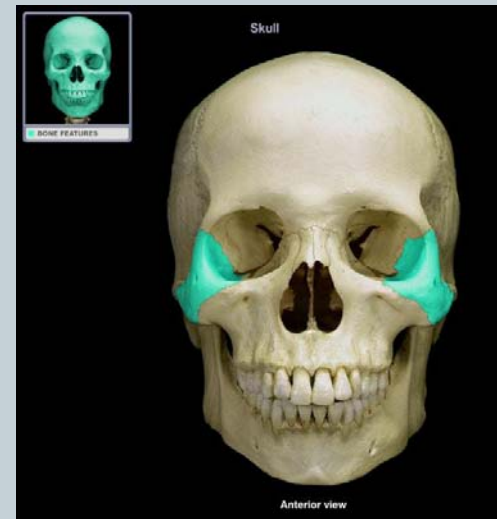
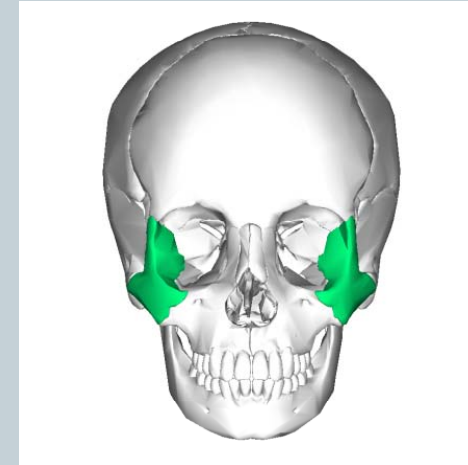
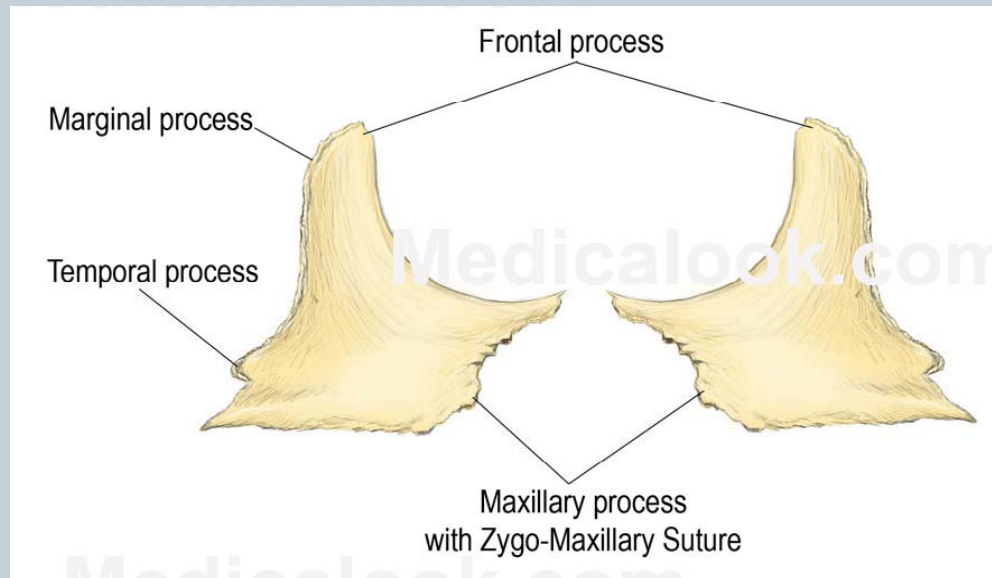
- L shape
- Floor & lateral wall of nose
- Mouth roof
- Orbit

• 2 plates
Horizontal
Perpendicular



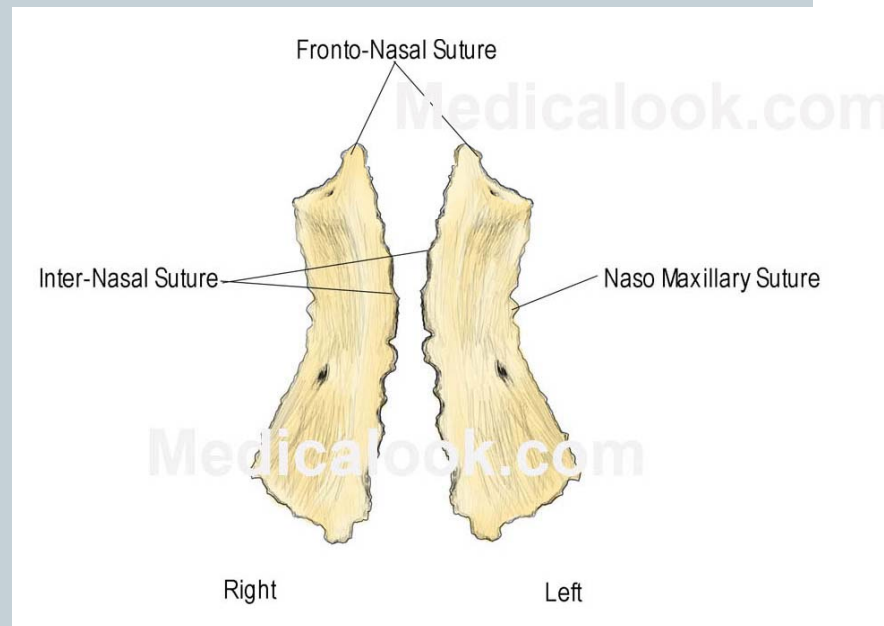
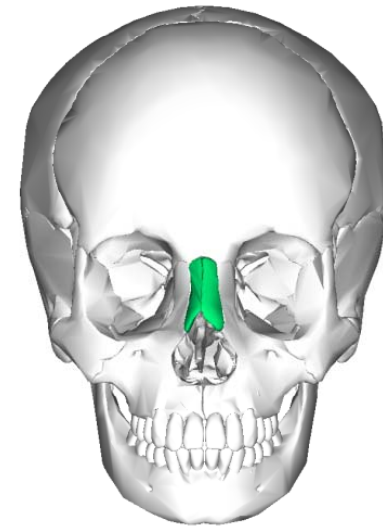
Zygomatic bone

- Orbit Lateral wall & floor
- Temporal & infra temporal fossa



Nasal bone

- Nasal bridge
- Very thin bone

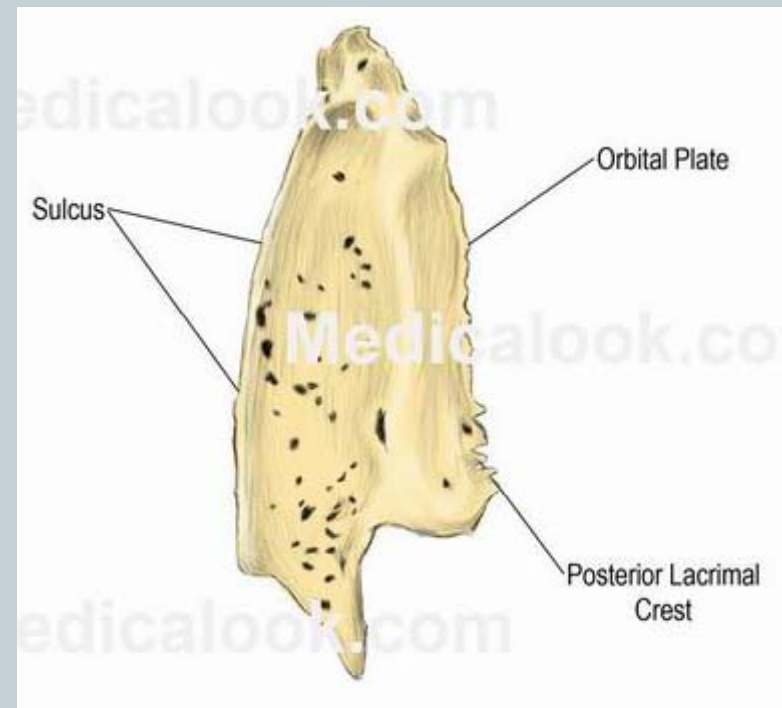
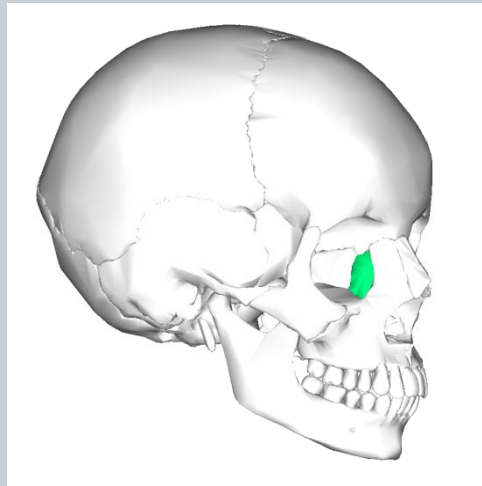


Lacrimal bone

- Orbit medial wall
- Nose lateral wall

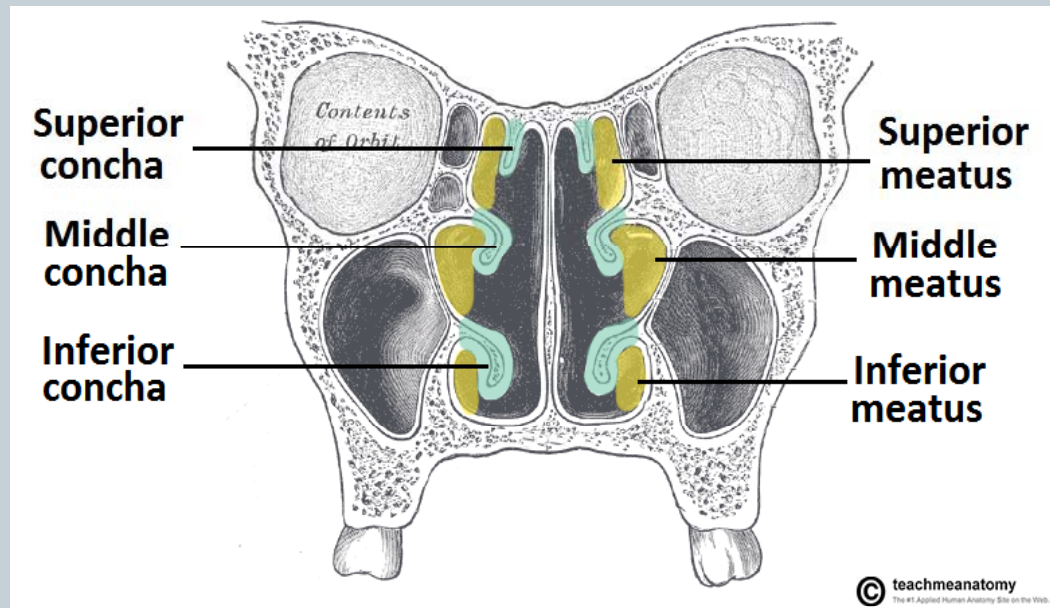
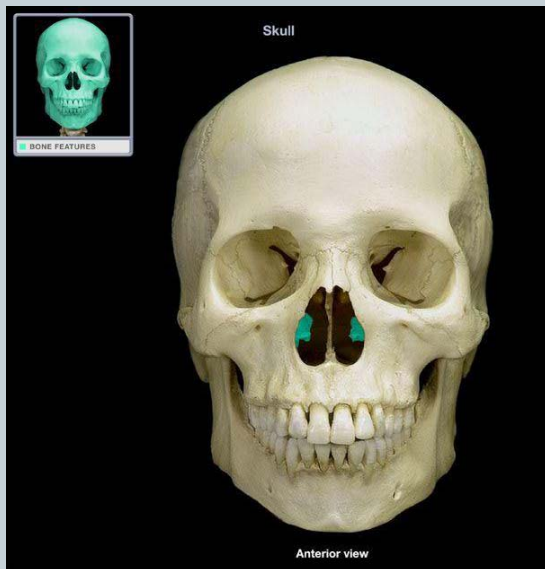
Surface

Lacrimal groove



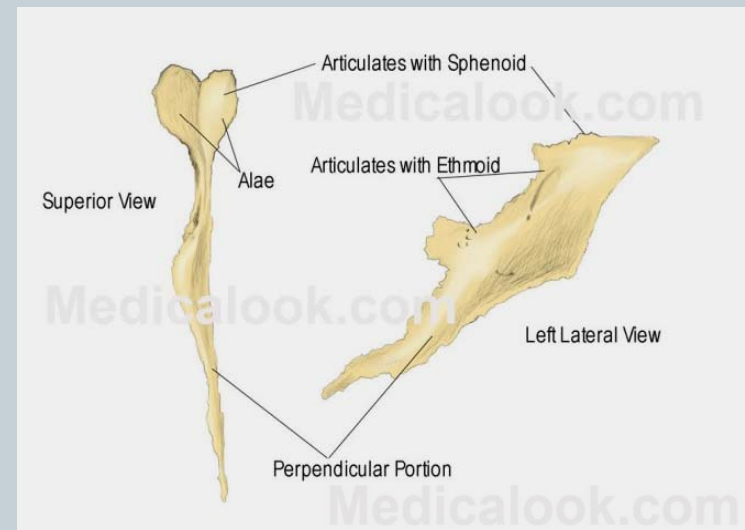
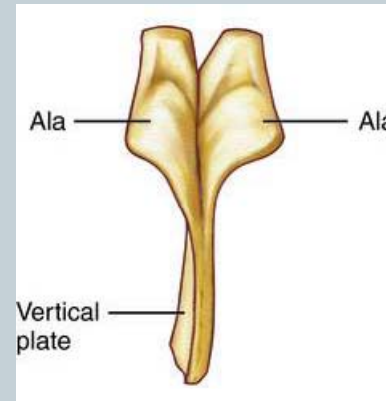
Inferior concha

- Nasal Lateral wall (Inferior part)
- Superior concha (ethmoid)
- Middle concha (ethmoid)



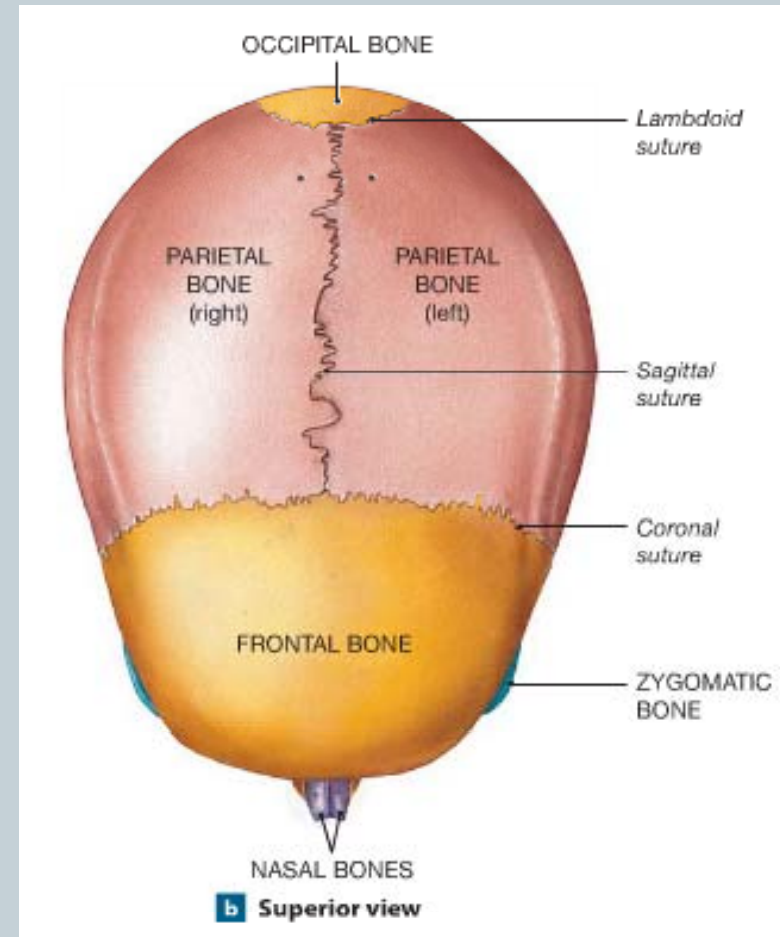
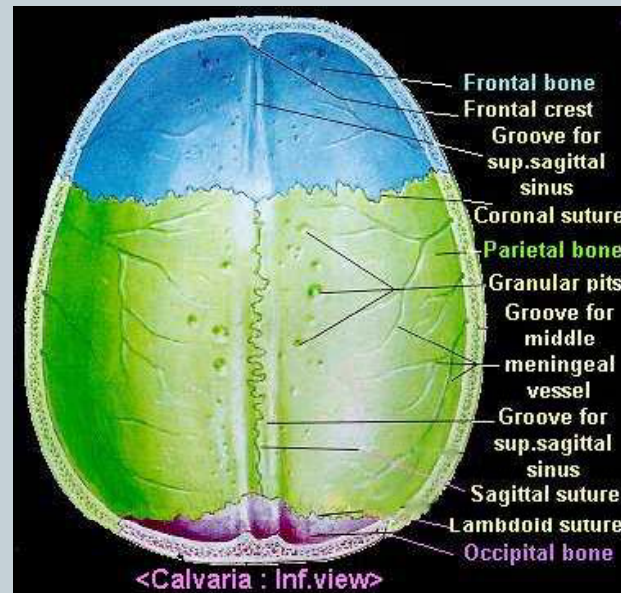
Vomer bone

- Postero inferior part of nasal septum

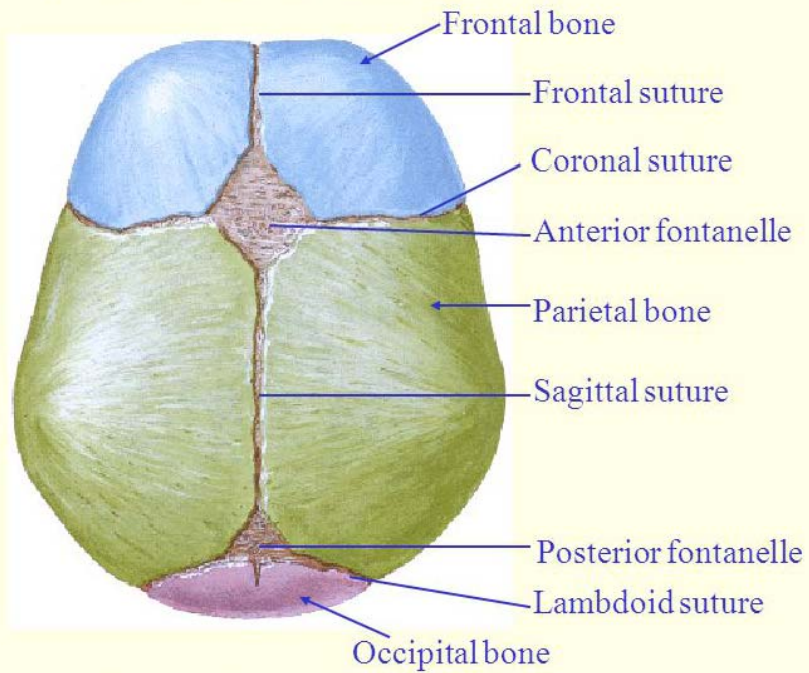


Skull norma verticalis (superior)

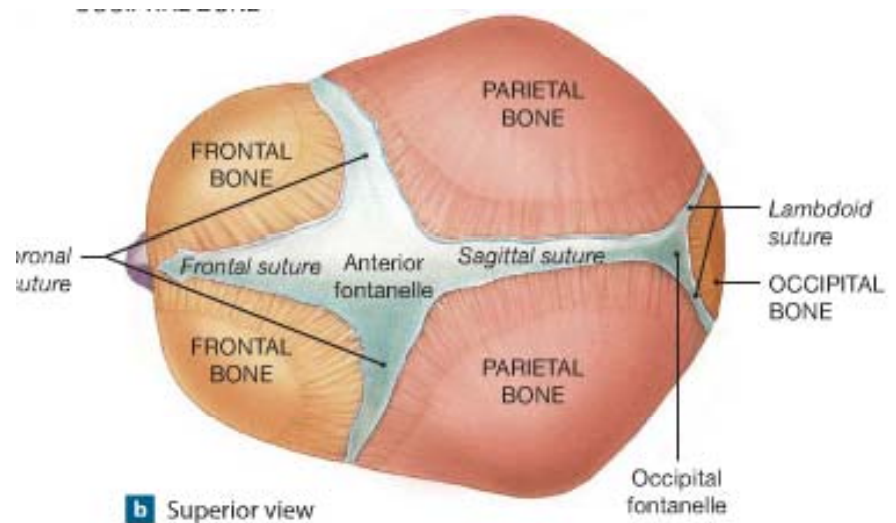
- Oval shape
- Bone
 - Frontal
 - Occipital
 - Parietal
- suture
 - Coronal (frontal)
 - Sagittal
 - Lambdoid



IV. The Skull at Birth



Superior view



Skull norma frontalis

- Bone:

Frontal

Maxilla

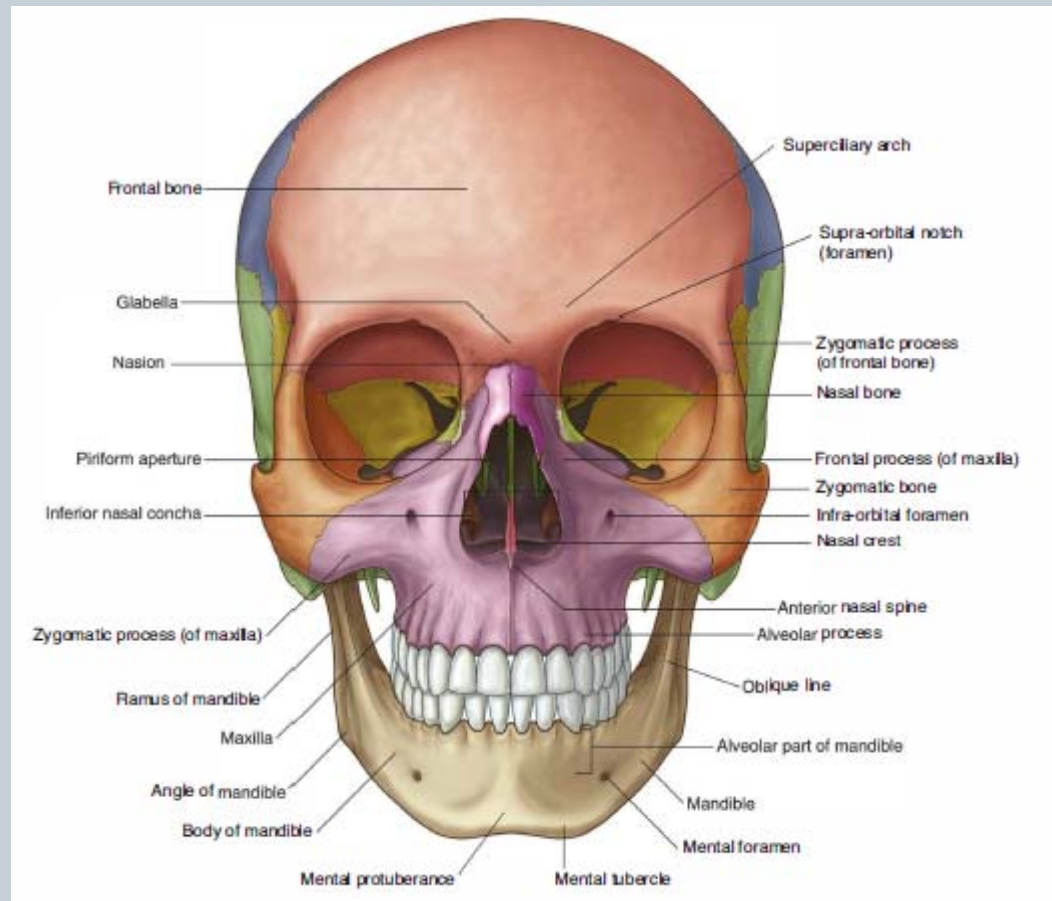
Zygomatic

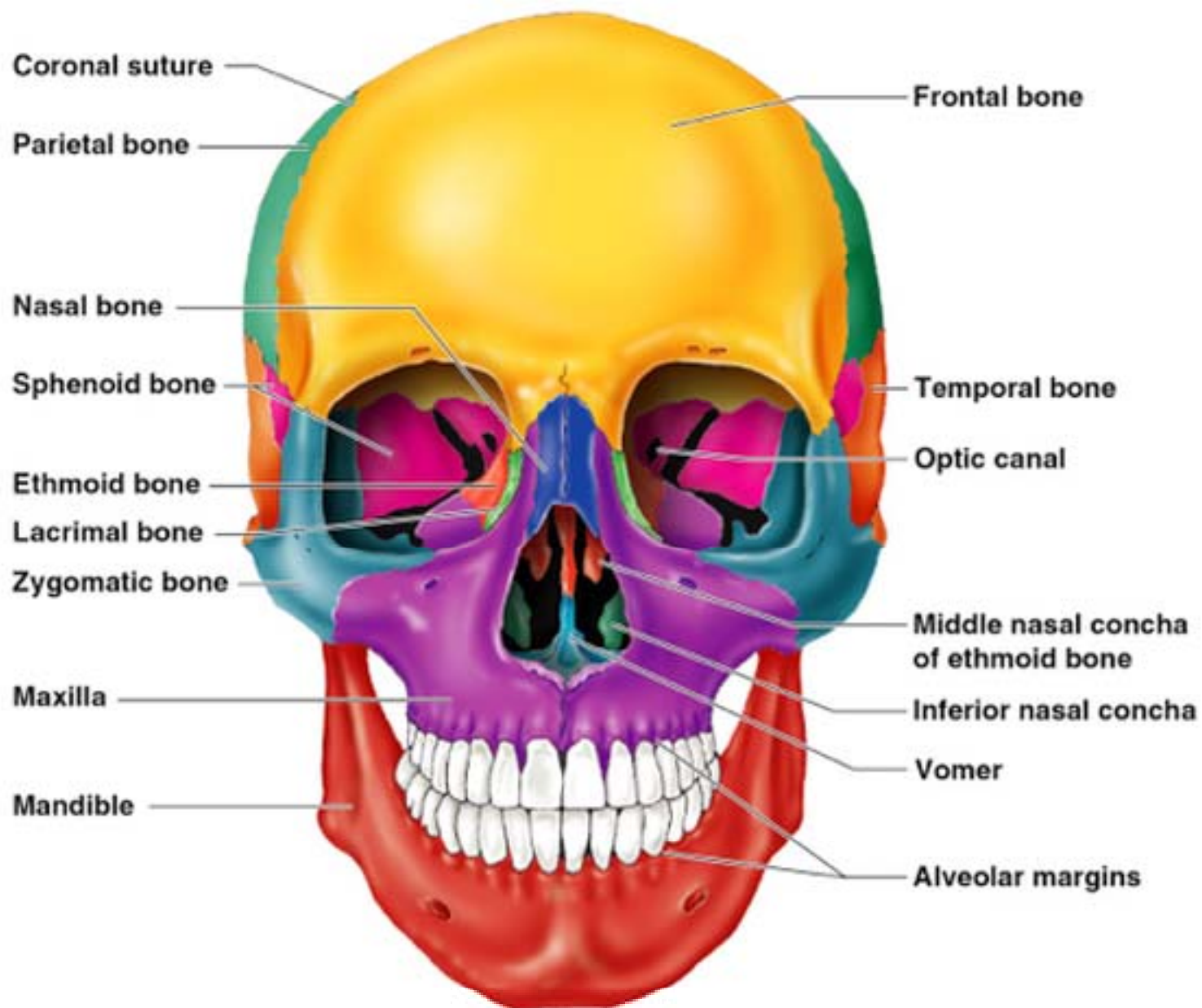
Nasal

Mandible

Nasal fossa

Orbit



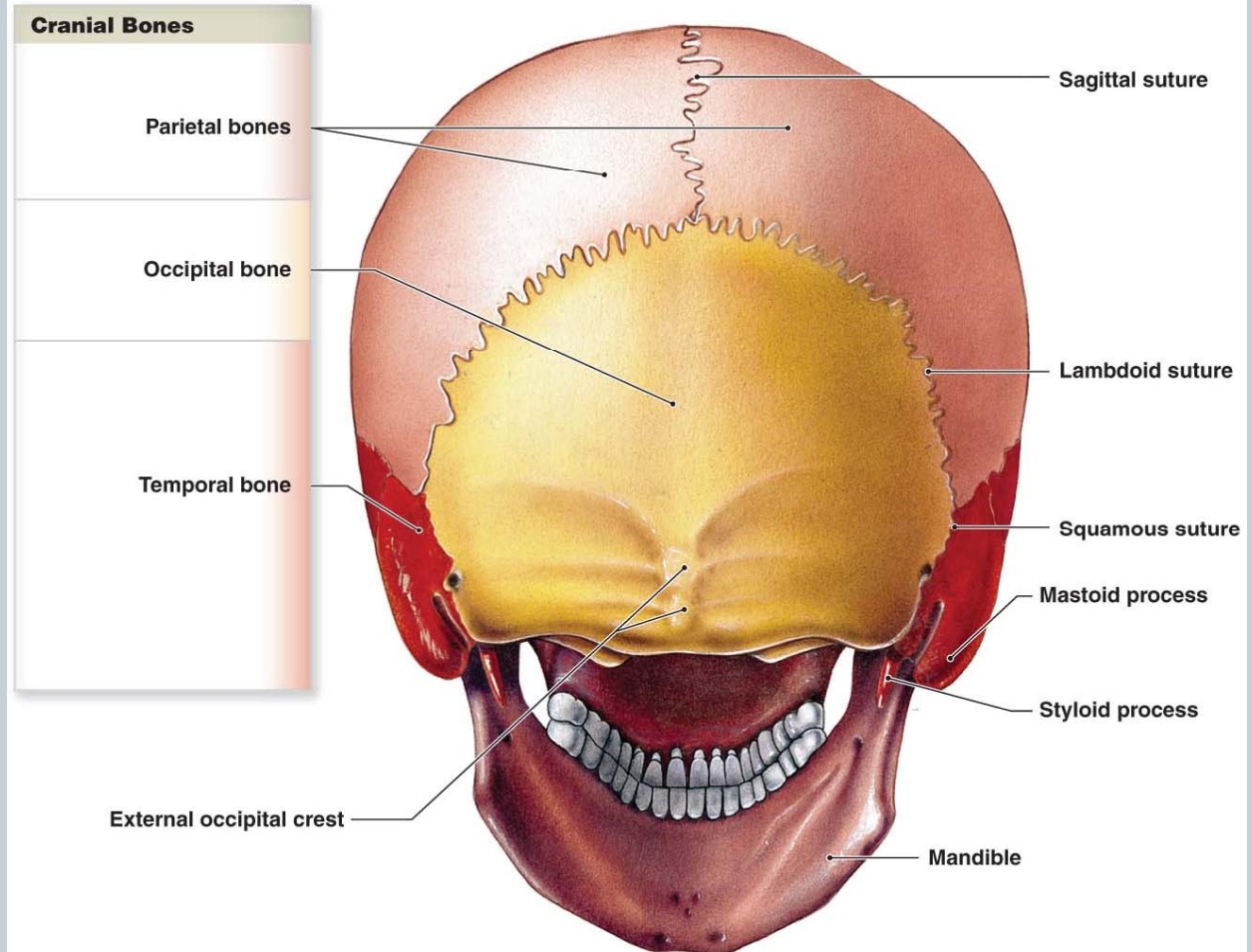


Skull norma occipitalis

- Bone
Parietal
Occipital
Temporal

- Suture
Lambda
Sagittal

The bones of the skull in posterior view



Skull norma lateralis

- Bone

Frontal

Parietal

Temporal

Zygomatic

Sphenoid

Maxilla

Mandible

Nasal

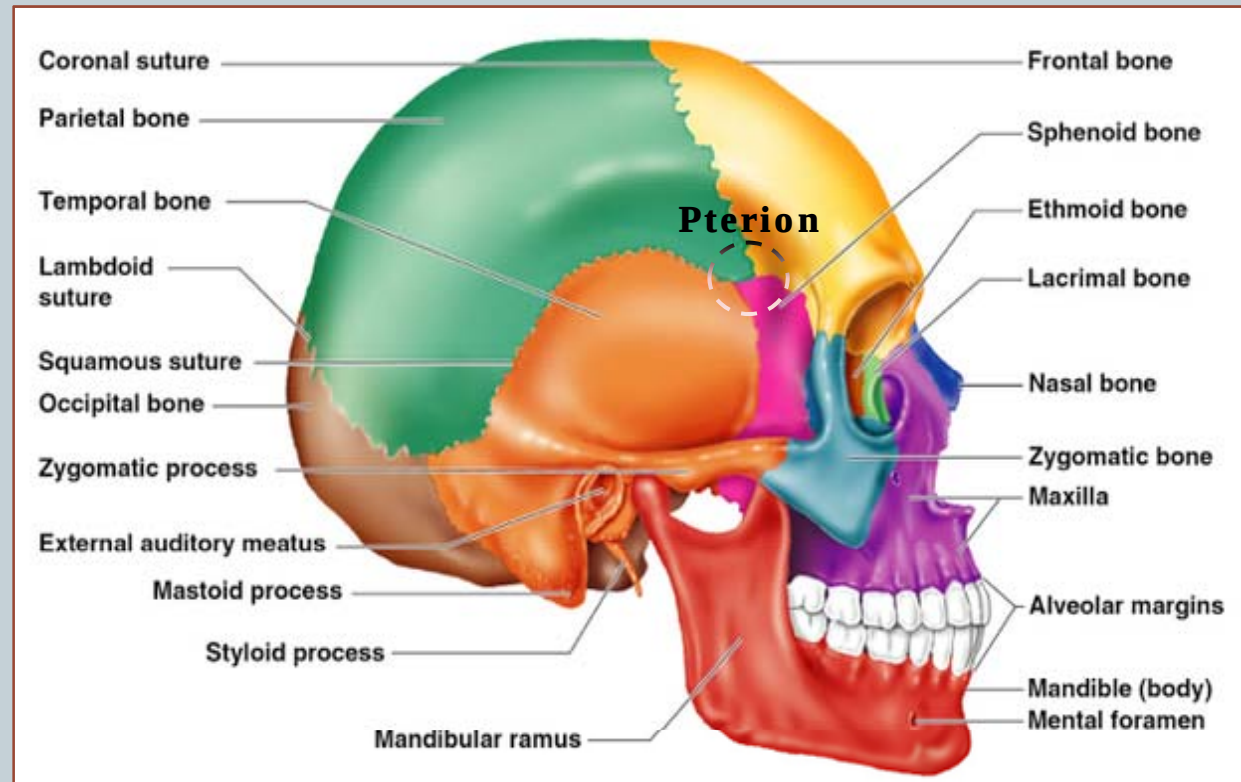
Pterion

External acoustic meatus

Styloid & mastoid processes

Sup. & inf. Temporal line

Temporal & infratemporal fossa



Temporal & infra temporal fossa

Temporal fossa between

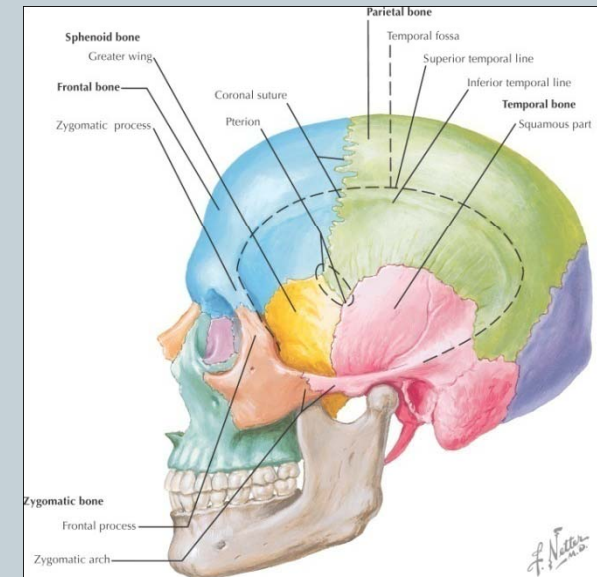
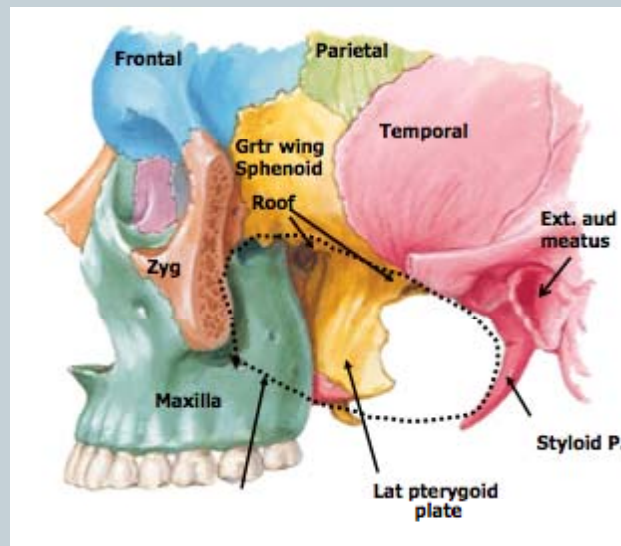
- Temporal line
- Zygomatic arch

Pterion

Infra temporal fossa

Pterygomaxillary fissure

Pterygopalatine fossa

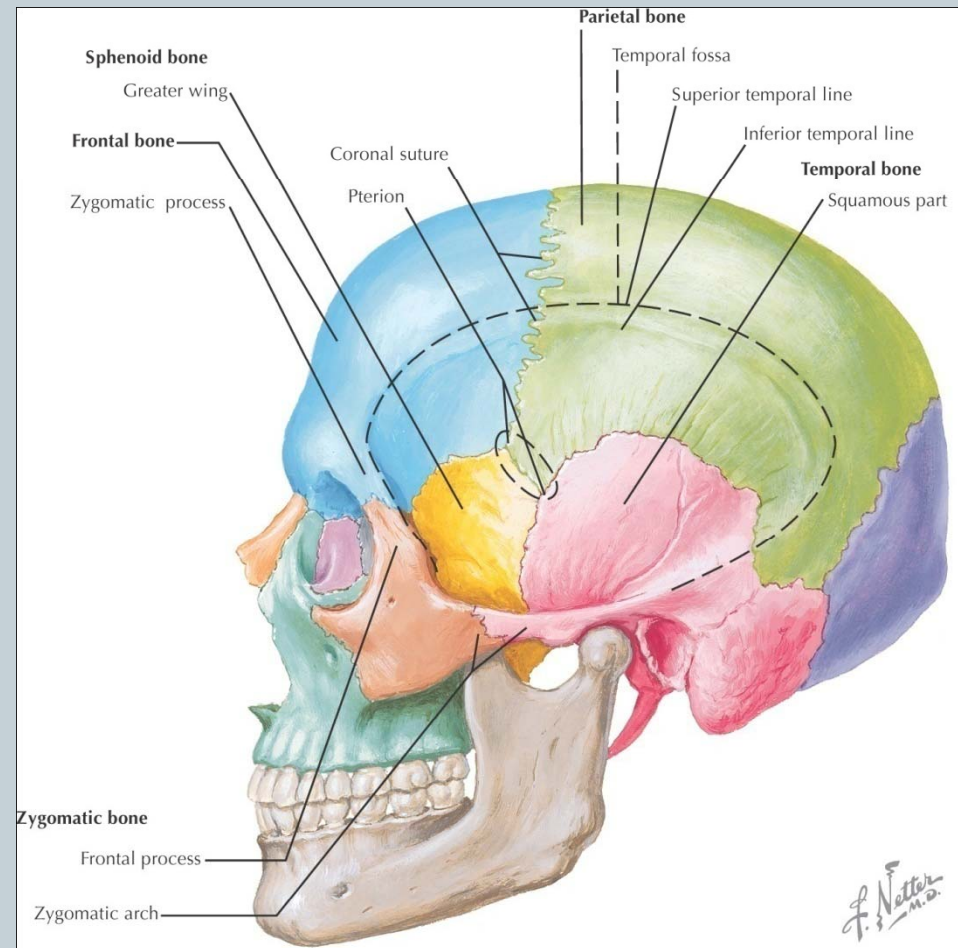
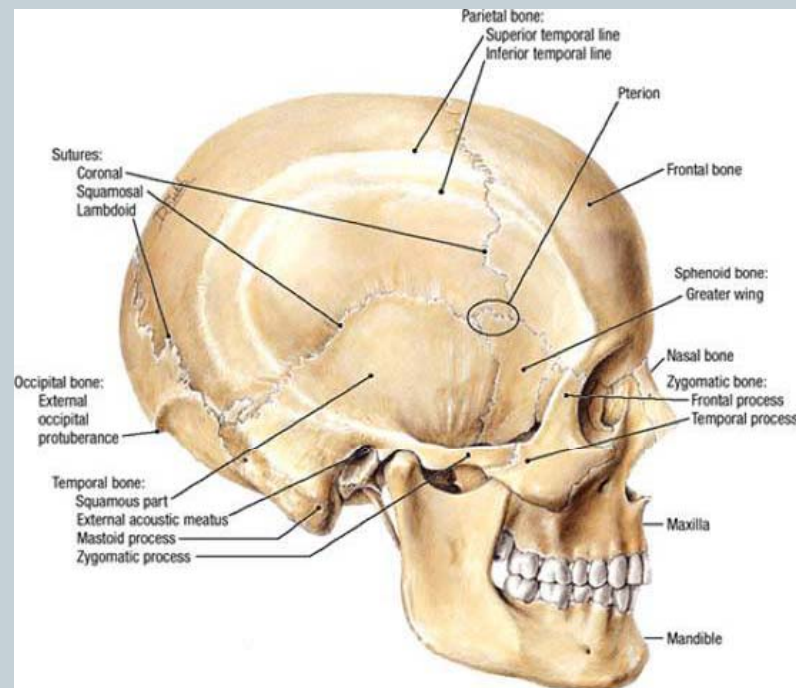


Temporal fossa

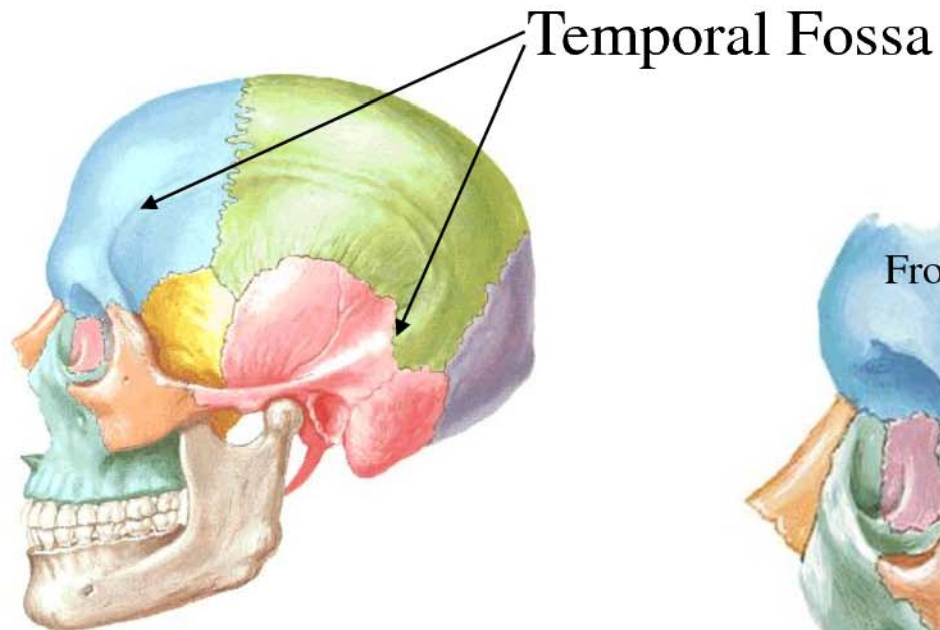
Temporal fossa between

- Temporal line
- Zygomatic arch

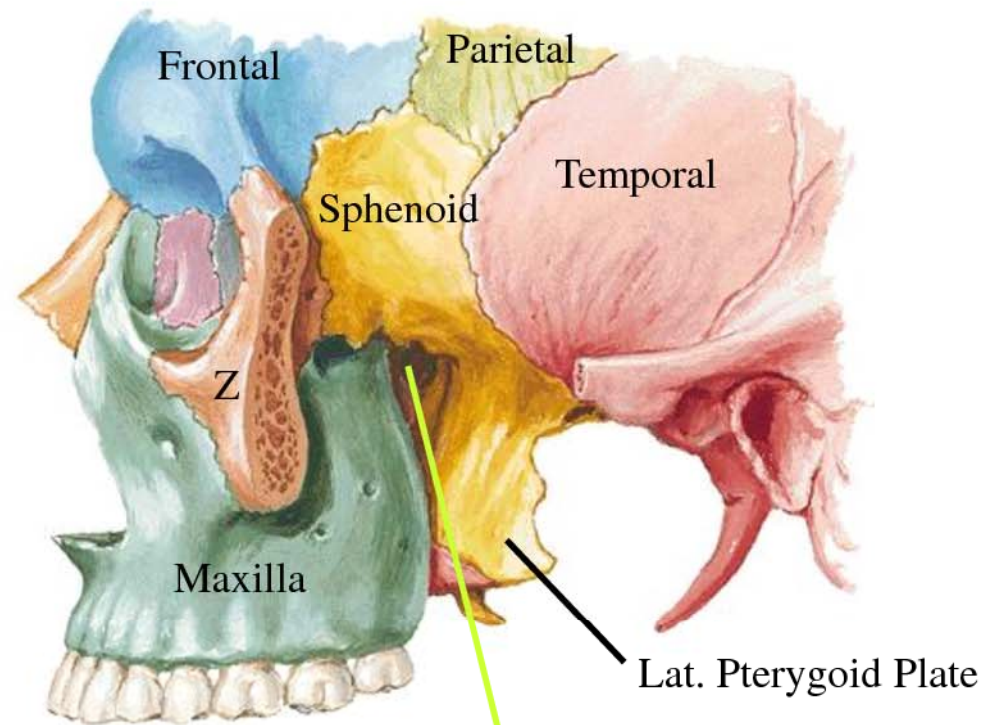
Pterion



Identify the boundaries of the infratemporal fossa.



Boundaries:
Lateral=Ramus of Mandible
Anterior=Maxilla
Medial=Lat. Pterygoid Plate
Roof=Sphenoid

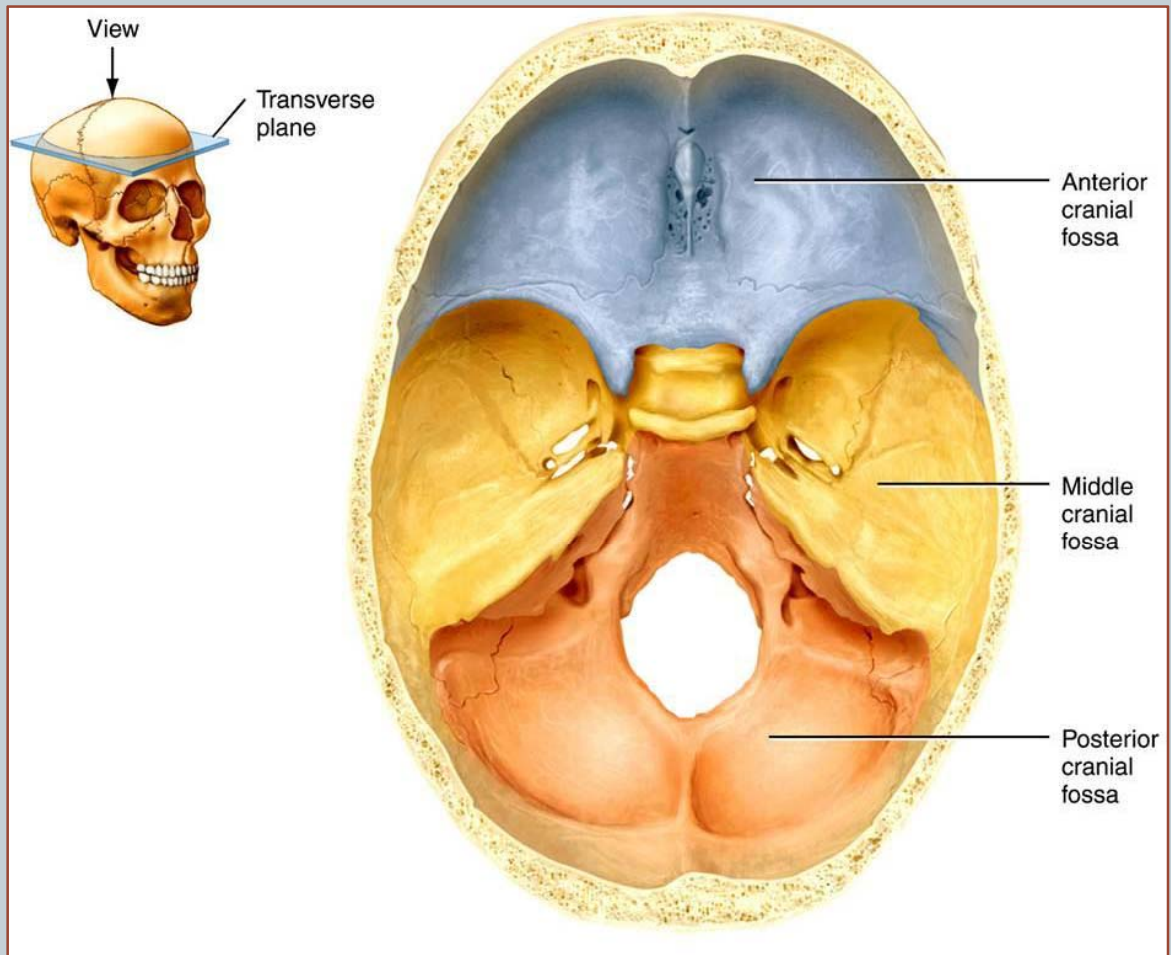


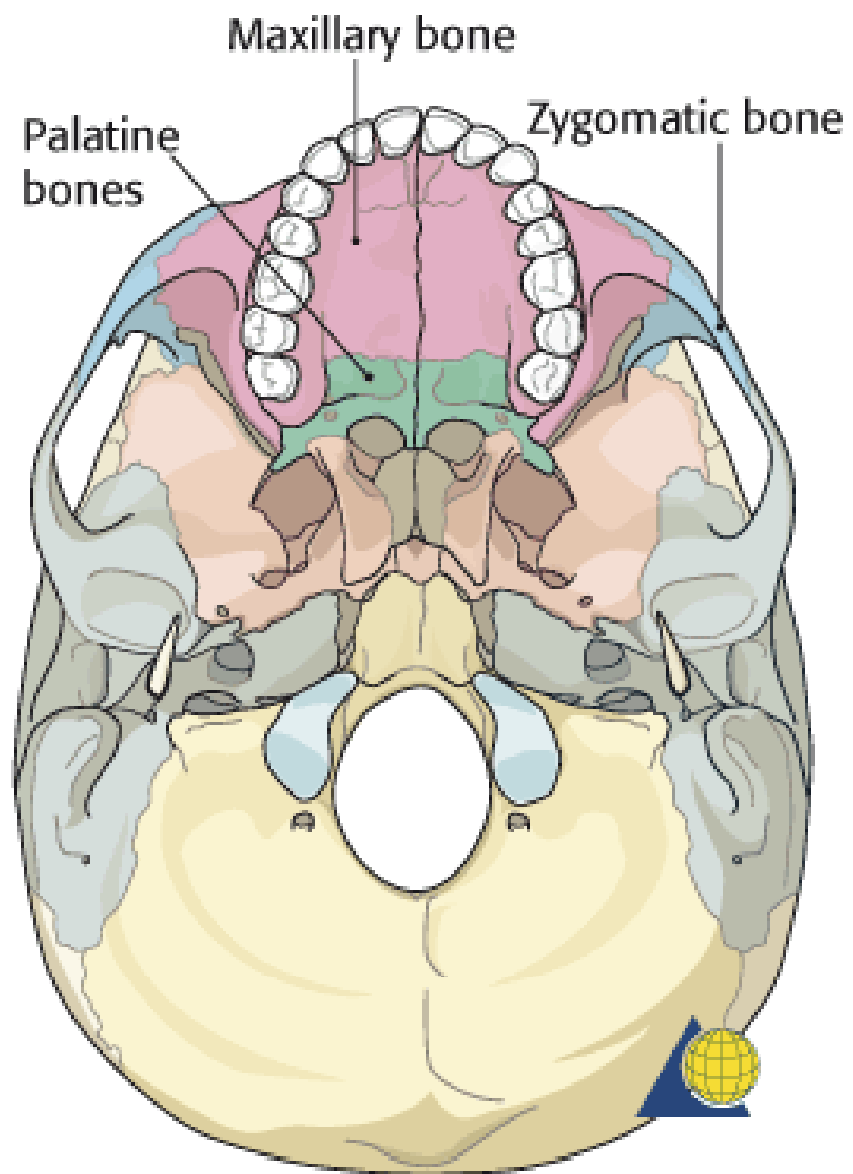
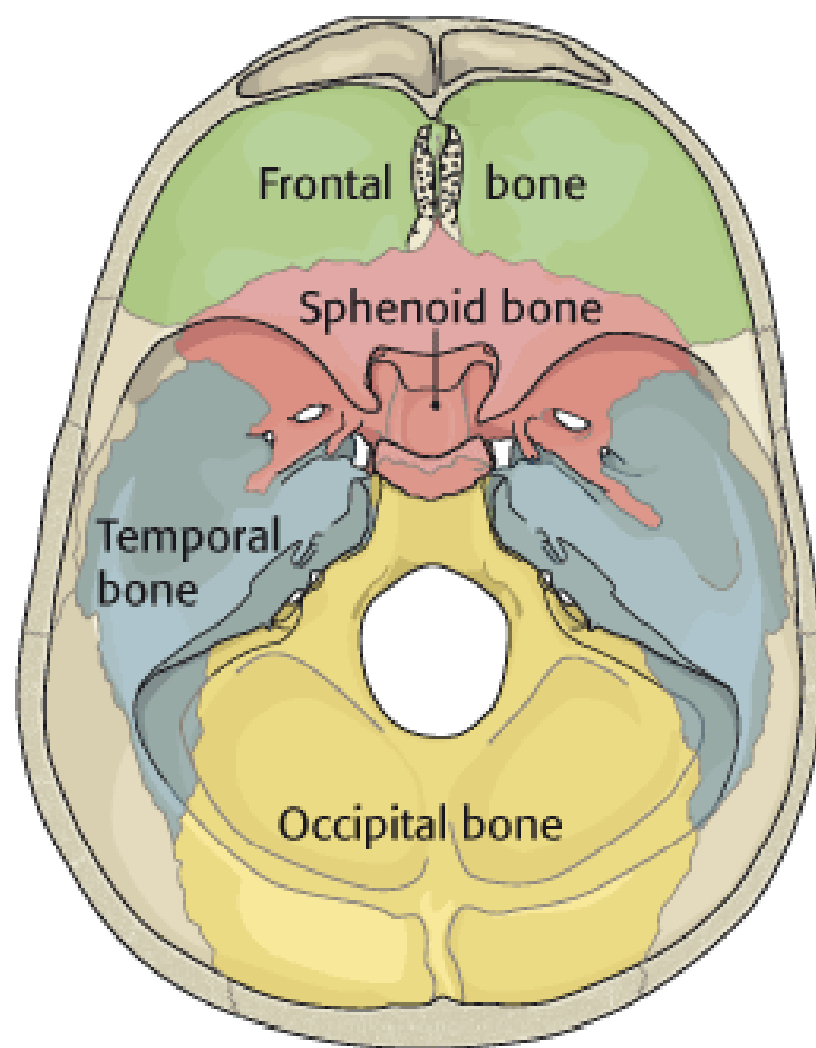
Base of skull

- Internal view
- External view

Fossa

1. Anterior cranial fossa
2. Middle cranial fossa
3. Posterior cranial fossa

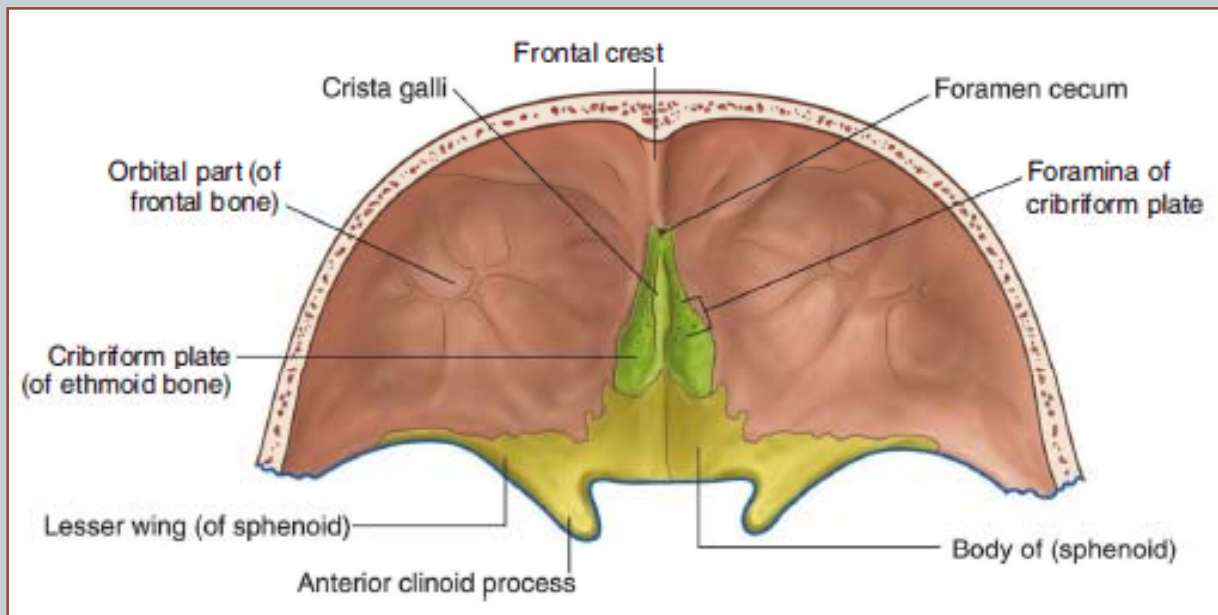




Anterior cranial fossa

- Anterior & lateral wall
Frontal bone
- Posterior border
Sphenoid lesser wing

CSF



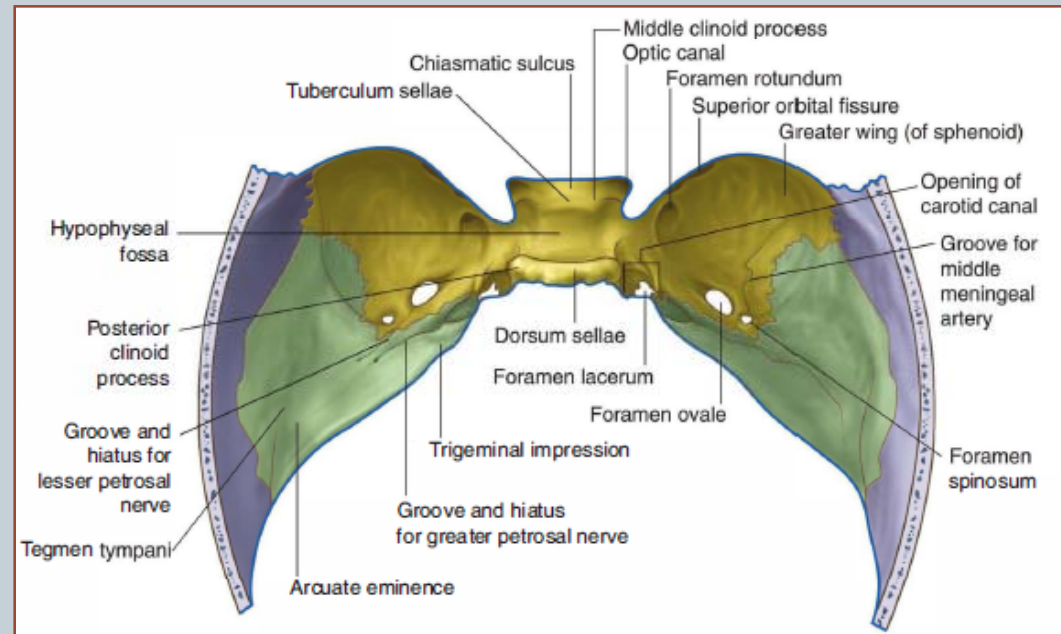
Middle cranial fossa

- Deeper
- Anterior border
Sphenoid lesser wing

- Posterior border
Dorsum cella
Superior border of Petrous

Sphenoid great wing
Round foramen (maxillary n.)
Oval foramen (mandibular n.)
Spinosum foramen

Fracture (CSF & ear)



Posterior cranial fossa

- Deepest
- Anterior border
Dursum cella
Superior border of Petrous

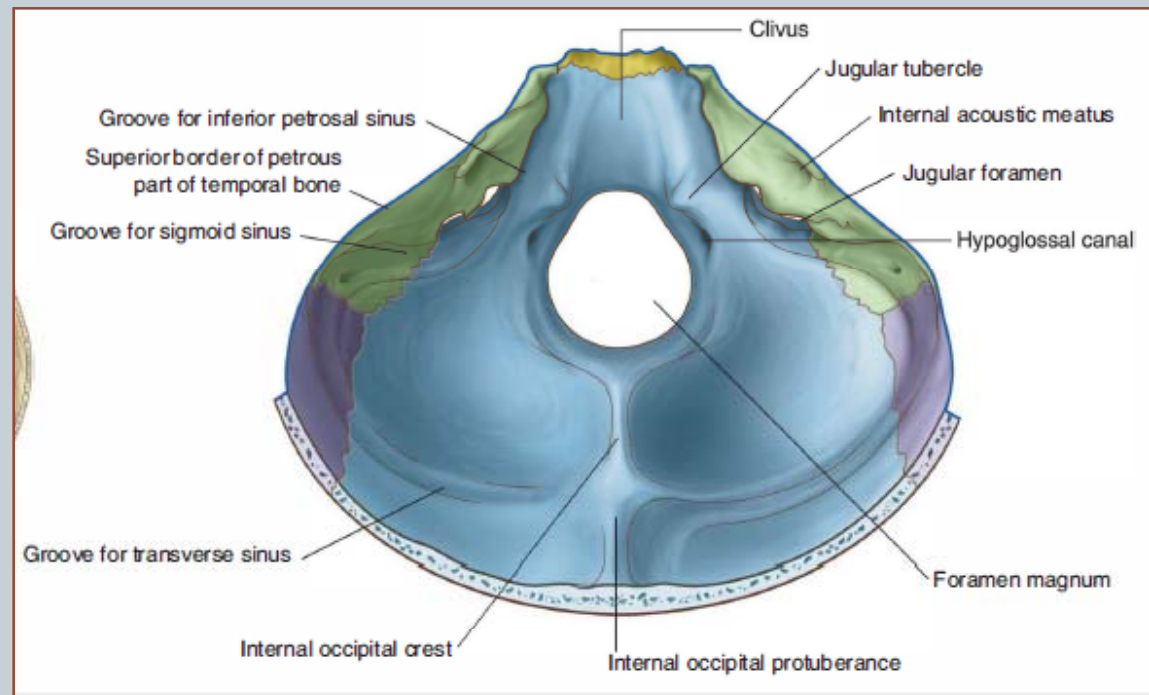
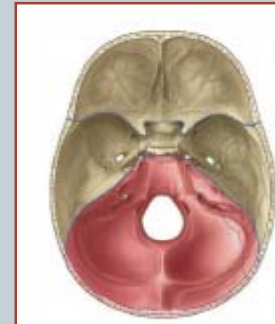
- Posterior border
Squamous part of occipital

Foramen magnum

Jugular foramen

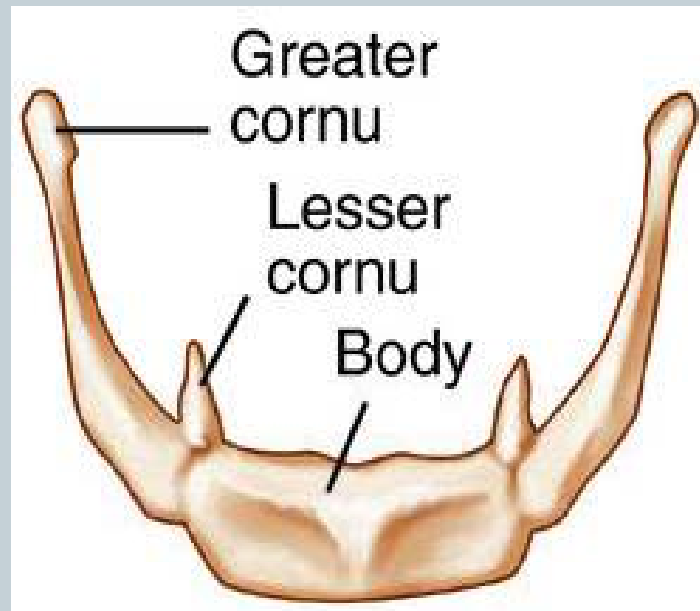
Jugular vein

Cranial nerves (9, 10 & 11)



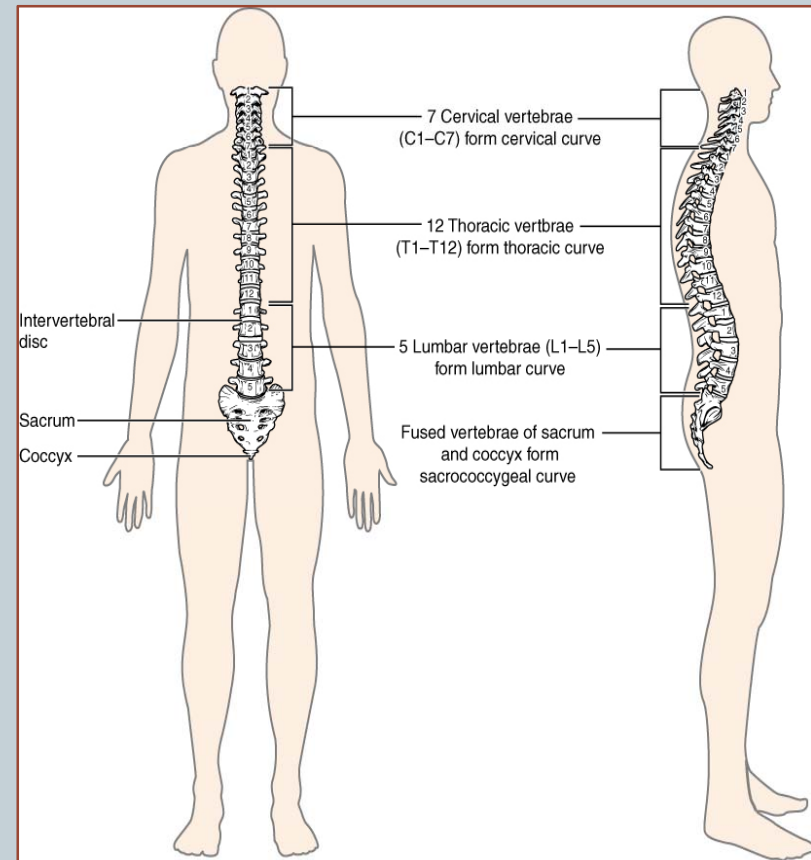
Hyoid

- U shape
- Body
- Great cornu
- Lesser cornu



Vertebral Column

- 33 (26)
- 7 Cervical
- 12 Thoracic
- 5 Lumbar
- Sacral
- Coccygeal
- Male (60cm)
- Female (50cm)



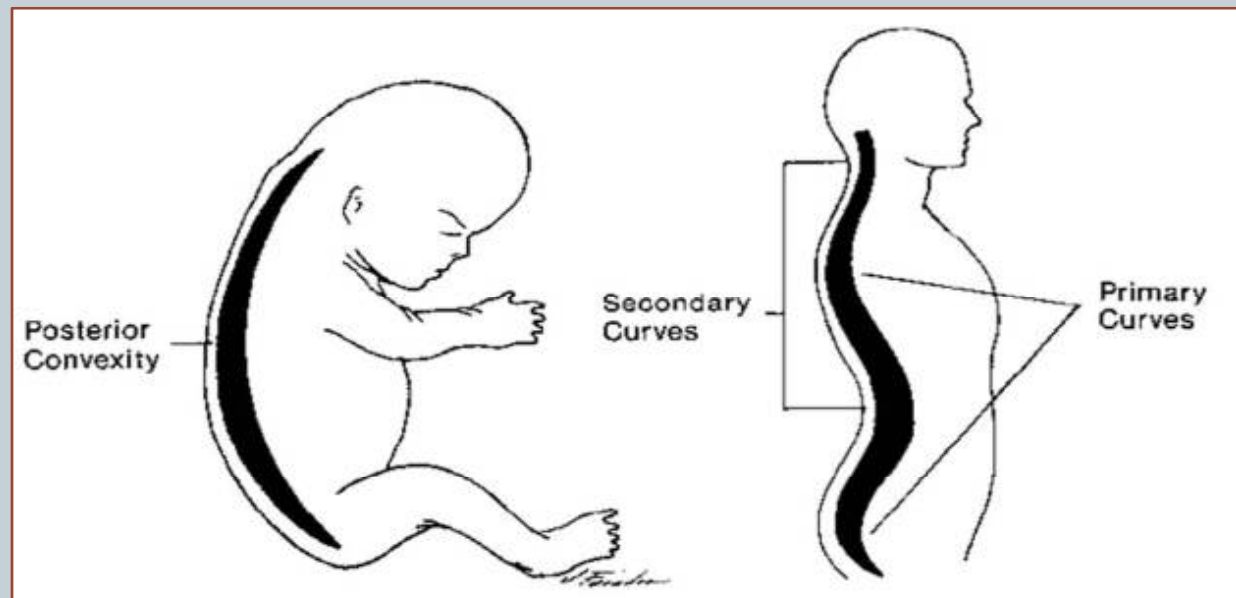
Vertebral Column curves



Curves:

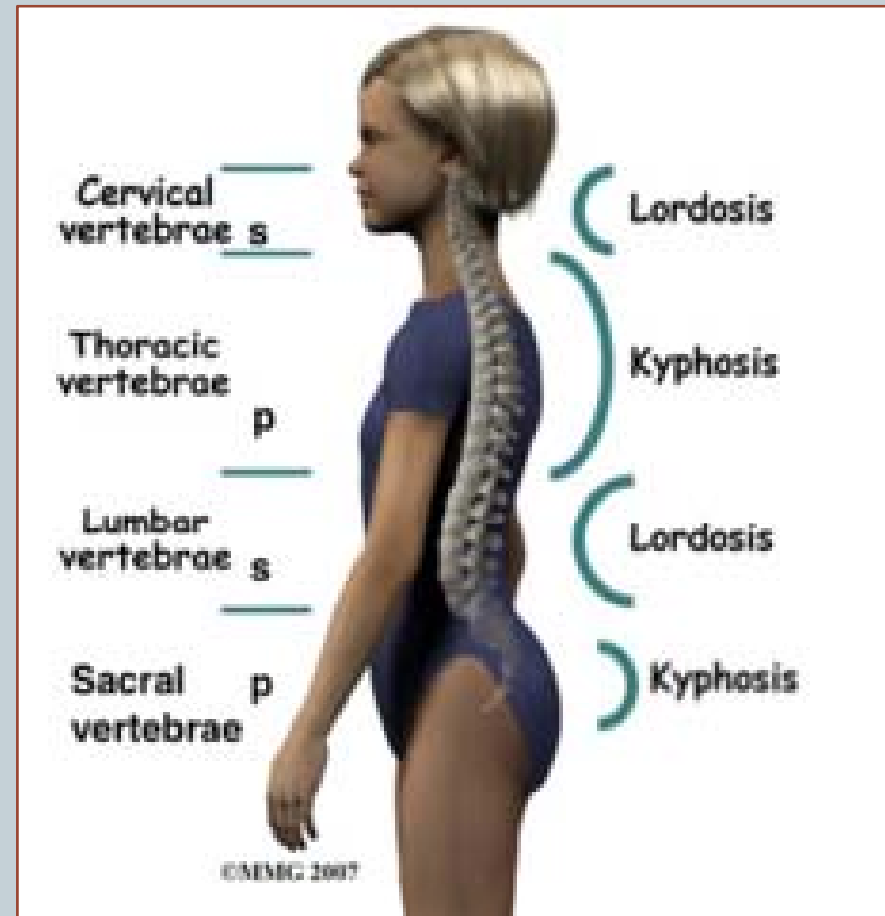
- Primary
 1. Thoracic
 2. Sacral (5th month)

- Secondary
 1. Cervical (5-9th month)
 2. Lumbar (12-18th month)



Clinical points

- Scoliosis (left or right)
- Lordosis or hollow back (lumbar)
- Kiphosis (thoracic)



A typical vertebra

- Body
- Vertebral Arch

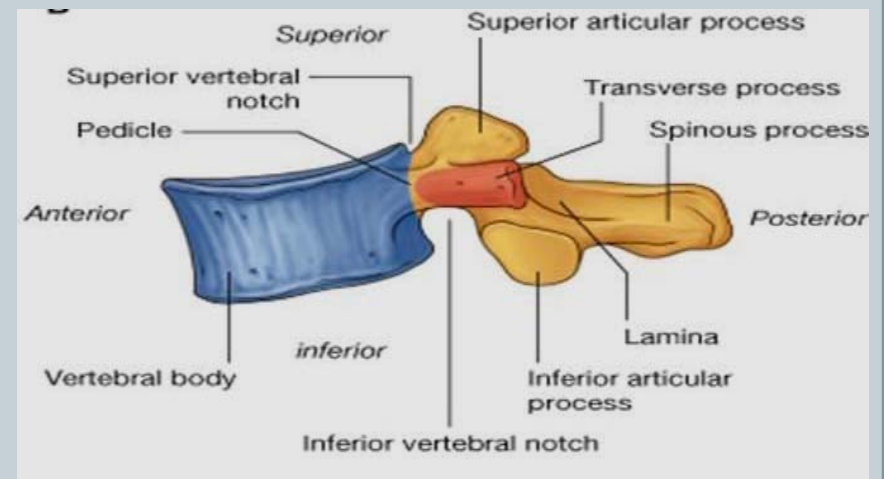
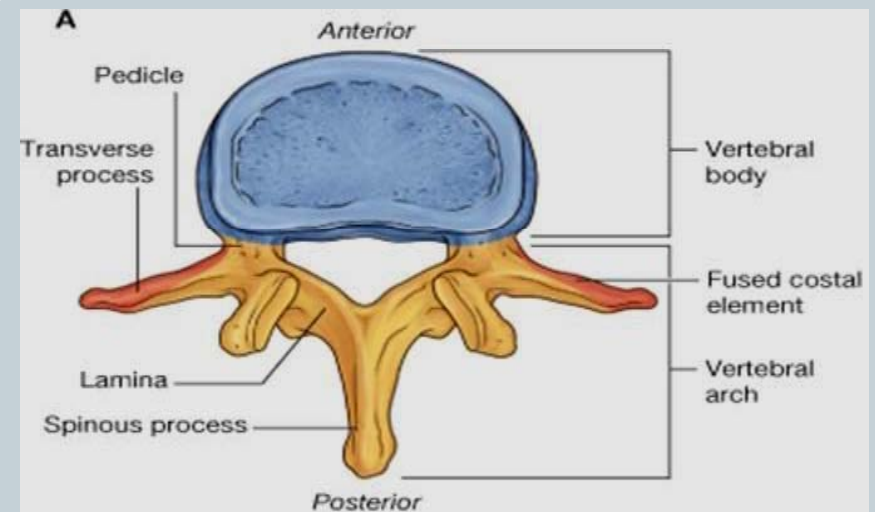
Pedicle

Lamina

Vertebral Foramen

Vertebral Arch

- 2 Transverse processes
- 2 sup. Articular processes
- 2 inf. Articular processes
- Spinous processes



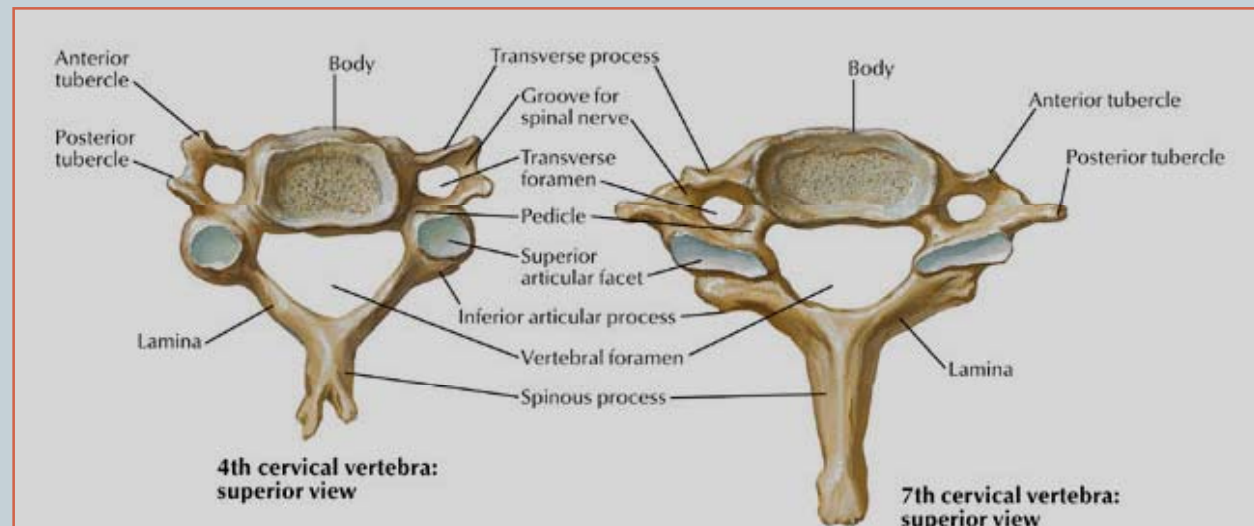
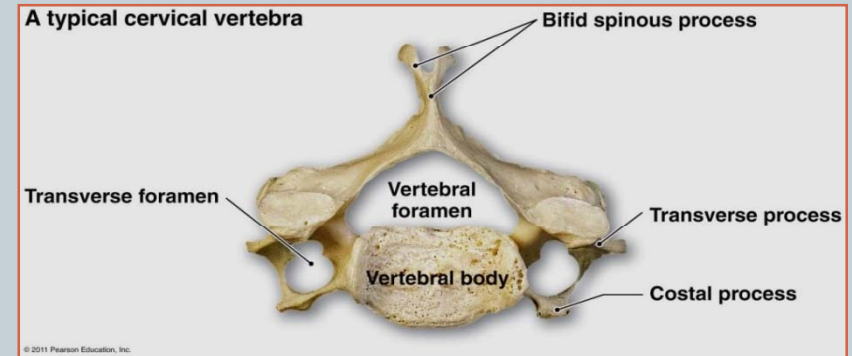
Cervical vertebra

Transverse foramen in transverse process

- Atypical (c3-c6)

Large & triangular vertebral foramen

Bifid spinous process



- Typical (c1, c2, c7)

C7: prominent vertebra with long & unispinous process

Thoracic vertebra

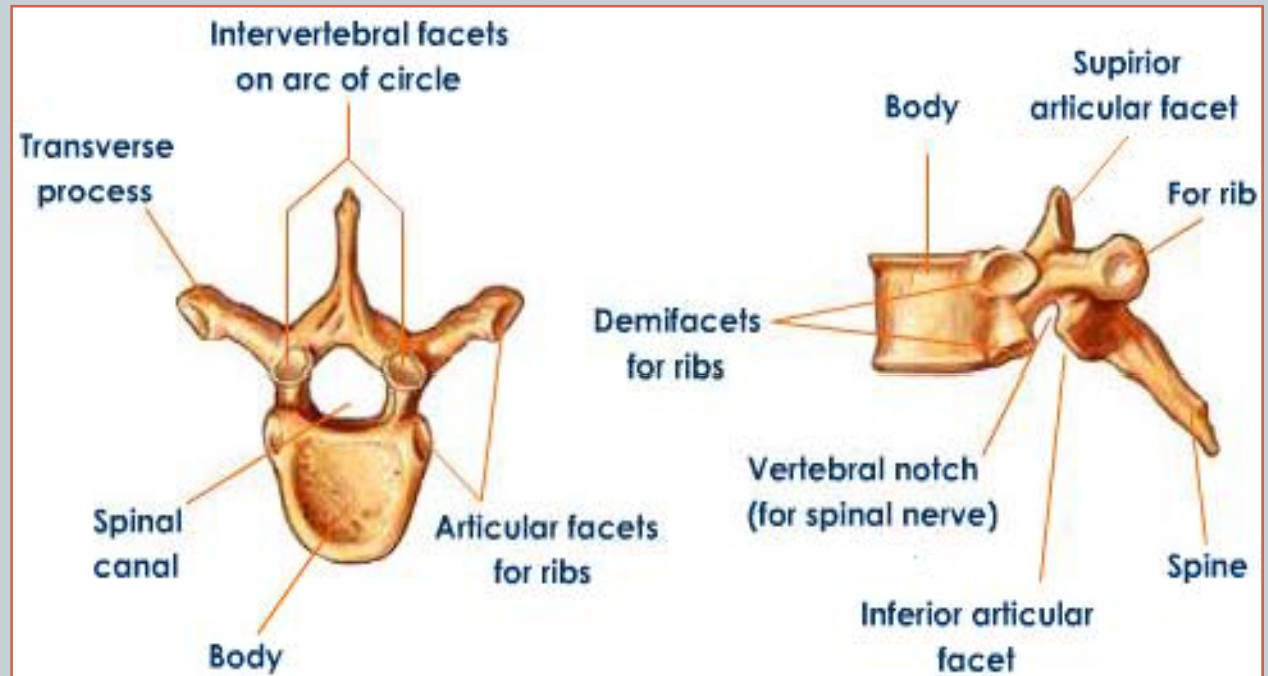
Articular facets for ribs

- Typical (T2-T8)



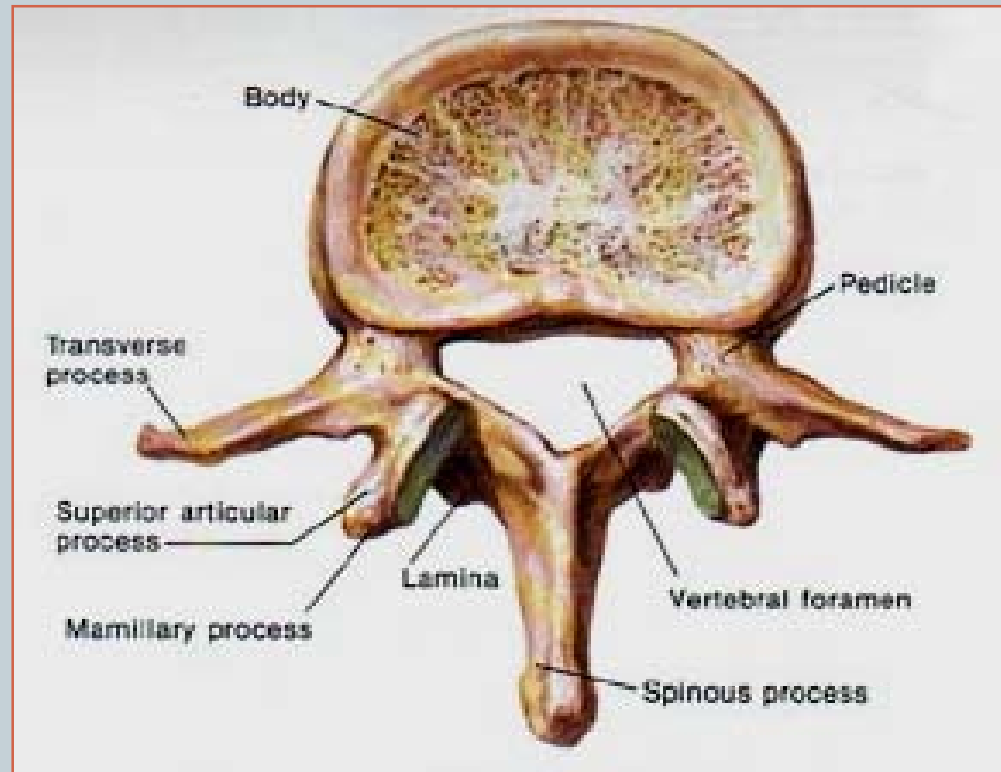
Long spinous process

- Atypical (T1, T9, T10, T11, T12)



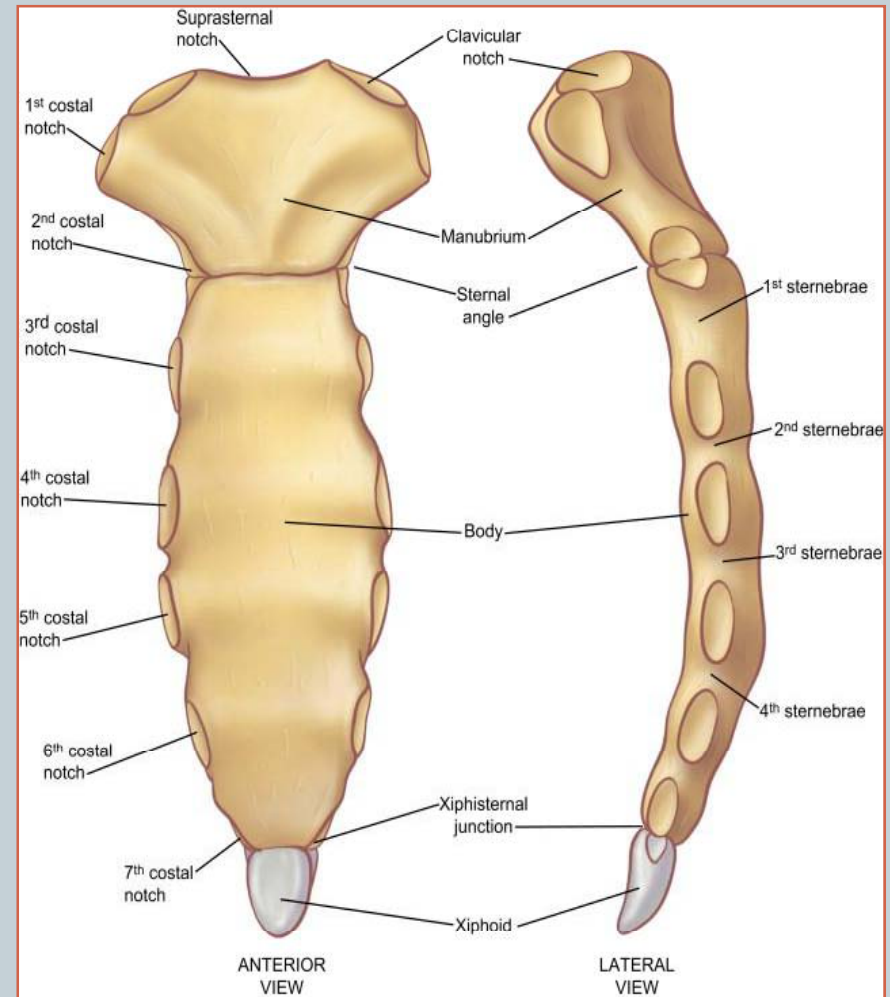
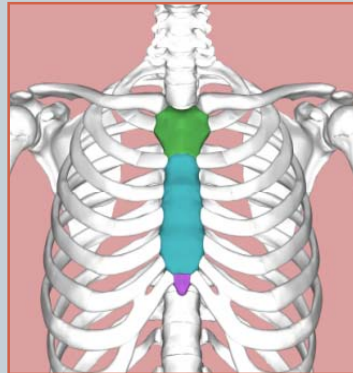
Lumbar vertebra

- Accessory process
- Mammillary process
- Typical (L1-L4)
- Atypical (L5)



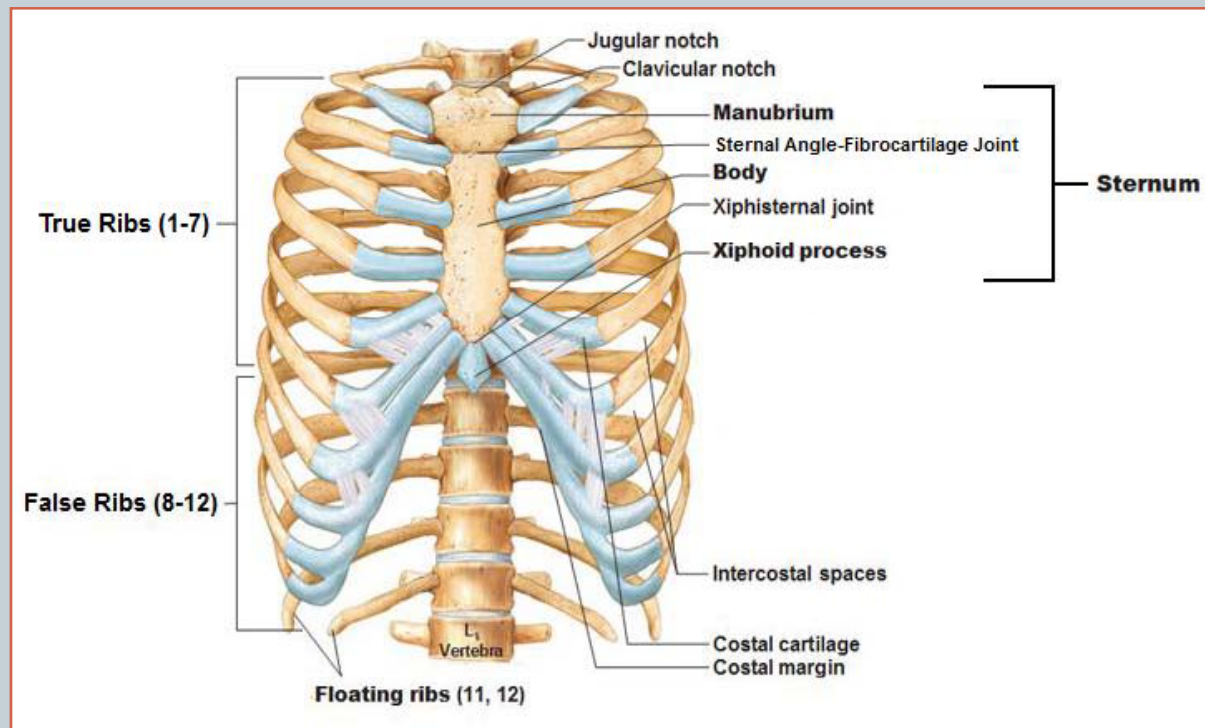
Sternum

1. Manubrium
2. Body
3. Xiphoid rprocess



Rib

- Typical (3-9)
- Atypical (1, 2, 10, 11, 12)

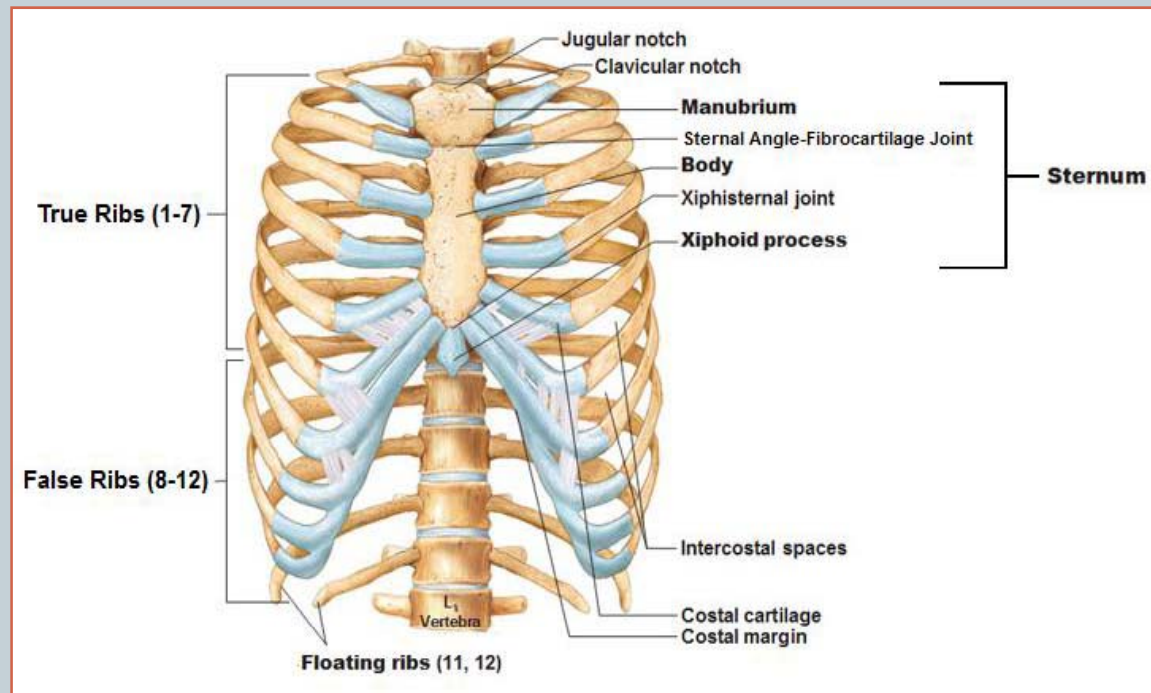


Ribs classification

1. True ribs (1-7)
2. False ribs (8-12)

Vertebro chondral ribs (8-10)

Floating ribs (11 & 12)



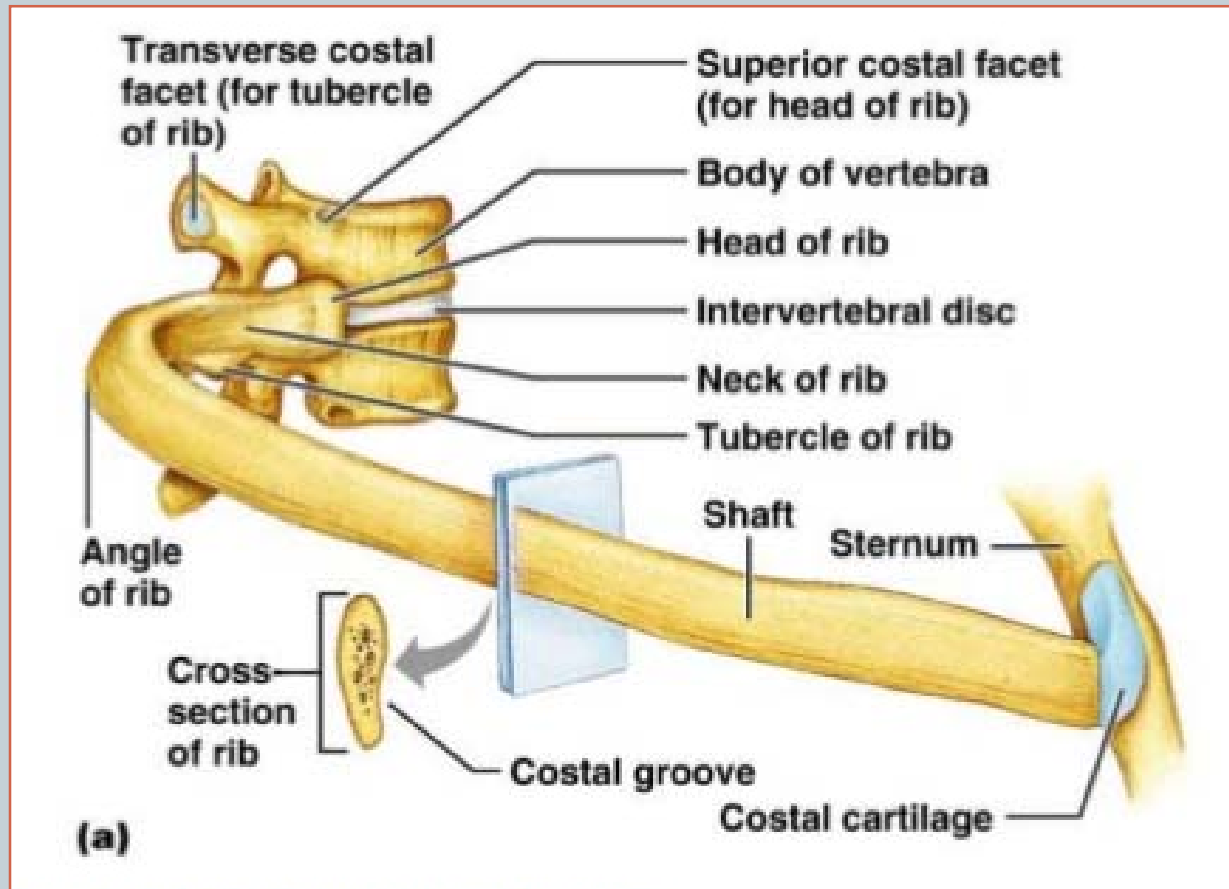
Typical rib

Posterior end

- Head
- Neck
- Tubercle

Body (shaft)

- Thin & flat
- Surface (int. & ext.)
- Border (sup. & inf.)
- Costal groove



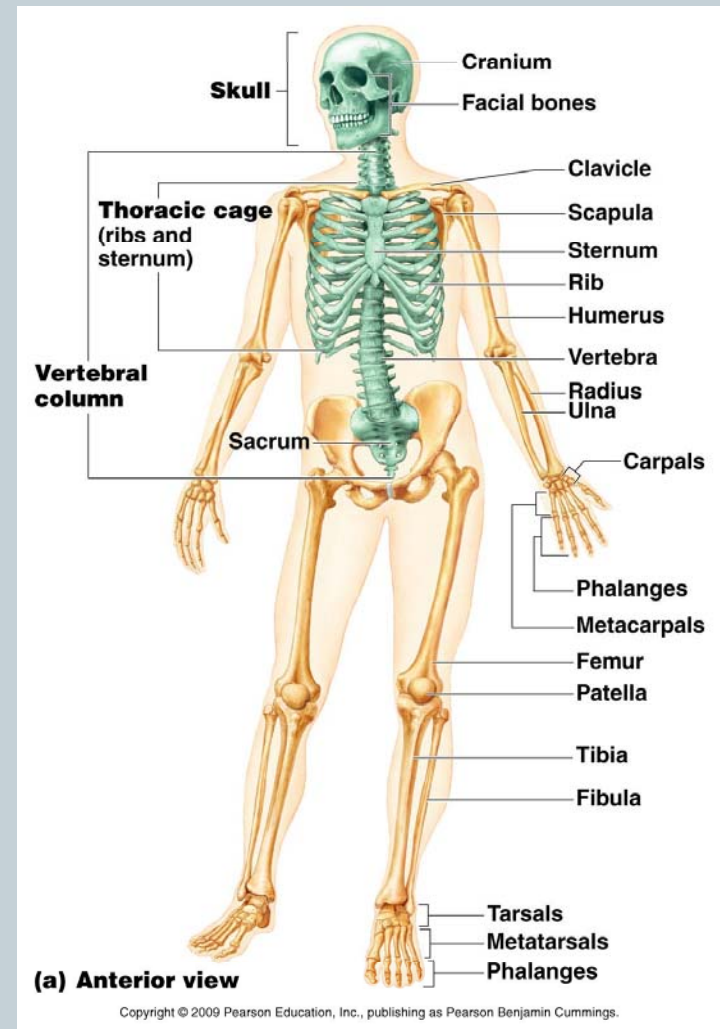
Appendicular skeleton

- **Upper limbs**

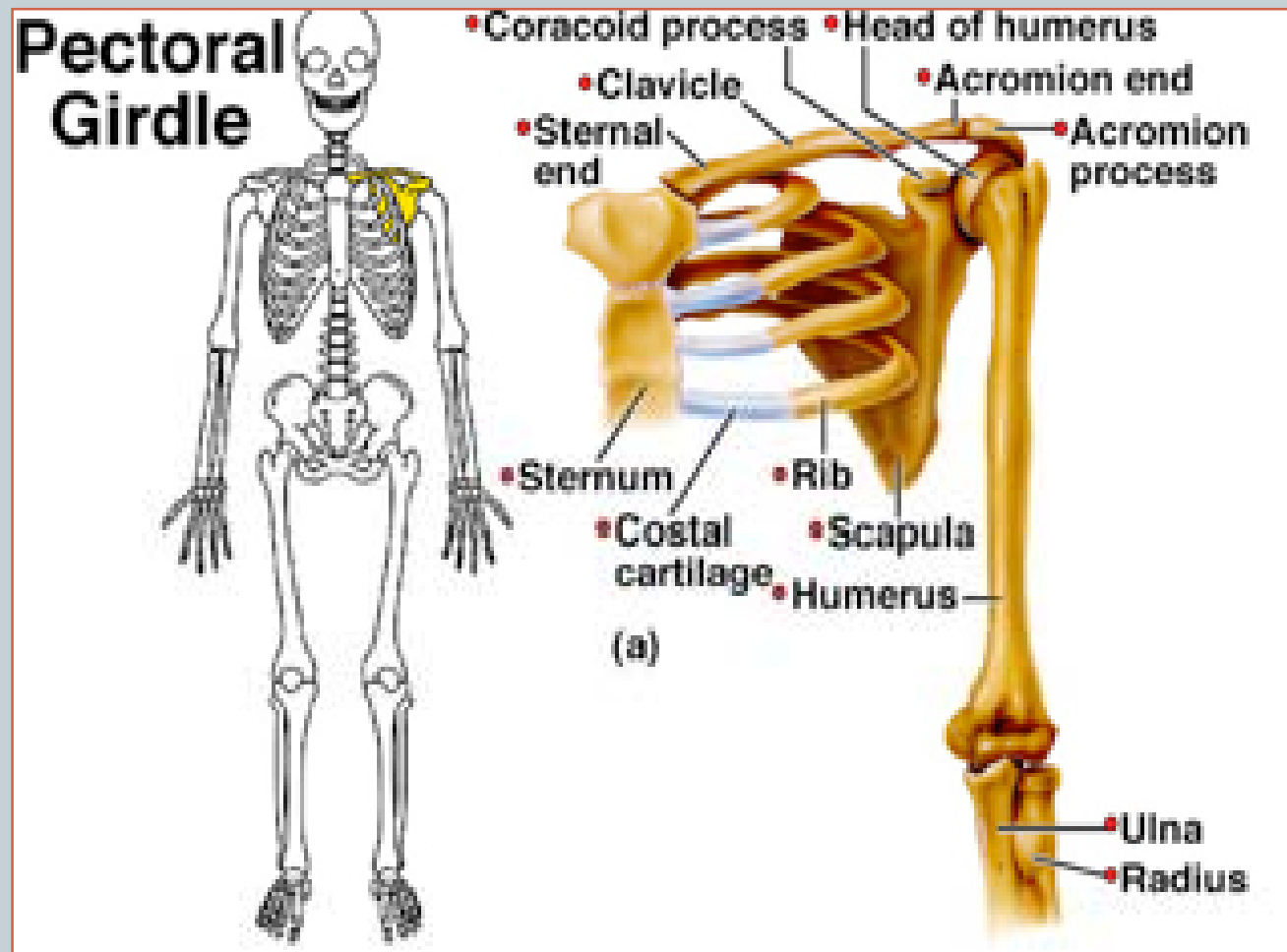
Pectoral Girdle (clavicle & scapula)

- **Lower limbs**

Pelvic Girdle (hip bone)



Pectoral girdle (shulder)



Scapula

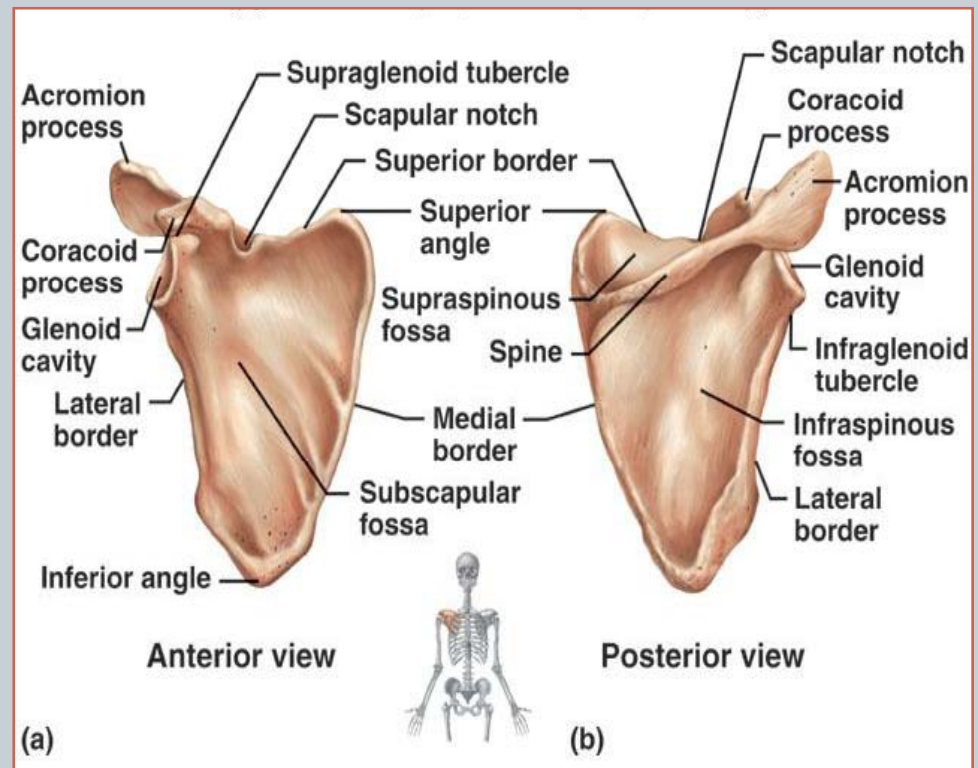
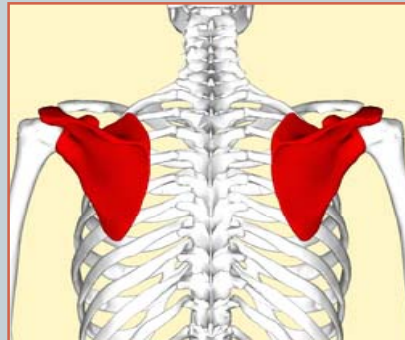
- Triangular flat bone
- Lateroposterior part of thorax
- 2-7 rib

- Surface

1. Anterior
2. Posterior

- Borders:

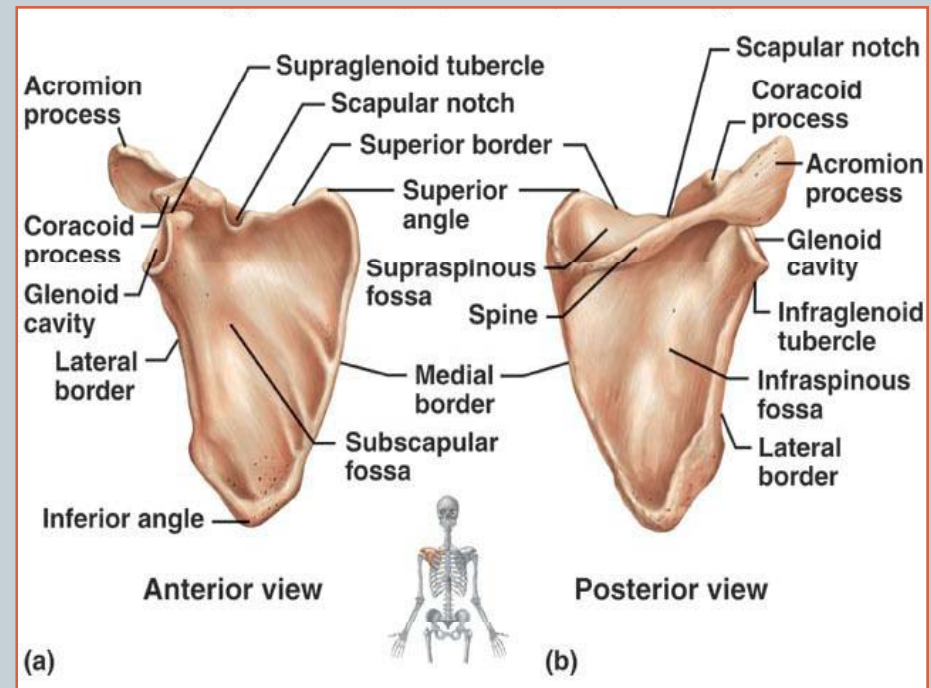
1. Superior
2. medial
3. lateral



Scapula

- Angles
 1. Superior
 2. inferior
 3. Lateral (head glenoid fossa by humerus bone)

- Processes
 1. Spinous p.
 2. Coracoid p.
 3. Acromion p.
- lateral end of clavicle



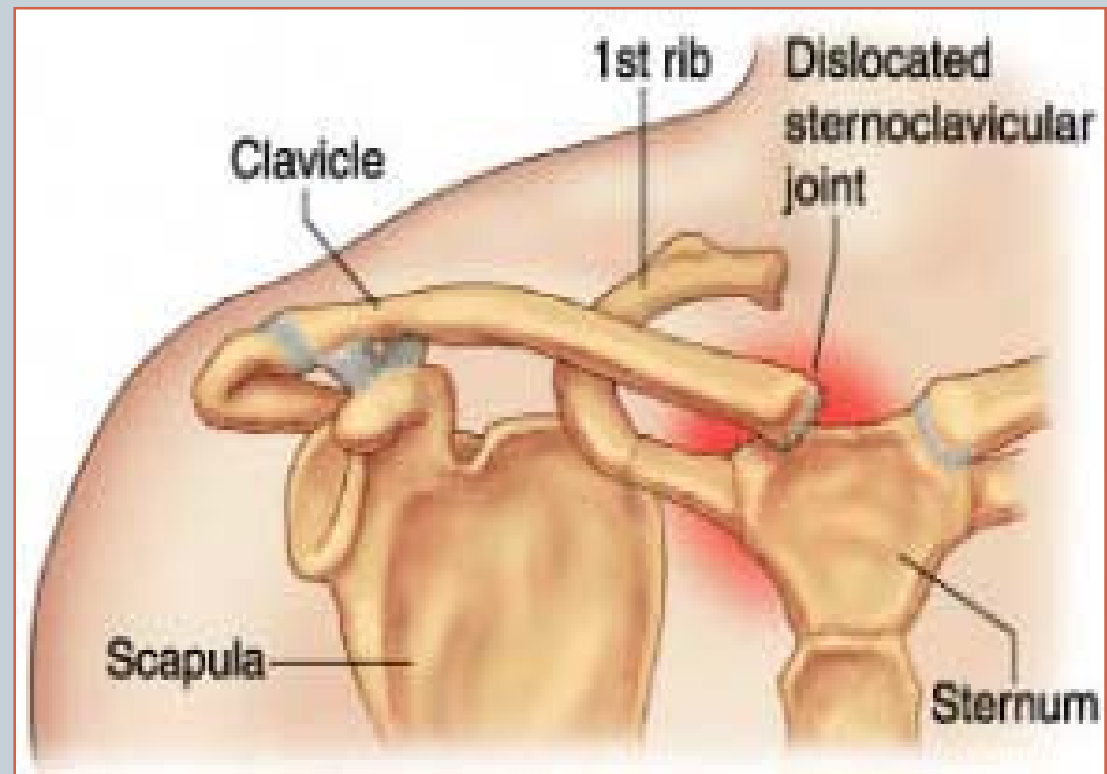
Clavicle

- Body to upper limb
- Completely touchable
- S shape

- Body
- lateral end
- Medial end

- Fracture

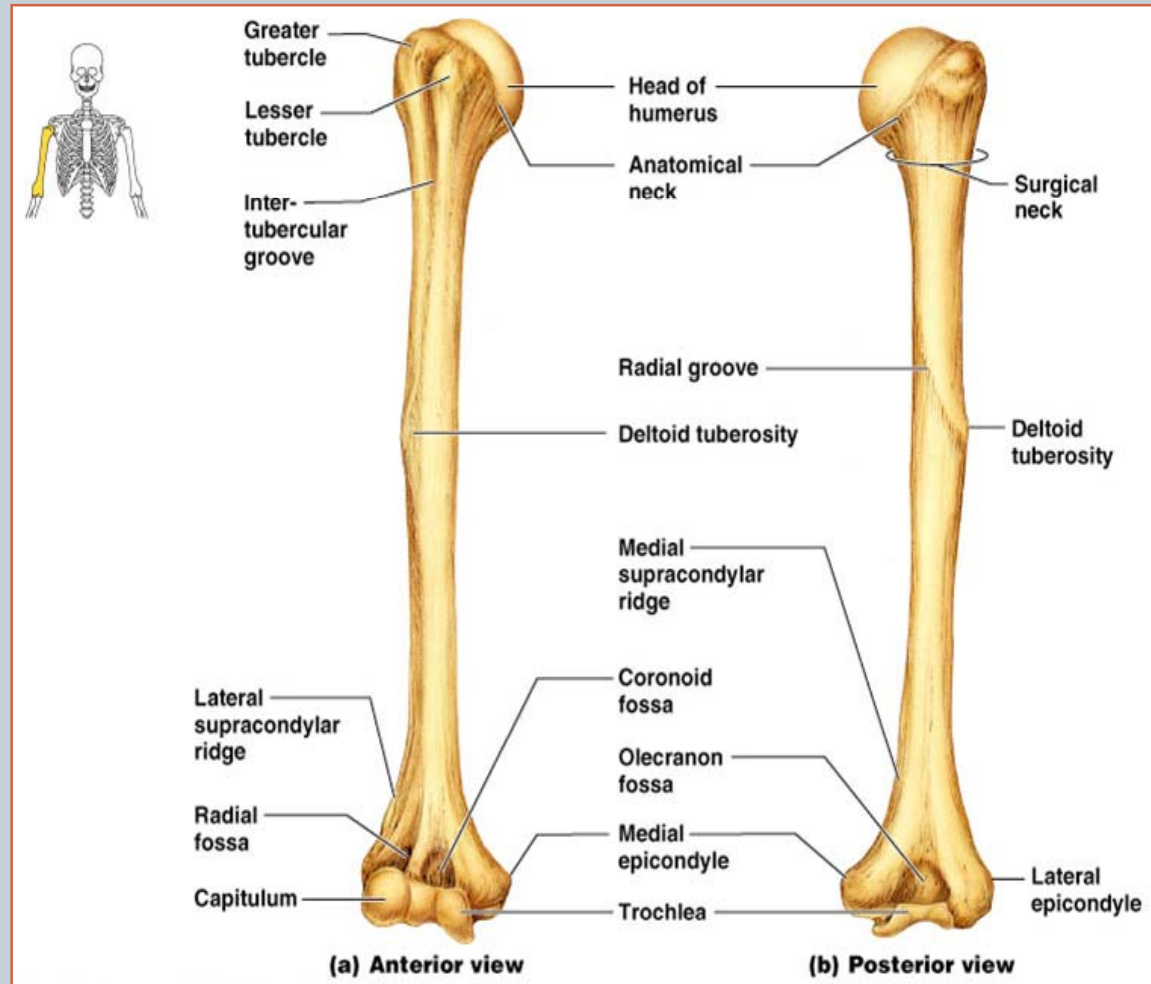
2/3 med. End & 1/3 lat. end



Humerus

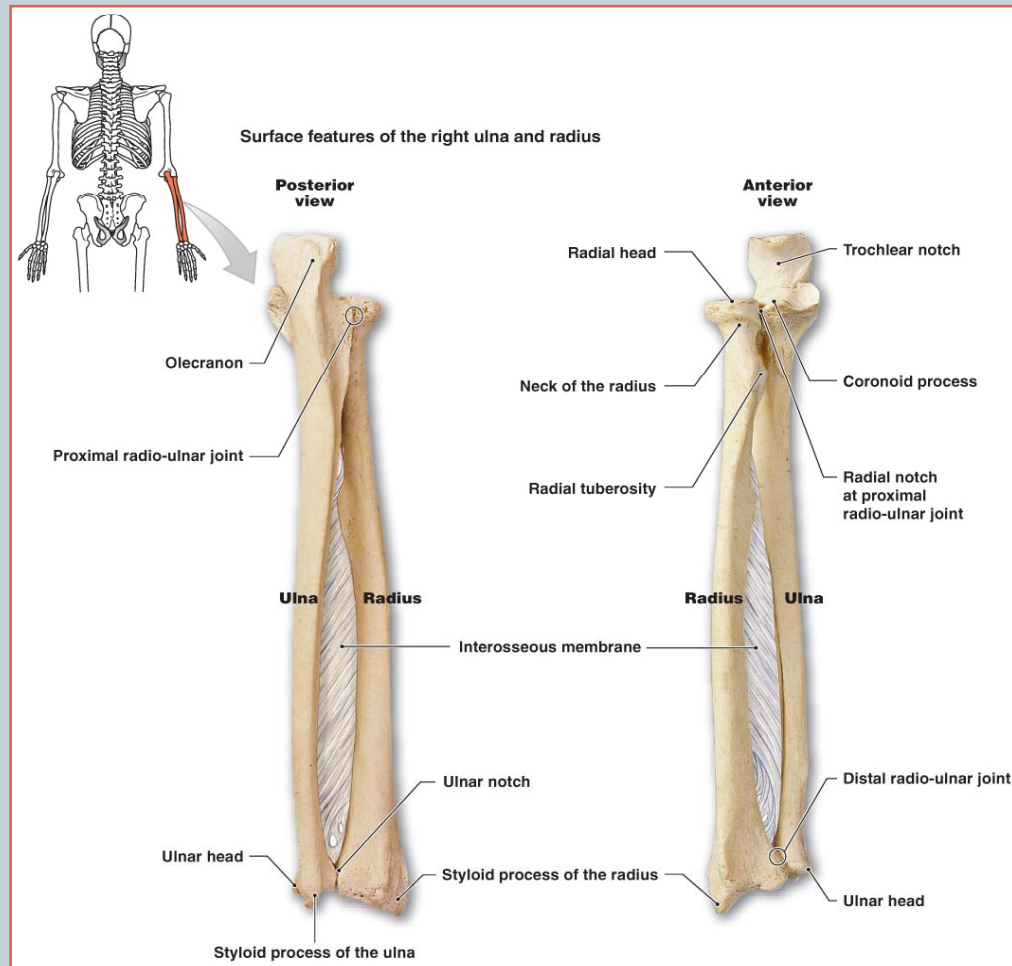


- Long bone
- Body
 - Deltoid tuberosity
- Superior end
 - Head (Glenoid fossa)
 - Greater Tubercle
 - Lesser Tubercle
- Inferior end
 - Medial condyle (ulna)
 - Lateral condyle (radius)



Forearm bones

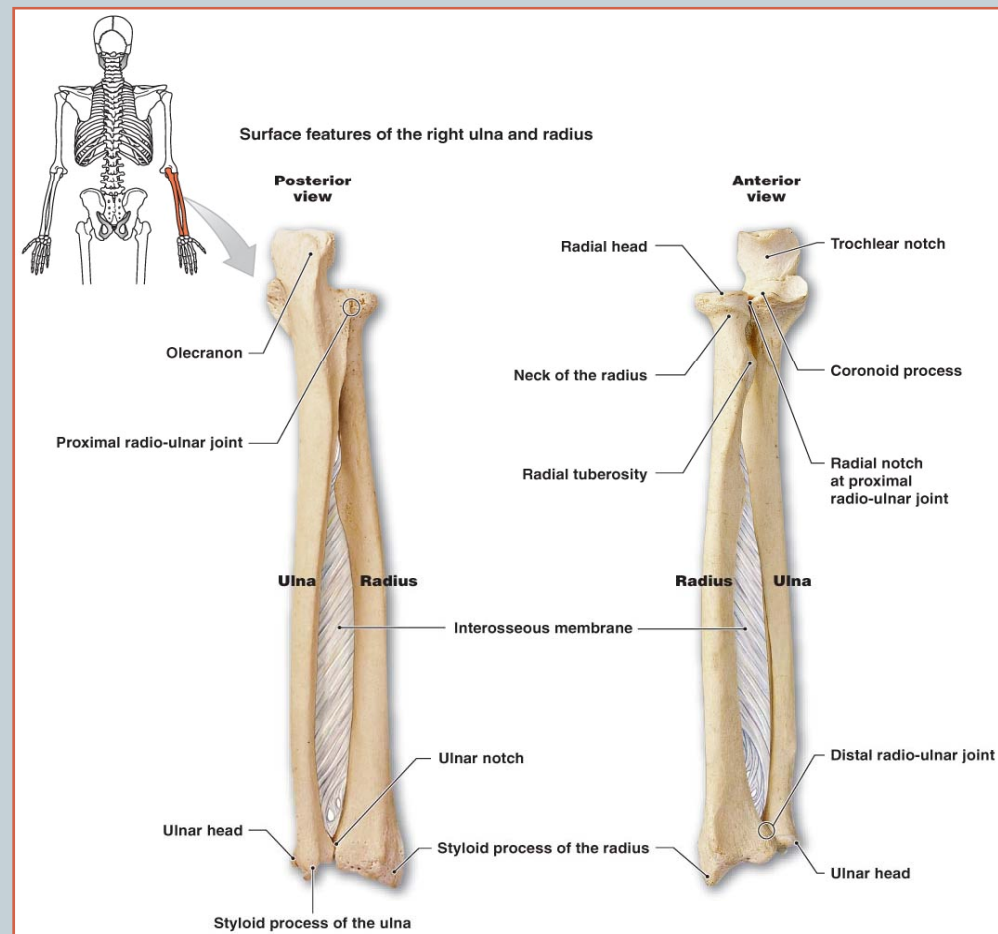
- Radius
- ulna



Radius

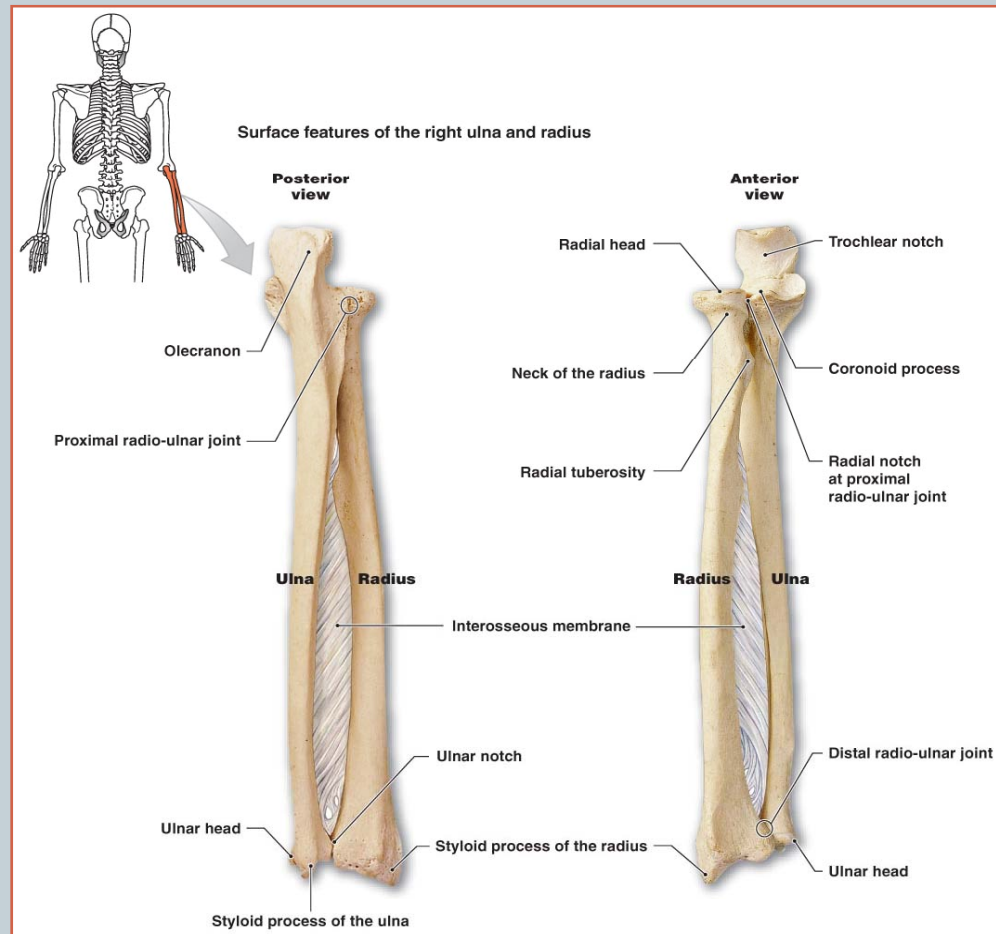


- Long bone
- Lateral part of forearm
- Superior end
Humerus Lateral condyle
- Inferior end
Wrist Proximal bones
- body



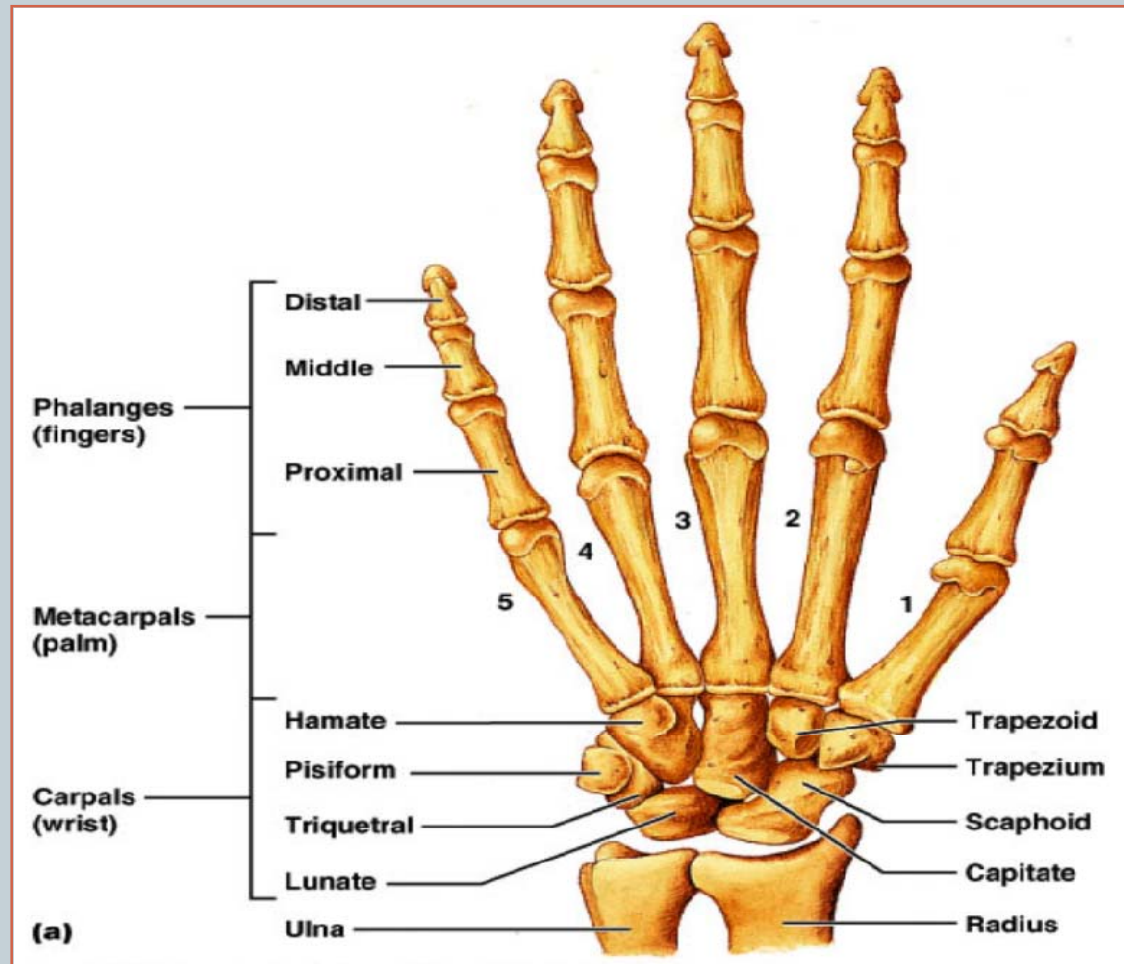
Ulna

- Long bone
- Medial part of forearm
- Superior end
Humerus medial condyle
- Inferior end
Wrist Proximal bones
- body



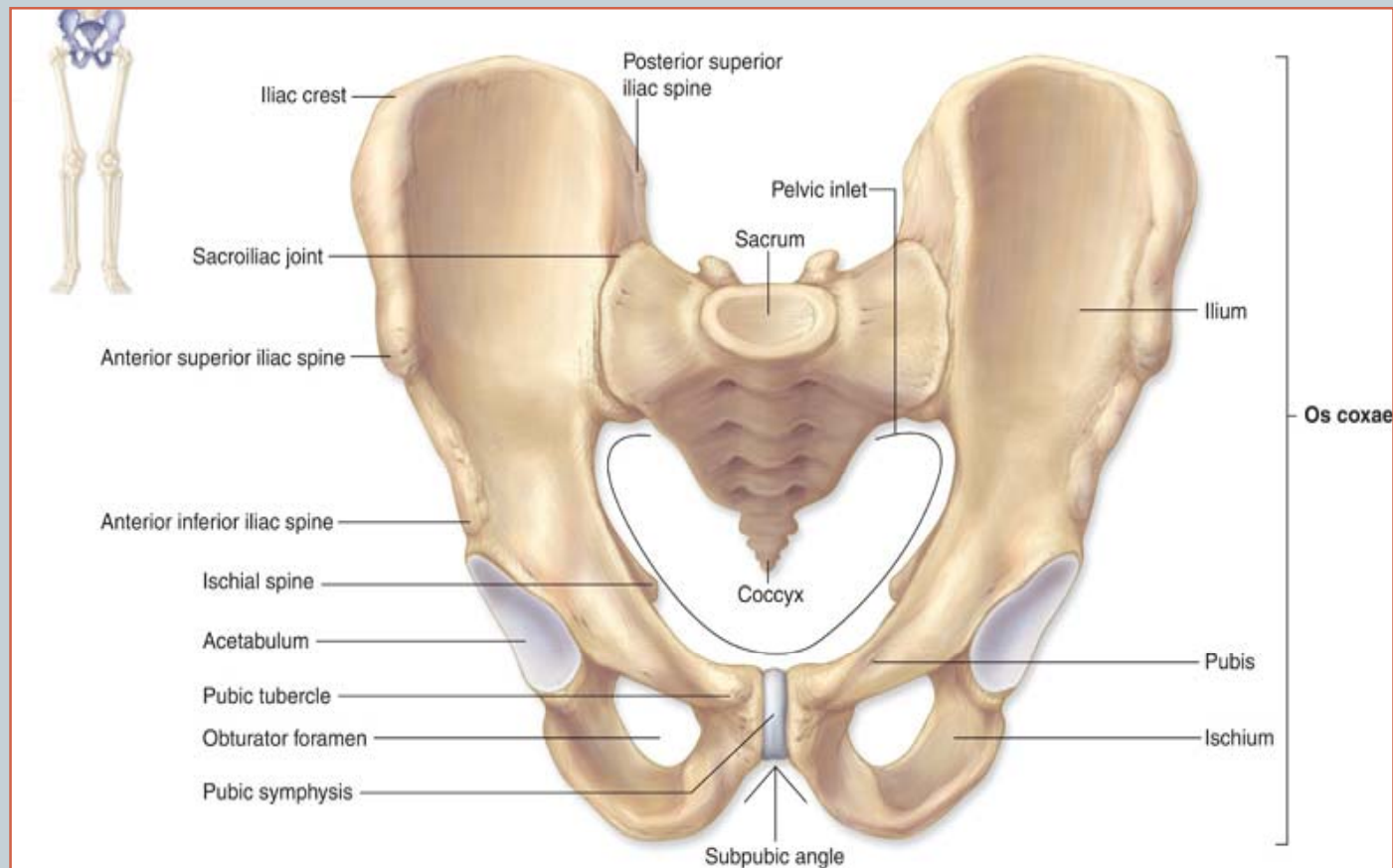
Hand

- Carp or Wrist bones
Proximal part (4)
Distal part (4)
- Metacarpals (5)
- Phalanges (14)



Pelvis

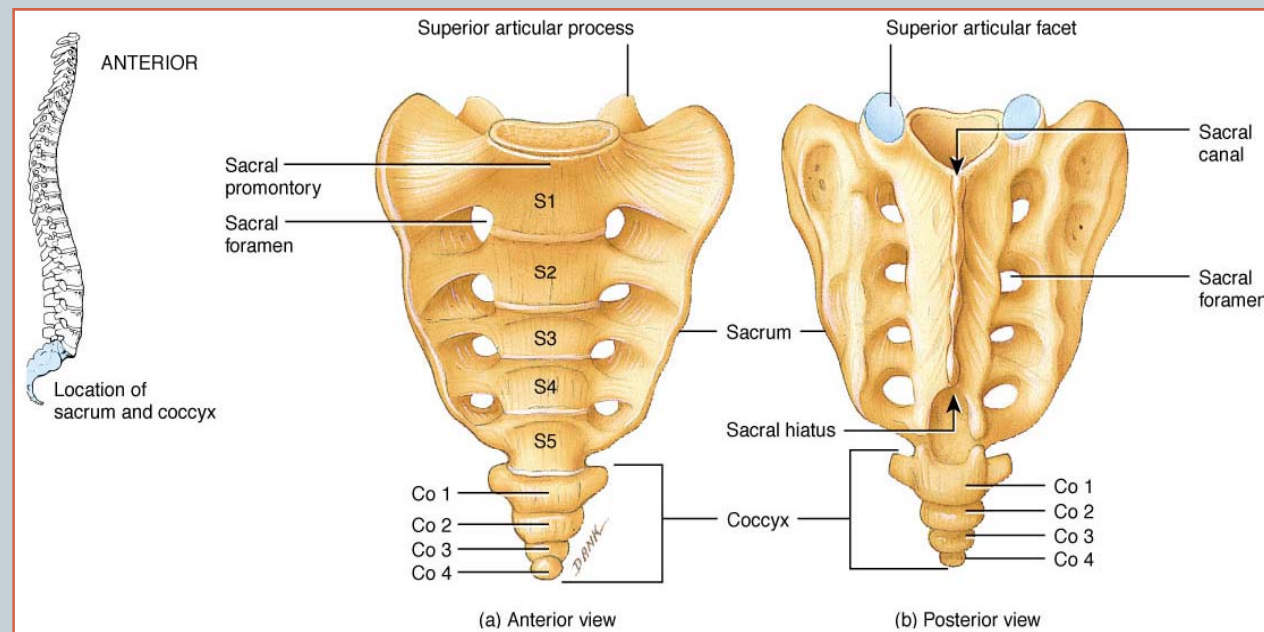
- Hip bones
- Sacrum
- Coccyx



Sacrum

- Flat & triangular bone
- Posterior wall
- 5 embryonic vertebra
- Sacroiliac joint

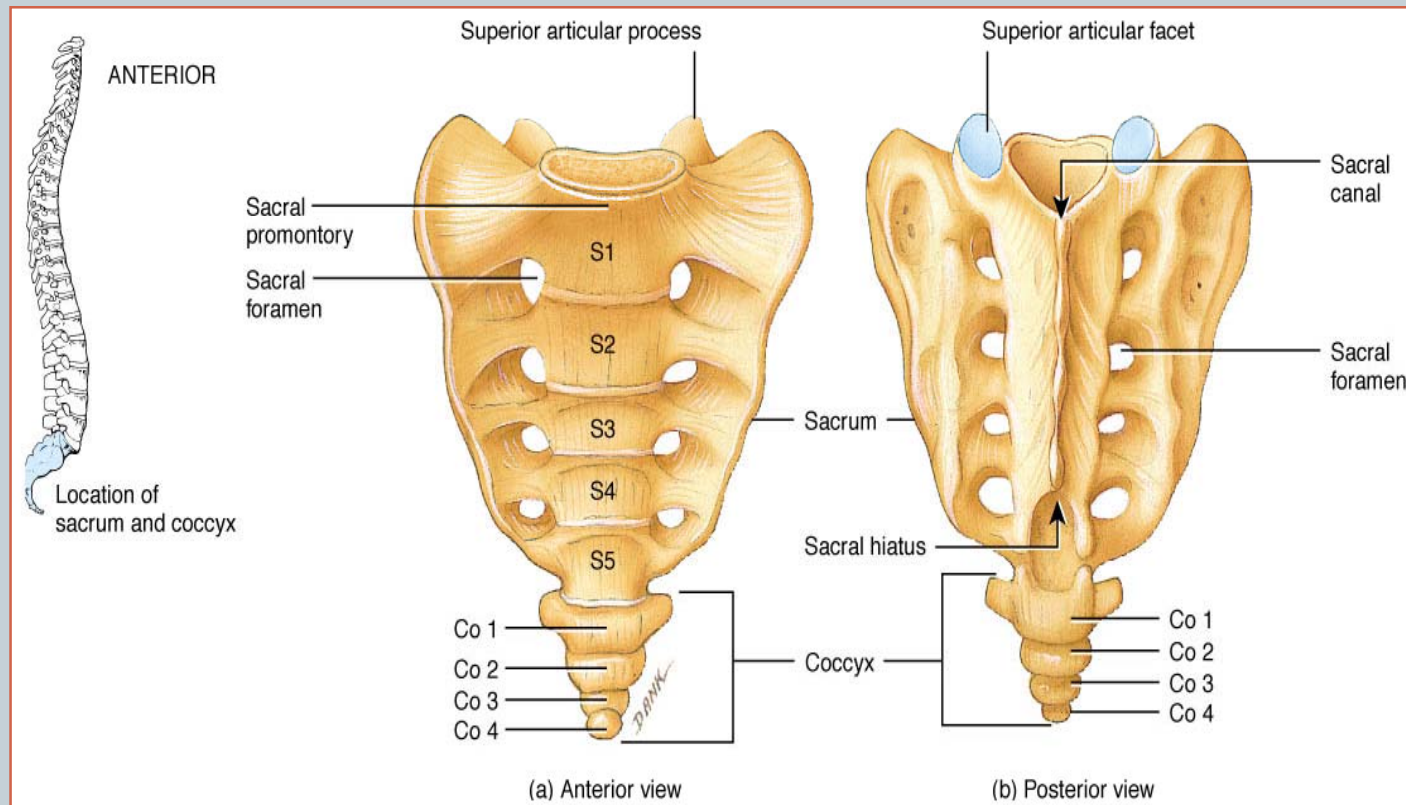
- Apex
- Base
- Canal
- Sacral nerve



Coccyx

- Small triangular bone
- 4-5 embryonic vertebra

- Base
- Apex



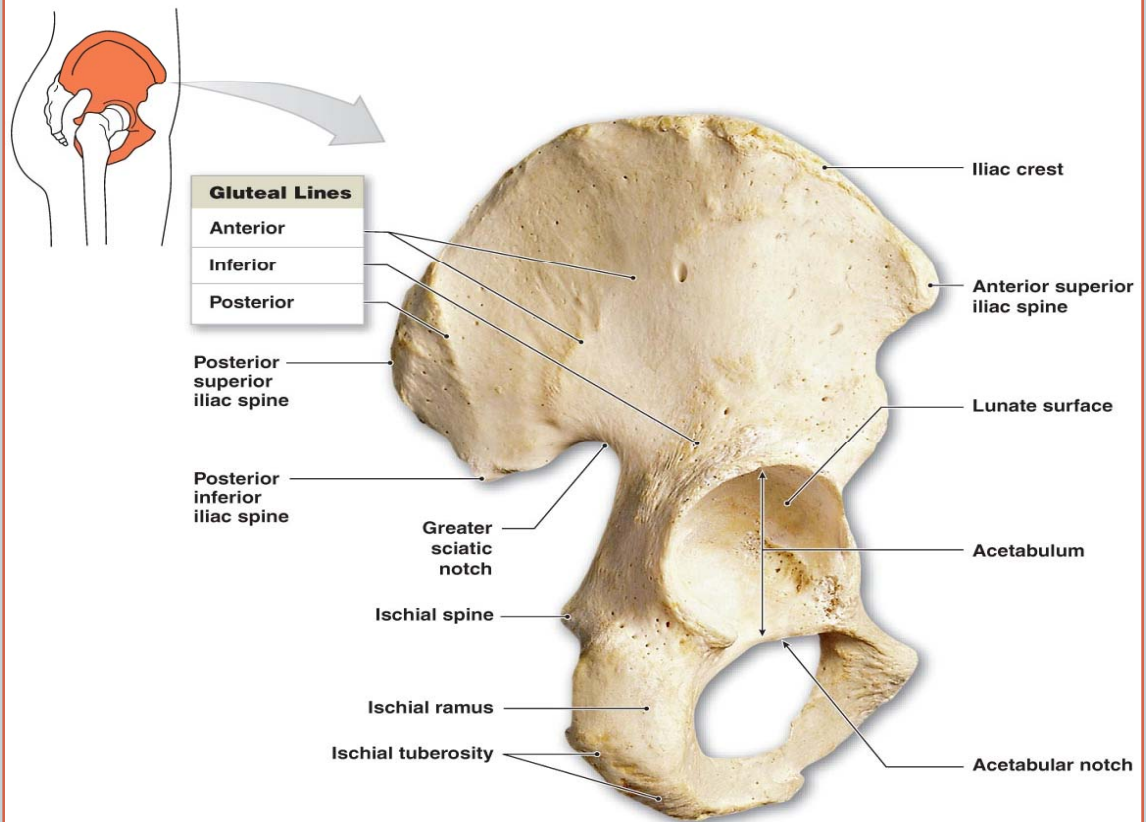
Hip

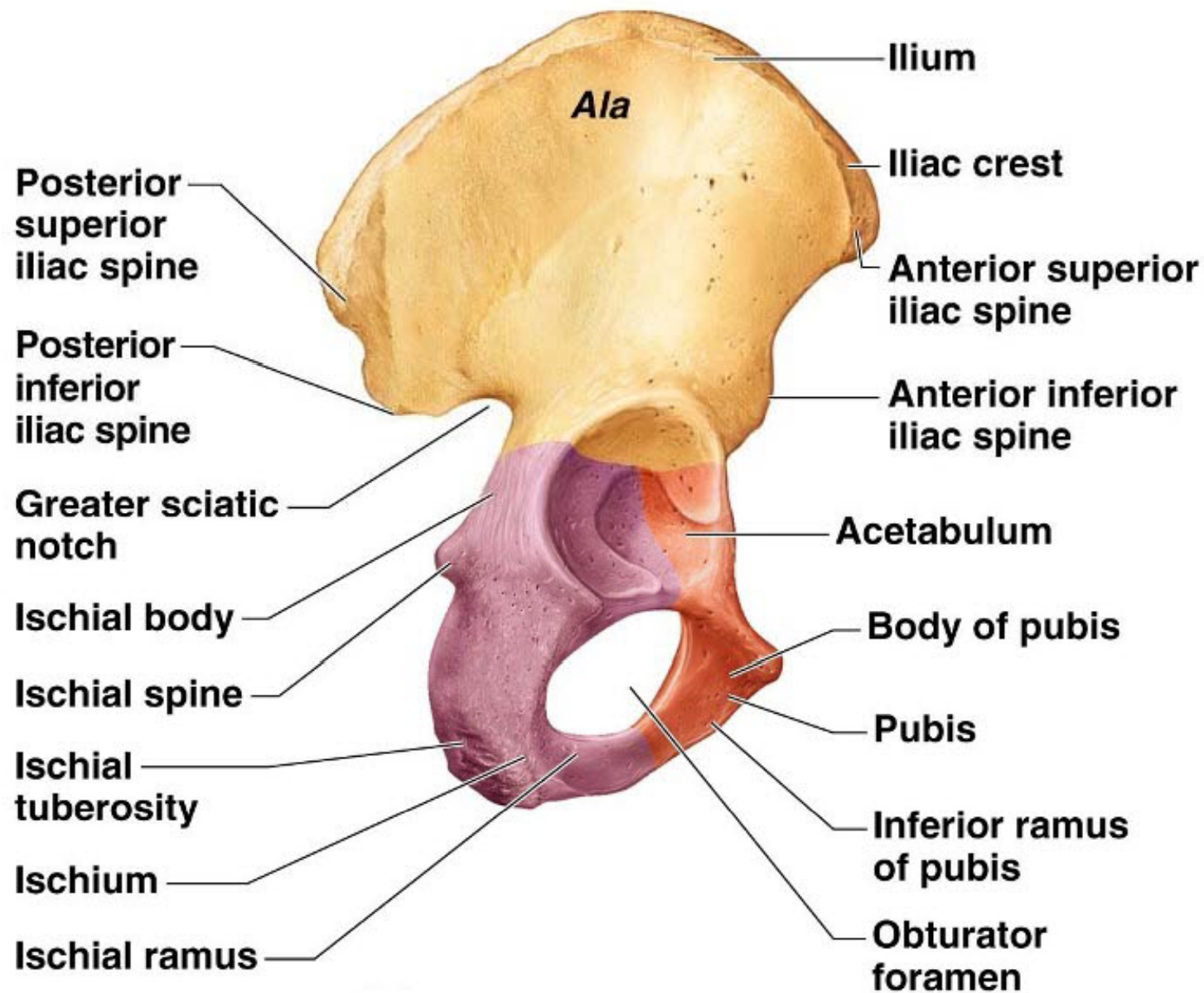


- Ilium
- Pubis
- Ischium

- Obturator
- Acetabulum

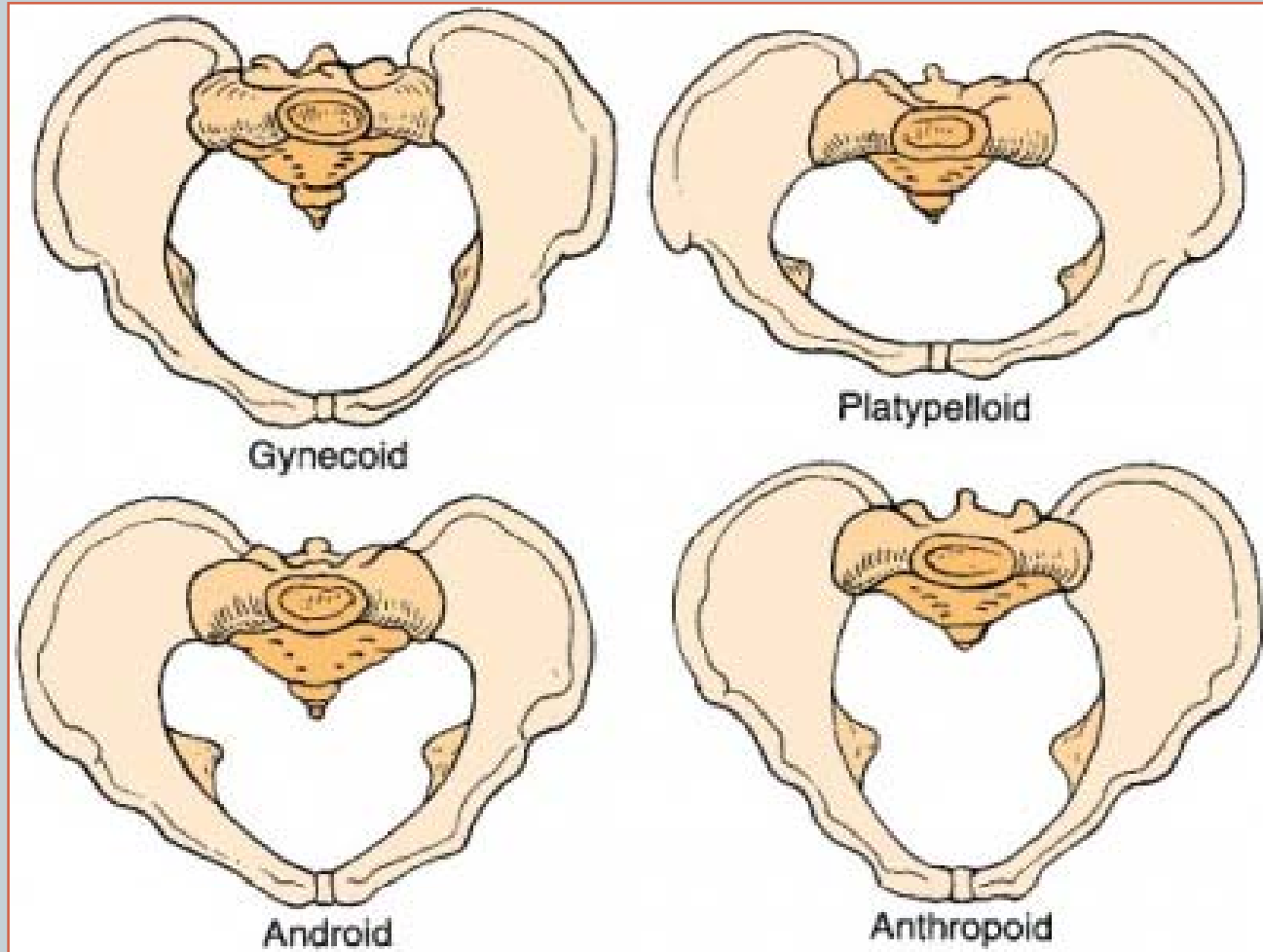
A lateral view of the right hip bone





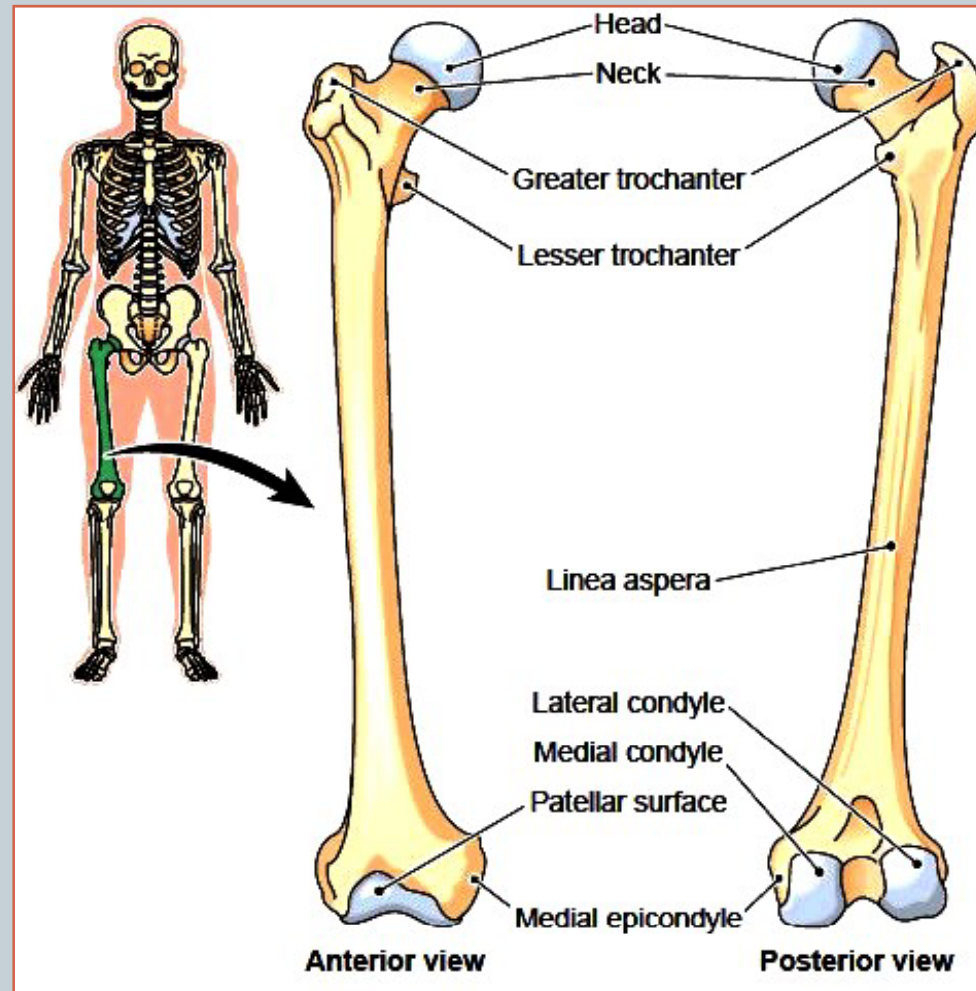
Hip classification

- Gynecoid
- Android
- Anthropoid
- platypelloid



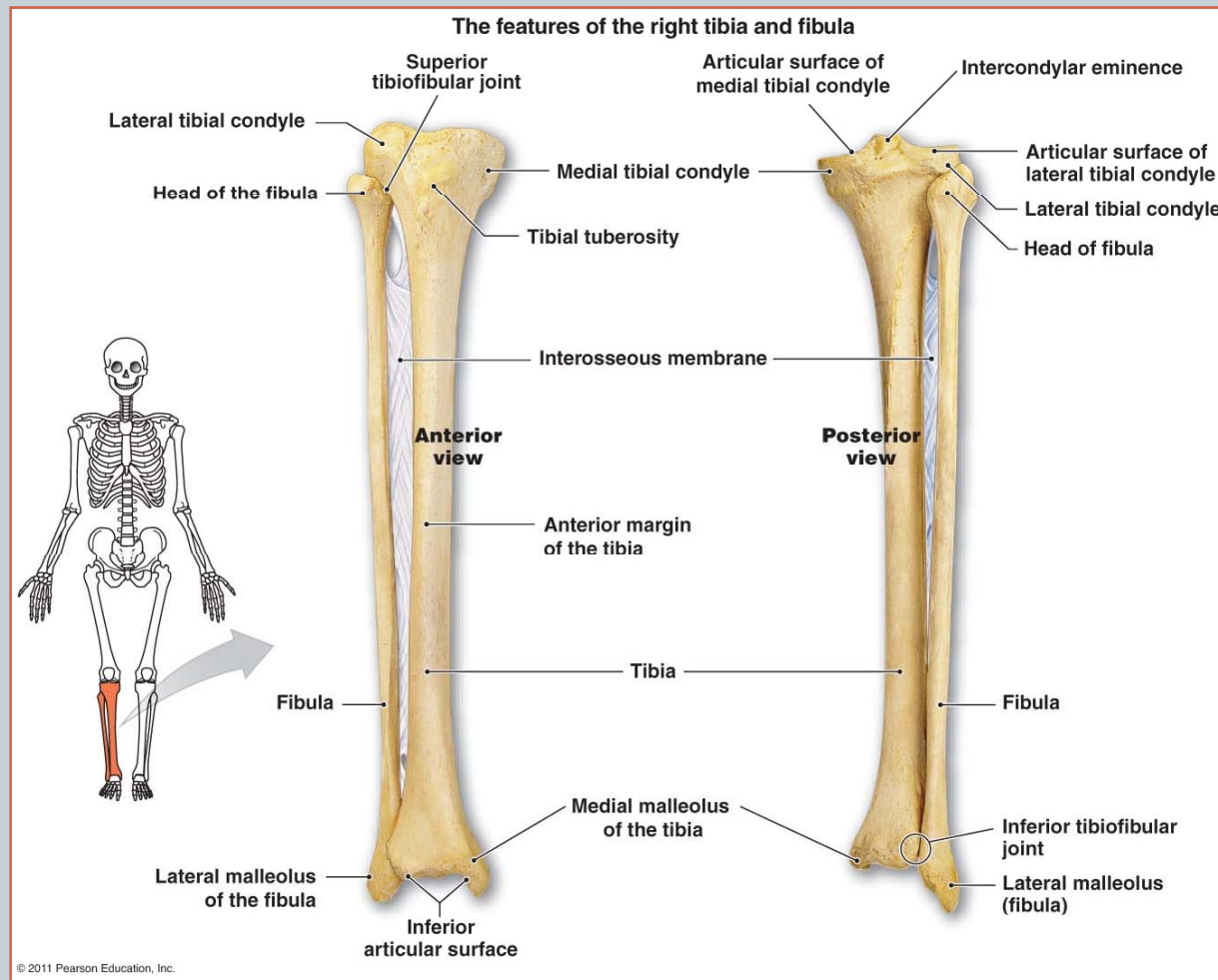
Femur

- Longest
- Strong
- Superior end
 - Head
 - Neck
 - greater trochanter
 - Lesser trochanter
- Shaft
 - Linea aspera
- Inferior end
 - Medial epicondyle
 - Lateral epicondyle



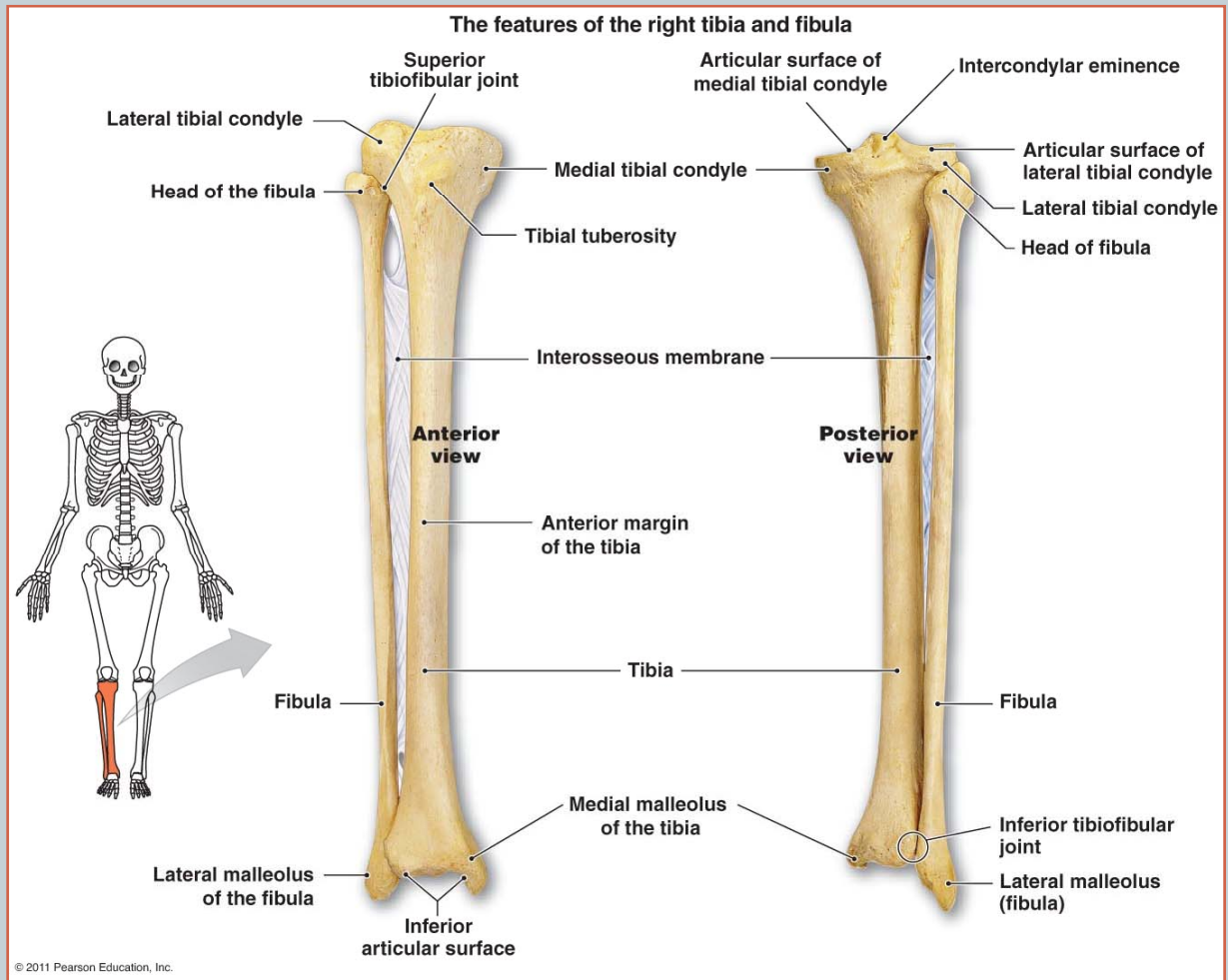
Tibia

- Superior end
Medial condyle
Lateral condyle
- Shaft
- Inferior end
Medial malleolus



Fibula

- Superior end (head)
- Shaft
- Inferior end
Lateral malleolus



Foot

- ***Tarsus***

7 bones

2 proximal layer

5 distal layer

- ***5 Metatarsus***

- ***14 Phalanges***

