

The skull

- ❖ It is the skeleton of the head.
- ❖ It is formed of **22** bones united together by fibrous joints called **sutures**.
- ❖ **21** of them are immovable bones and **one** single movable bone called the **mandible**.
- ❖ **5** of them are unpaired (single) and **8** are paired. } immovable
21
8x2 = 16

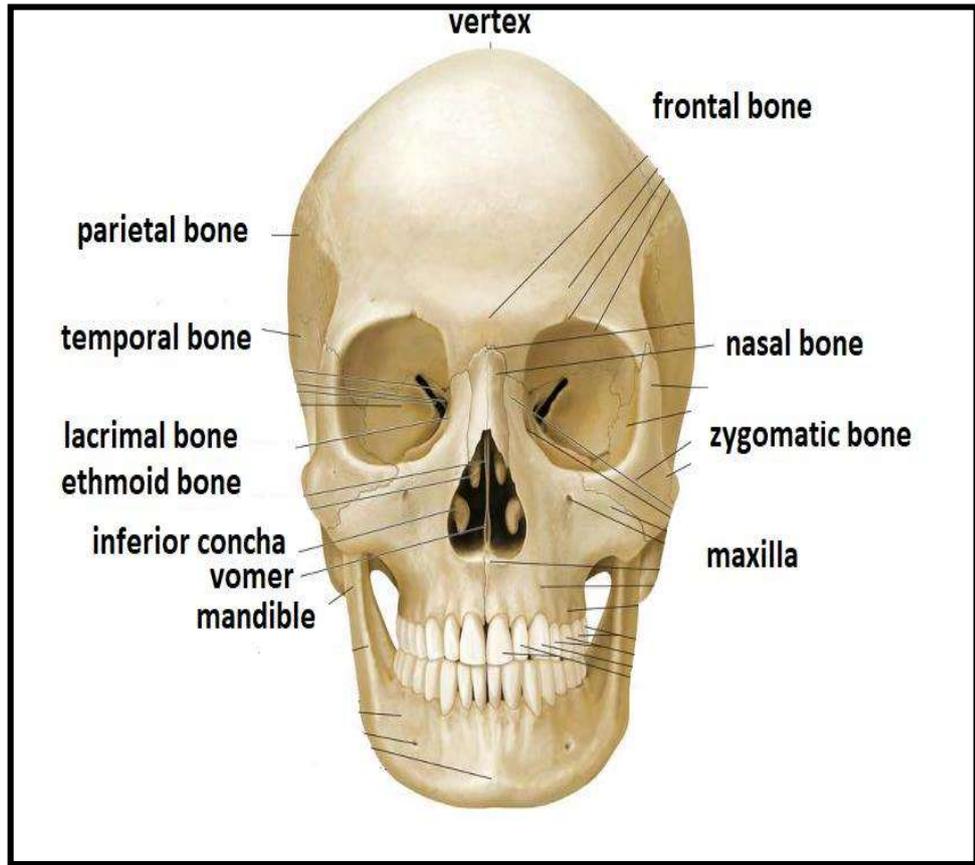
Parts of the skull:

- + Large postero-superior part called **cranium** that encloses the brain.
- + Small antero-inferior part called **facial skeleton**. } facial bone
mandible
- + The **facial skeleton** is furtherly subdivided into:
 1. upper part fixed called **facial bones** and
 2. lower movable part called **mandible**

Bones of the skull include:

- ⊗ **Paired bones:** ① Parietal, ② temporal, ③ zygomatic, ④ maxillary, ⑤ lacrimal, ⑥ nasal, ⑦ inferior concha and ⑧ palatine bones.
- ⊗ **Unpaired bones:** ① Frontal, ② ethmoid, ③ sphenoid, ④ vomer and ⑤ occipital bones
- ⊗ The skull has five surfaces called **normae**:

1. **Norma verticalis**; upper surface viewed from the top ← من الأعلى
2. **Norma frontalis**; anterior surface viewed from the front ← من الأمام
3. **Norma occipitalis**; posterior surface viewed from the back ← من الخلف
4. **Norma lateralis**; lateral surface viewed from the side ← من الجنب
5. **Norma basalis**; inferior surface viewed from the base ← من الأسفل



Bones of skull

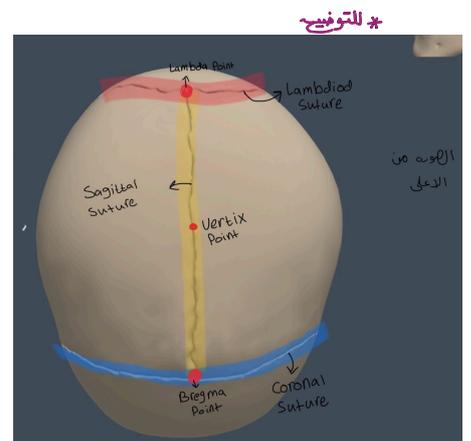
Norma Verticalis

- It is the superior aspect of the skull .
- It is formed of **4 bones**:
 - 1 frontal (anteriorly)
 - 2 parietals (on the sides)
 - 1 occipital (posteriorly).

It has the following features:

✗ 3 Sutures :

- 1. Coronal** ; between the frontal & the 2 parietal bones
- 2. Sagittal** ; between the parietal bones
- 3. Lambdoid**; between the occipital & the 2 parietal bones



infant موجود عند → **N.B. Metopic** ; is present only in children skulls until the age of eight years.
 Pair of Frontal bone يفعل ال

ANATOMY OF HEAD

☒ **2 Eminences:** بروز

- a- Frontal eminence
- b- Parietal eminence

☒ **2 Points :**

a. **Bregma :**

- It is the meeting of the sagittal with the coronal sutures.
- In the newly born skull it is occupied by a rhomboid shaped membrane called the **anterior fontanelle**.
- It ^{تنظم}ossifies and closes 18 months after birth. ⇒ (سنه 18 شهر)

b. **Lambda:**

- It is the meeting of the sagittal with the lambdoid sutures.
- In the newly born skull it is occupied by a triangular membrane called the **posterior fontanelle**.
- It ossifies and closes 3-6 months after birth.

☒ **2 lines:**

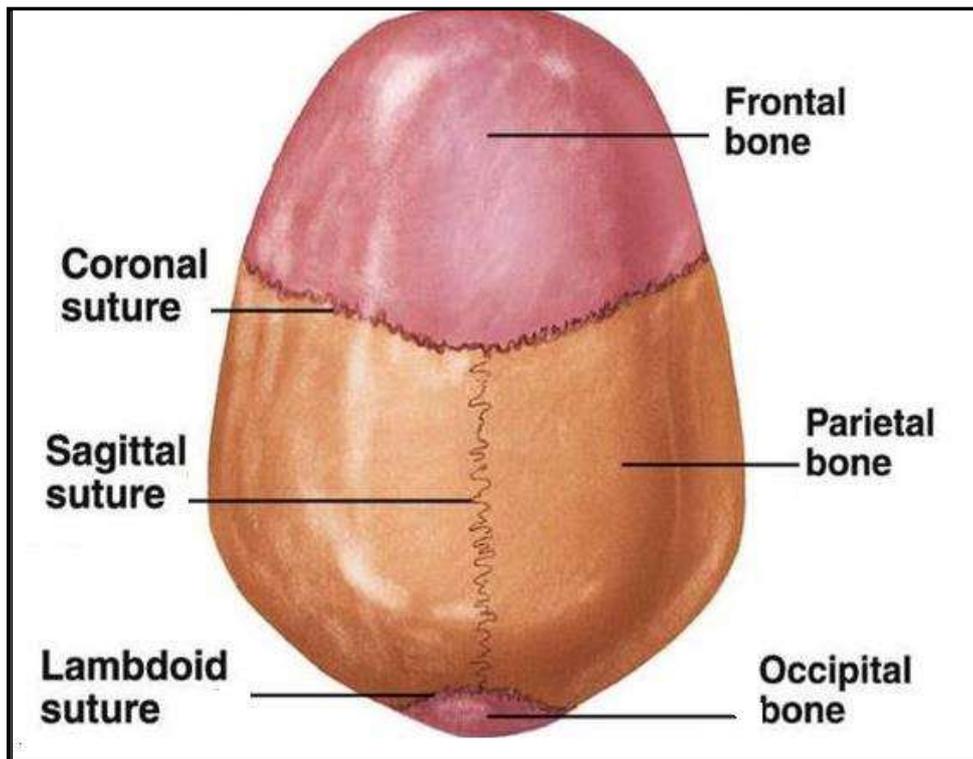
- **Temporal lines:** Usually double.

☒ **2 Foramina:**

▪ **Parietal foramen:**

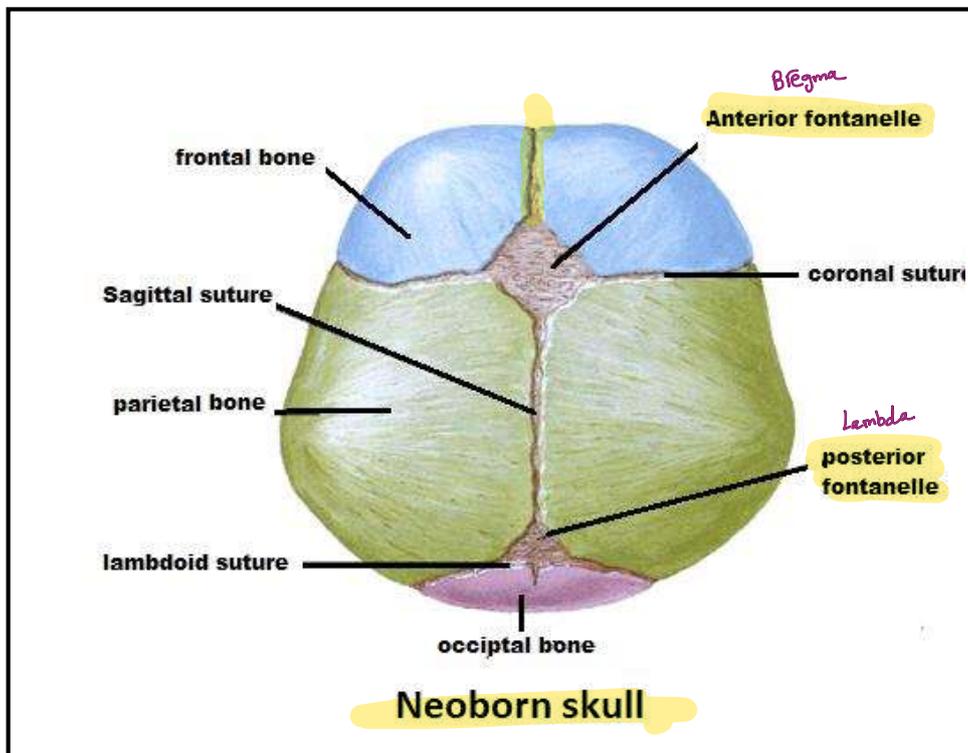
- ° It is present 3 cm anterior to the **lambda** , one on each side of the sagittal suture
- ° Transmits emissary vein connecting the scalp veins with the superior sagittal sinus.

ANATOMY OF HEAD



* الفرق بين البالغ والطفل

Adult norma verticalis



newborn norma verticalis

Norma Frontalis

- It is the anterior aspect of the skull.
- It is formed of 7 bones:
 - ✓ 1 frontal ... 2 nasal 2 zygomatic 2 maxillary
 - ✓ It has **the following foramina:**
 1. Supraorbital notch (or foramen) for supraorbital vessels and nerve
 2. Infraorbital foramen for infraorbital vessels and nerve
 3. Zygomaticofacial foramen for zygomaticofacial vessels and nerve

- **Regions:**
Norma frontalis includes the following regions:
Frontal ,orbital & facial

A. Frontal region:

- ◆ it is formed by the frontal bone

2. Supra-orbital notch or foramen:

B. Orbital region

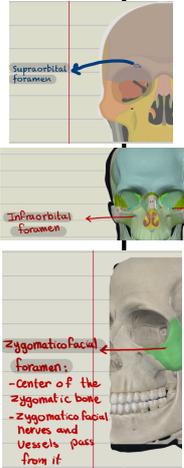
- ◆ The orbit is a pyramidal shaped space in the norma frontalis
- ◆ It has an apex placed deeply , a base which opens anteriorly and **4** walls.

☒ **Apex :**

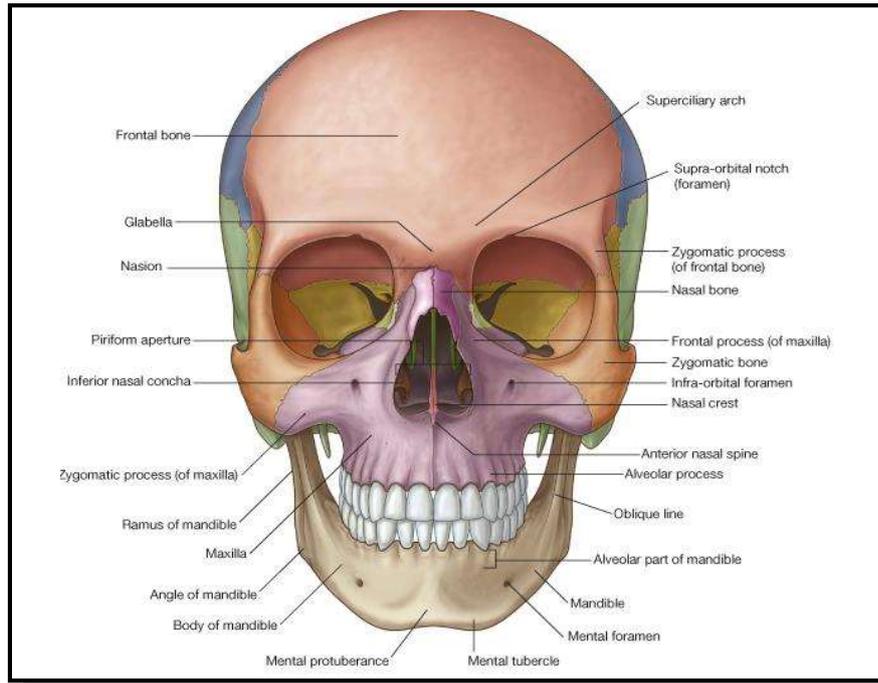
Is the optic foramen.

☒ **Base has 4 Boundaries:**

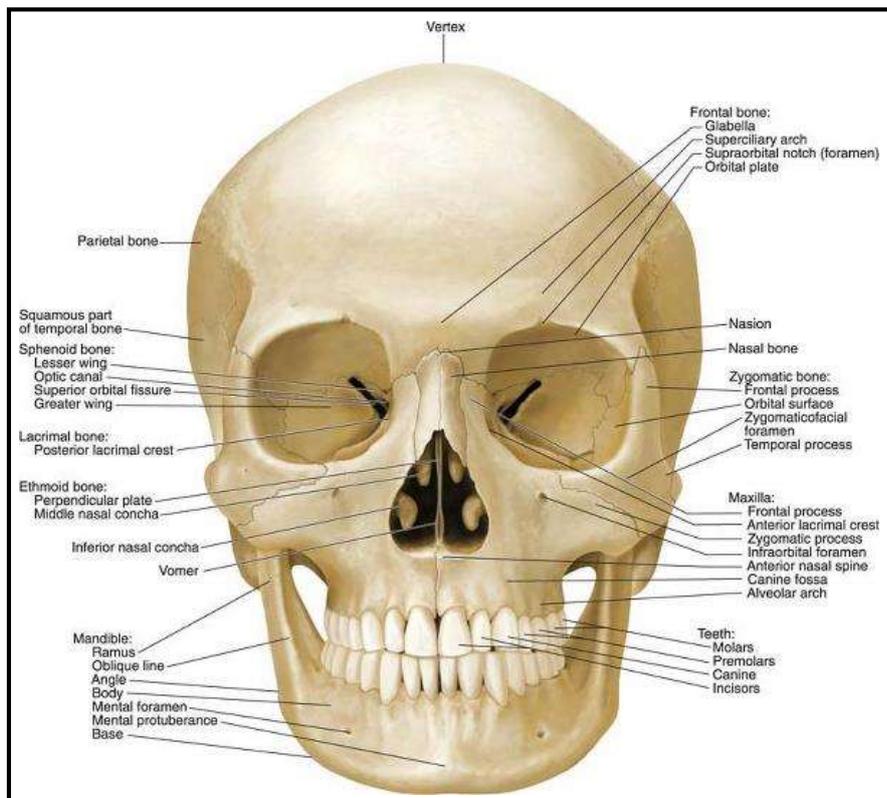
1. Supra orbital margin (containing supraorbital notch).
2. Lateral margin (containing frontozygomatic suture).
3. Medial margin
4. Inferior margin



ANATOMY OF HEAD



Norma frontalis



Norma frontalis

ANATOMY OF HEAD

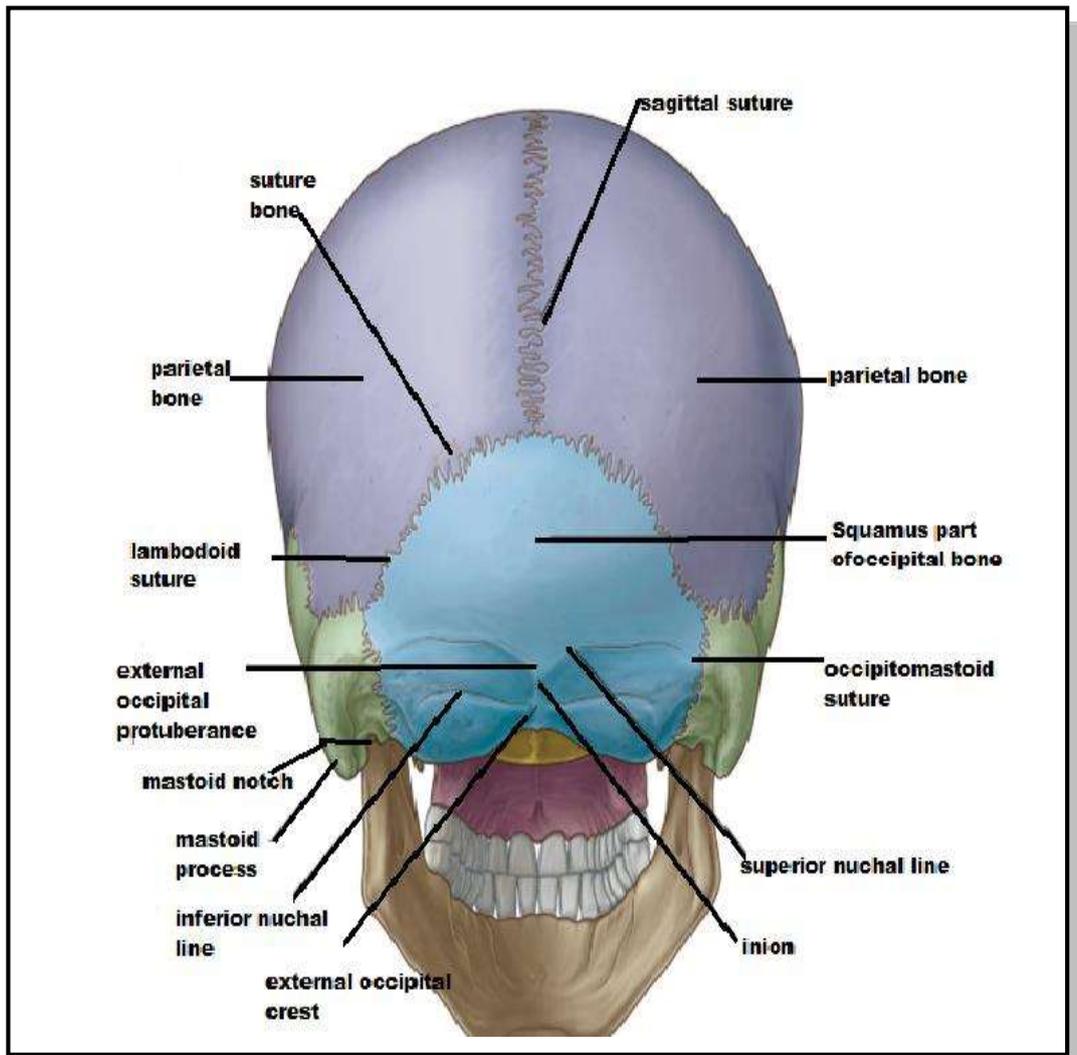
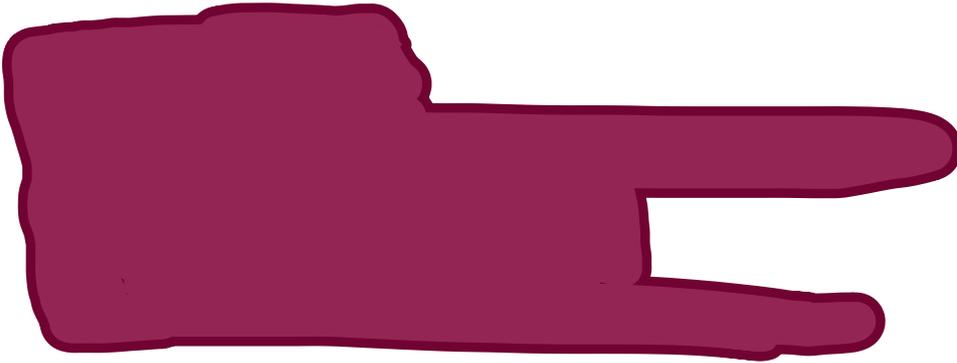
Facial region

- ◆ Formed by : Nasal, Maxillary bone & zygomatic bone.
- ◆ It has the following features:
 - ☒ **Dorsum of the nose:**
 - Lies between the 2 orbital openings.
 - Formed by :
 - a. The frontal process of maxilla,
 - b. 2 nasal bones
 - ☒ **Anterior nasal aperture:**
 - Shape: Piriform in shape
 - ☒ **Features of the facial region:**
 1. Anterior nasal spine
 2. Canine eminence
 3. Canine fossa
 4. Incisive fossa
 5. Infra-orbital foramen
 6. Zygomatic facial foramen
 7. Alveolar process of maxilla: This provides the sockets for the maxillary teeth.

Norma Occipitalis

- ❖ It is the posterior aspect of the skull .
- ❖ It is formed of **5** bones:
 - 2 parietal bones (above)
 - 2 mastoid processes of the temporal bones (on the sides)
 - 1 squamous part of occipital bone (posteriorly).
- ❖ It has the following features:
 - ☒ **Sutures:**
 - Posterior aspect of sagittal suture, Lambdoid suture and occipito-mastoid suture

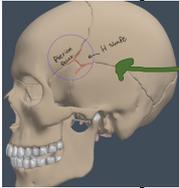
ANATOMY OF HEAD



features of norma occipitalis

Norma lateralis

- ❖ It is the lateral aspect of the skull .
- ❖ It is formed of following bones as arranged from before backwards:
 - ☒ Above : frontal , parietal and occipital bones.
 - ☒ Below : sphenoid, temporal and occipital bones,.
- ❖ **It has the following features :**



A. Pterion:

- ☒ It is an area of meeting of 4 bones:
 - * Frontal* Parietal* Temporal* Greater wing of the sphenoid
- ☒ The 4 bones are connected by H shaped suture

[Redacted text]

- ☒ It overlies the anterior branch of middle meningeal artery

[Redacted text]

C. Two temporal lines.

[Redacted text]

G. Tympano-mastoid fissure:

[Redacted text]

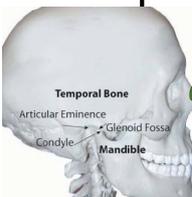
- ☒ It transmits the auricular branch of vagus.

H. Zygomatic arch:

- ☒ It is formed by :
 - * The zygomatic process of the temporal bone.
 - * The temporal process of the zygomatic bone.

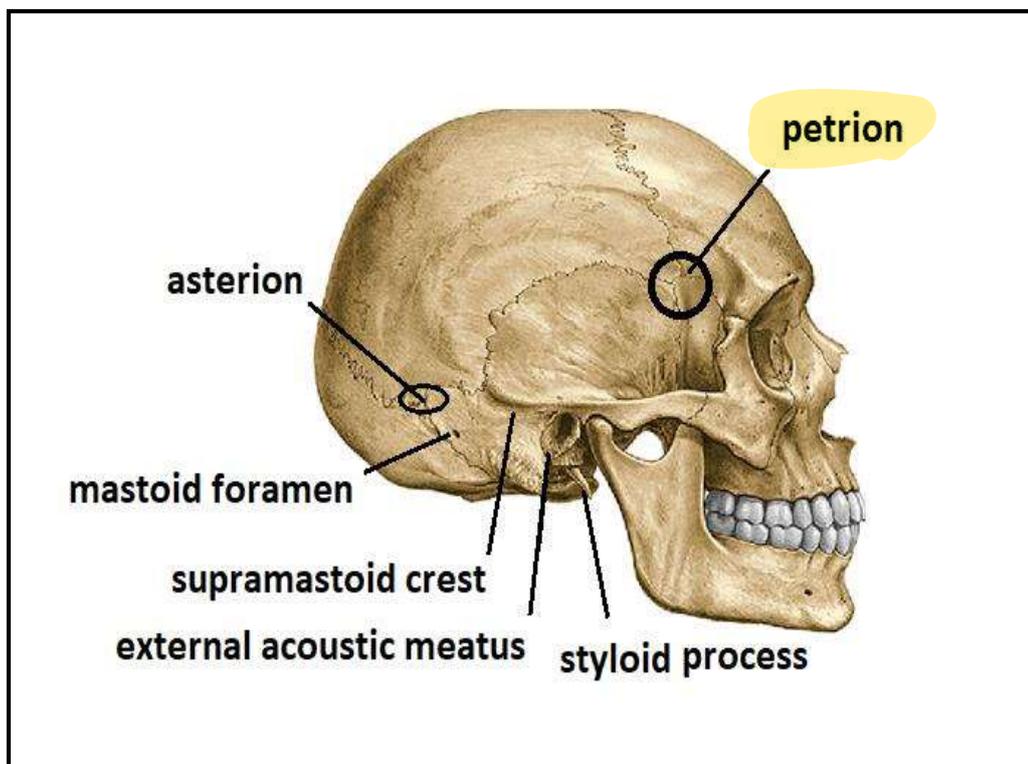
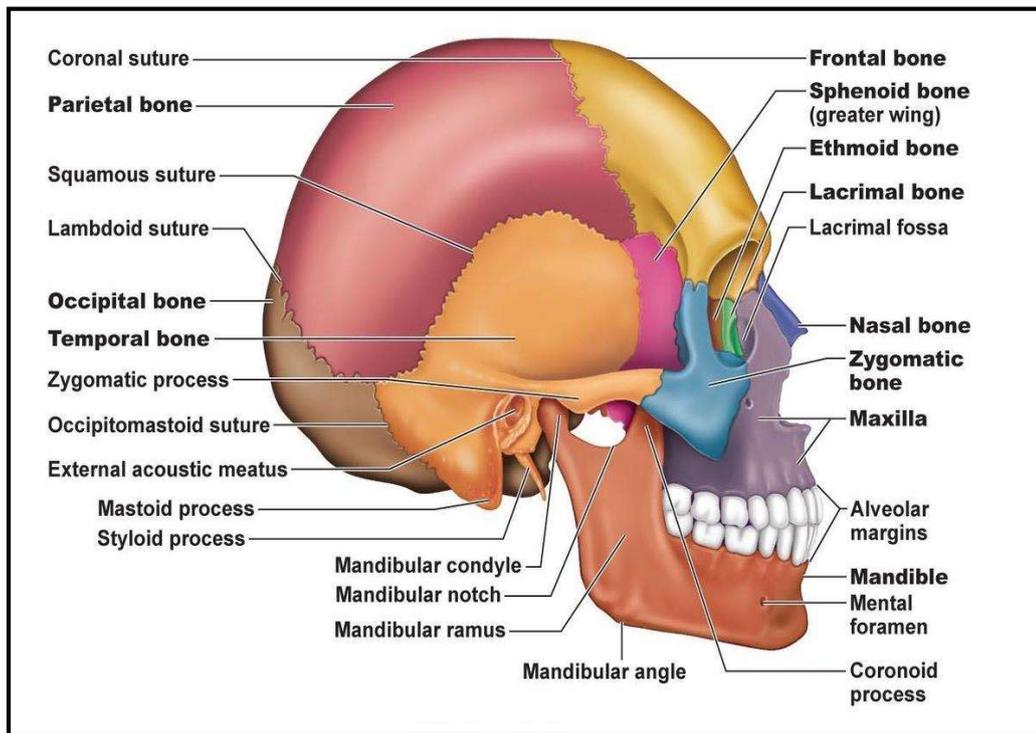
I. Glenoid fossa:

- ☒ It receives the articulation of the head of mandible to form temporo-mandibular joint (TMJ).

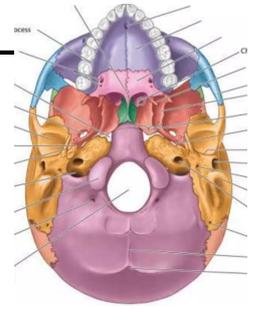


J [Redacted text]
K [Redacted text]
[Redacted text]

ANATOMY OF HEAD



Features and landmarks of norma lateralis



Norma Basalis

- ❖ It is the inferior aspect of the skull .
- ❖ It is divided by 2 imaginary transverse lines into 3 regions : anterior , middle & posterior

- + *anterior imaginary line*: along the posterior border of hard palate
- + *Posterior line*: along the posterior border of foramen magnum

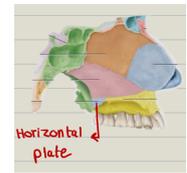
1. Anterior region of Norma basalis

- ❖ It is formed of the following bones:
Hard palate and Alveolar process of maxilla.

Hard Palate (Bony Palate)

? Formed by :

- ☒ Anterior 2/3 : Palatine process of maxillae .
- ☒ Posterior 1/3 : Horizontal plates of palatine bone.

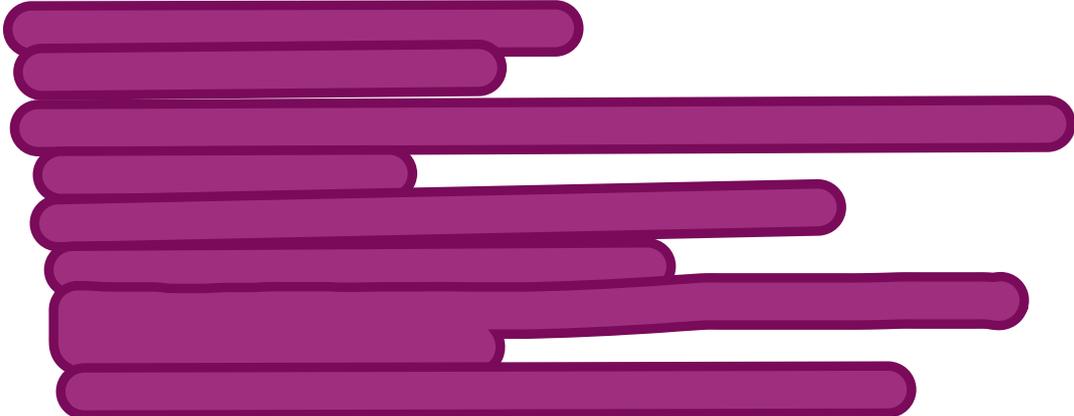
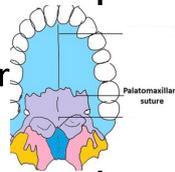
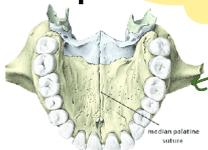


? Bounded by:

- ☒ *Anteriorly and laterally* : Alveolar process of maxillae

Sutures:

- ☒ Median palatine suture :Lies in the median plane between the 2 sides of hard palate
- ☒ Palato-maxillary suture: Between the anterior 2/3 and posterior 1/3 of hard palate



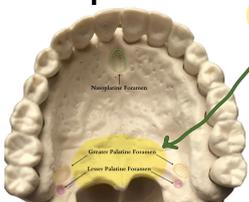
5. Foramina of the anterior region:

- ☒ 4 incisive foramina:



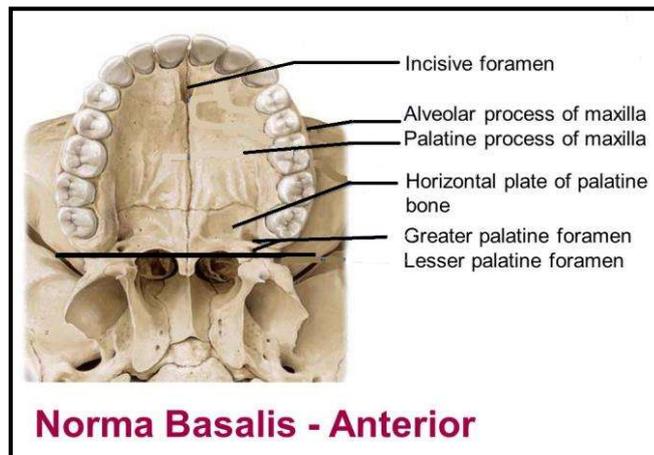
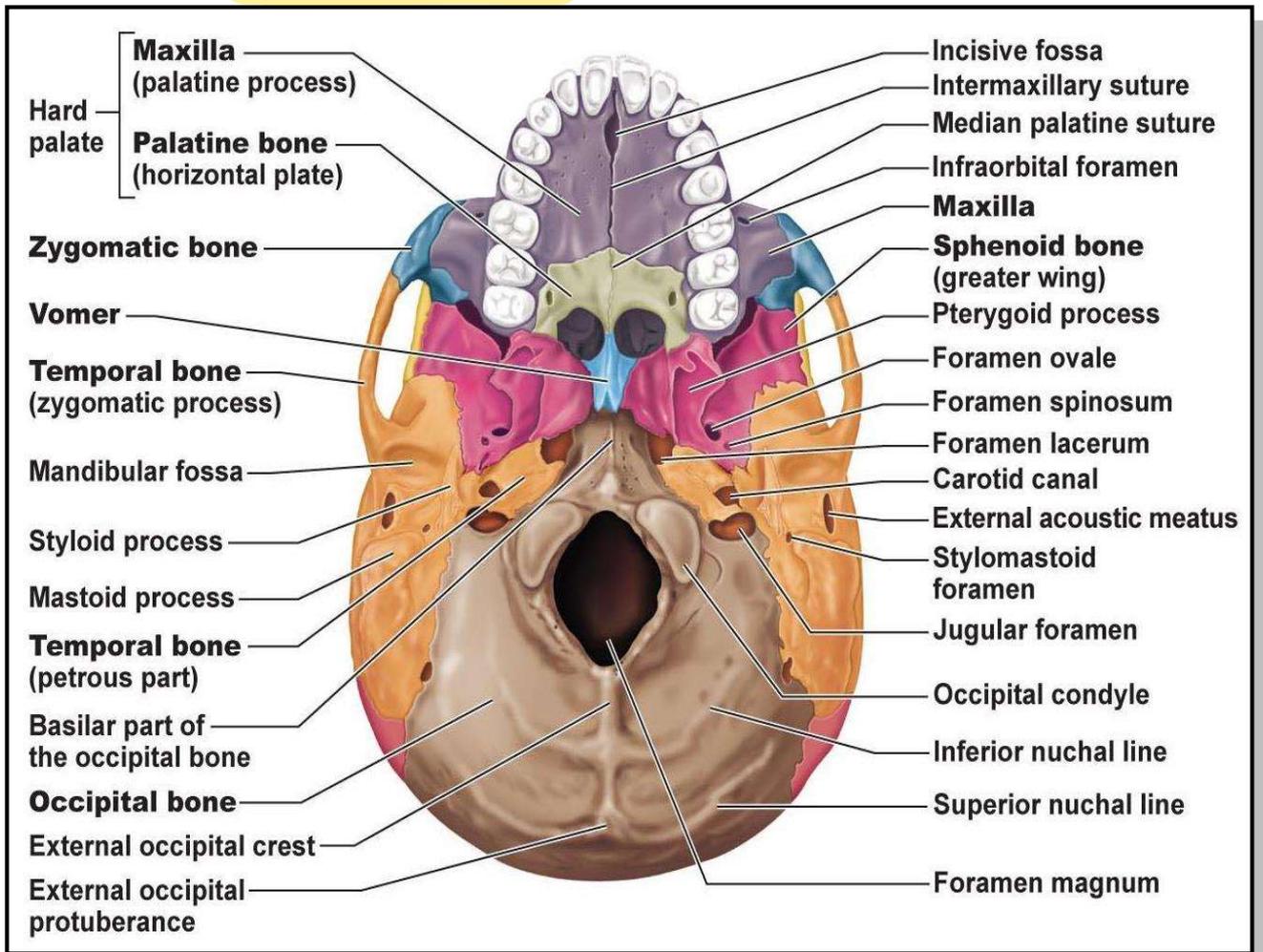
- ☒ Greater palatine foramen:

- + Lies at the postero-lateral angle of hard palate.



ANATOMY OF HEAD

☒ Lesser palatine foramen: lies behind the palatine crest



Norma basalis and its anterior region

ANATOMY OF HEAD

Middle region of norma basalis

It is formed of the following bones:

- ⊛ **Anteriorly in the middle** : Vomer and body of sphenoid
- ⊛ **Laterolaterally**: Pterygoid process and infratemporal surface of the greater wing of sphenoid
- ⊛ **Posteriorly laterally**: Petrous, mastoid, tympanic & squamous parts of temporal bone
- ⊛ **Posteriorly in the middle** Basilar part of occipital bone

❖ Features of the middle region:

1. Posterior apertures of nose (Posterior nasal choana):

- ⊛ These are 2 large openings separated from each other by the vomer.

2. Pterygoid process:

- ⊛ It lies lateral to the posterior nasal opening.
- ⊛ Anteriorly ; it is supplied from the back of maxilla by the Pterygo-maxillary fissure.
- ⊛ It splits into : Medial & lateral pterygoid plates
- ⊛ Both plates enclose the pterygoid fossa.
- ⊛ *Below* ; it ends in the pterygoid hamulus

3. Vaginal process:

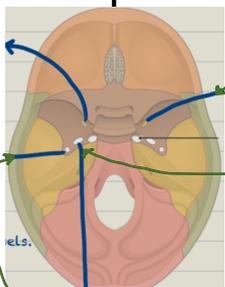
- ⊛ Extends medially from the upper end of medial plate to articulate with the ala of vomer.
- ⊛ **Petrovino-vaginal canal:** lies lateral to vaginal process.

4. Pterygoid canal:

- ⊛ Its posterior end is seen above the pterygoid tubercle on anterior margin of foramen lacerum.
- ⊛ It transmits the nerve of pterygoid canal (vidian nerve)

5. Foramina and fissures in the middle part of norma basalis:

- a. **Inferior orbital fissure** for infraorbital and zygomatic branches of maxillary nerve and accompanying vessels.
- b. **Pterygomaxillary fissure**—leads to the pterygopalatine fossa.
- c. **Foramen lacerum**—no major structure through its lower part; internal carotid artery in the upper part; meningeal branches of the ascending pharyngeal artery and emissary veins from the cavernous sinus.
- d. **Foramen ovale** for mandibular nerve, lesser petrosal nerve, accessory meningeal branch of maxillary artery, emissary vein from cavernous sinus and middle meningeal vein.
- e. **Foramen spinosum** for middle meningeal artery and nervous spinosus
- f. **Pterygoid canal** for nerve of pterygoid canal and accompanying vessels
- g. **Petrosphenoidal groove** for pharyngotympanic tube



ANATOMY OF HEAD

h. **Trotympanic fissure** for chorda tympani branch of facial nerve.

❖ The petrous part of temporal bone

Position lies between :

- ☒ The greater wing of sphenoid
- ☒ The basilar part of occipital bone

It shows the following features :

- ☒ Foramen lacerum: separates the petrous from sphenoid body.
- ☒ Carotid canal: thr inferior surface of petrous bone. its upper part transmits the internal carotid artery and the sympathetic plexus around the artery

☒ Jugular foramen: **transmits the following :**

1. Anteromedially: inferior petrosal sinus
2. Posteromedially: internal jugular vein
3. In the middle IX, X & vagus cranial nerves

☒ Jugular fossa

☒ Mastoid canaliculus:

☒ Tympanic canaliculus:

☒ **Styloid process : Gives origin to 3 muscles & 2 ligaments:**

Muscles :

1. Stylopharyngeus
2. Stylohyoid
3. Styloglossus.

Ligaments :

1. Stylomandibular
2. Stylohyoid

❖ The mastoid part of temporal bone:

1. **Mastoid process:**

2. **Mastoid notch:**

- ☒ Lies on the medial side of mastoid process
- ☒ It gives origin to the posterior belly of digastric

3. **Occipital condyle:**

- ☒ It is a groove for the occipital artery

4. **Stylomastoid foramen:**

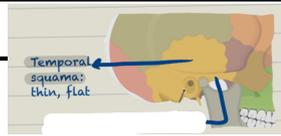
- ☒ Transmits the intracranial part of the facial nerve

❖ The tympanic part of temporal bone:

1. **Tympanic plate:** anterior to external acoustic meatus

2. **Squamo-tympanic fissure:** between the tympanic and squamous part of temporal bone.

ANATOMY OF HEAD



❖ The squamous part of temporal bone:

1. Mandibular fossa :

☒ It is a concave depression for articulation with the head of the mandible to form the temporo-mandibular joint (TMJ)

2. Articular eminence: in front of mandibular fossa.

❖ Basilar part of occipital bone:

☒ It is in front of foramen magnum

☒ It shows the following features

1. Petrous part of occipital condyle:

2. Foramen magnum:

☒ It is a large oval foramen between the 2 occipital condyles on both sides

3. Occipital condyle:

☒ They articulate with the 2 superior articular facets of atlas vertebra to form the atlanto-occipital joint.

4. Anterior condylar canal (Hypoglossal canal)

☒ It transmits the hypoglossal nerve

5. Condylar fossa:

☒ Lies behind the occipital condyle.

☒ It may contain the posterior condylar canal.

6. Jugular process: small to groove for occipital artery.

3. Posterior region of nuchal basalis

It is formed of the following lines:

- Mastoid part of temporal bone
- Squamous part of occipital bone

It shows the following features

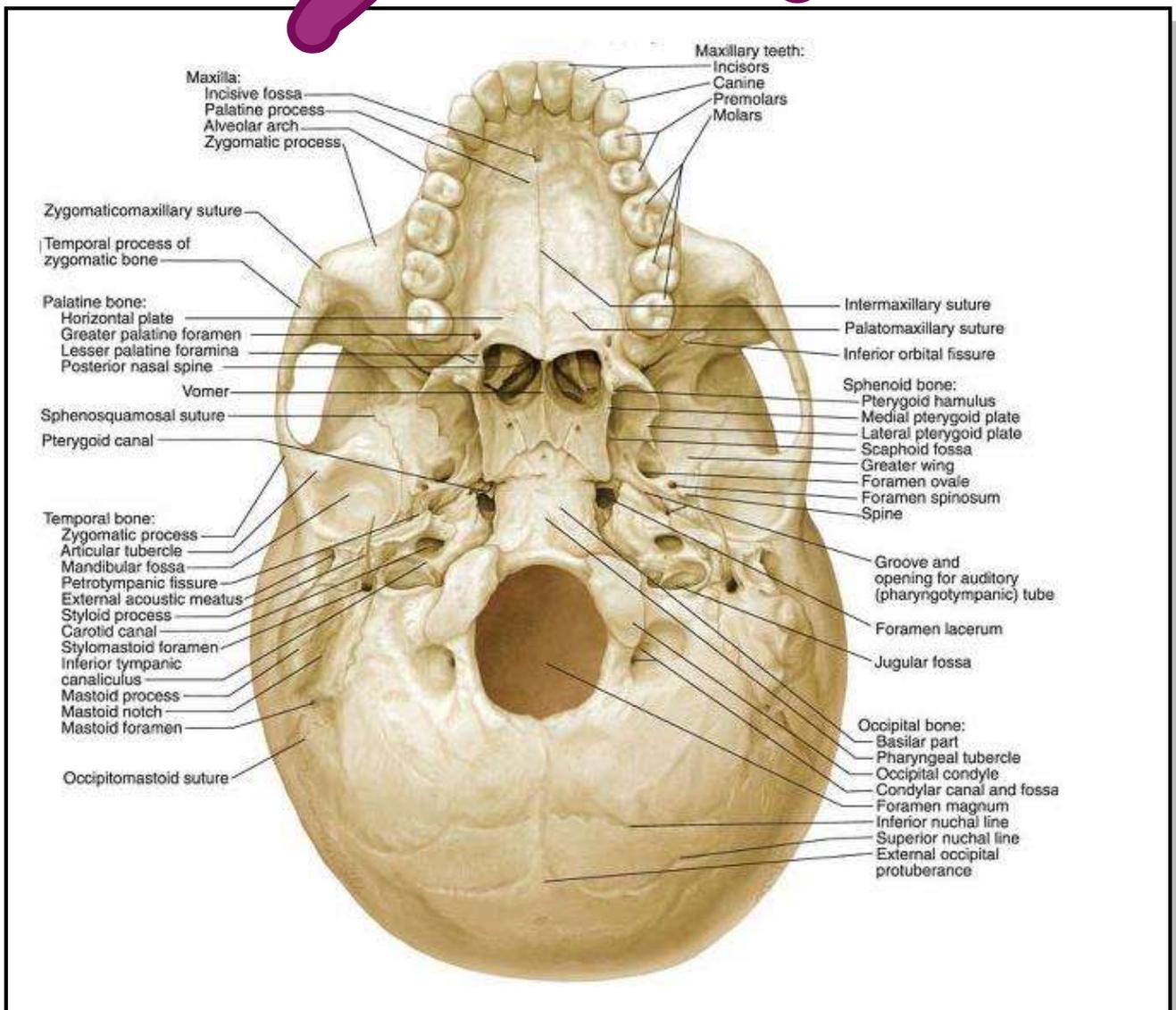
- External occipital protuberance
- External occipital crest
- Superior nuchal line
- Inferior nuchal line
- Transverse nuchal line

1. **Foramen magnum** for medulla, vertebral arteries, and spinal branch of accessory nerve

2. **Hypoglossal canal** for hypoglossal nerve, meningeal branch of ascending pharyngeal artery, emissary vein from basilar plexus

ANATOMY OF HEAD

3. **Posterior condylar canal** (posterior to occipital condyle): for emissary vein from sigmoid sinus
4. **Jugular foramen** for inferior petrosal sinus, Glossopharyngeal, vagus and accessory nerves, Internal jugular vein
5. **Mastoid canaliculus** for auricle branch of vagus nerve.
6. **Canaliculus for tympanic nerve** (branch of the glossopharyngeal nerve to the middle ear)
7. **Stylomastoid foramen** for facial nerve and stylomastoid artery
8. **Mastoid foramen** for emissary vein from sigmoid sinus.



Norma basalis