

■ The Axial Skeleton

Axial Skeleton



Facial Bones:

Maxillae bone articulates with every bone of the face except the mandible

■ Nasal Bones

- Form the bridge of the nose

■ Maxillae

- Form the upper jawbone
- Has the following processes:
 1. Frontal process superiorly
 2. Zygomatic process laterally
 3. Palatine process posteriorly
 4. Alveolar process inferiorly. This one contains sockets for the teeth.
- The palatine process form most of the hard palate
 - Separates the nasal cavity from the oral cavity

■ Zygomatic Bones

- Commonly called cheekbones, form the prominences of the cheeks
- The **temporal** process of this bone unite with the **zygomatic** process of the temporal bone to form the **zygomatic arch**.

- **Lacrimal Bones**

- Form a part of the medial wall of each orbit

- **Palatine Bones**

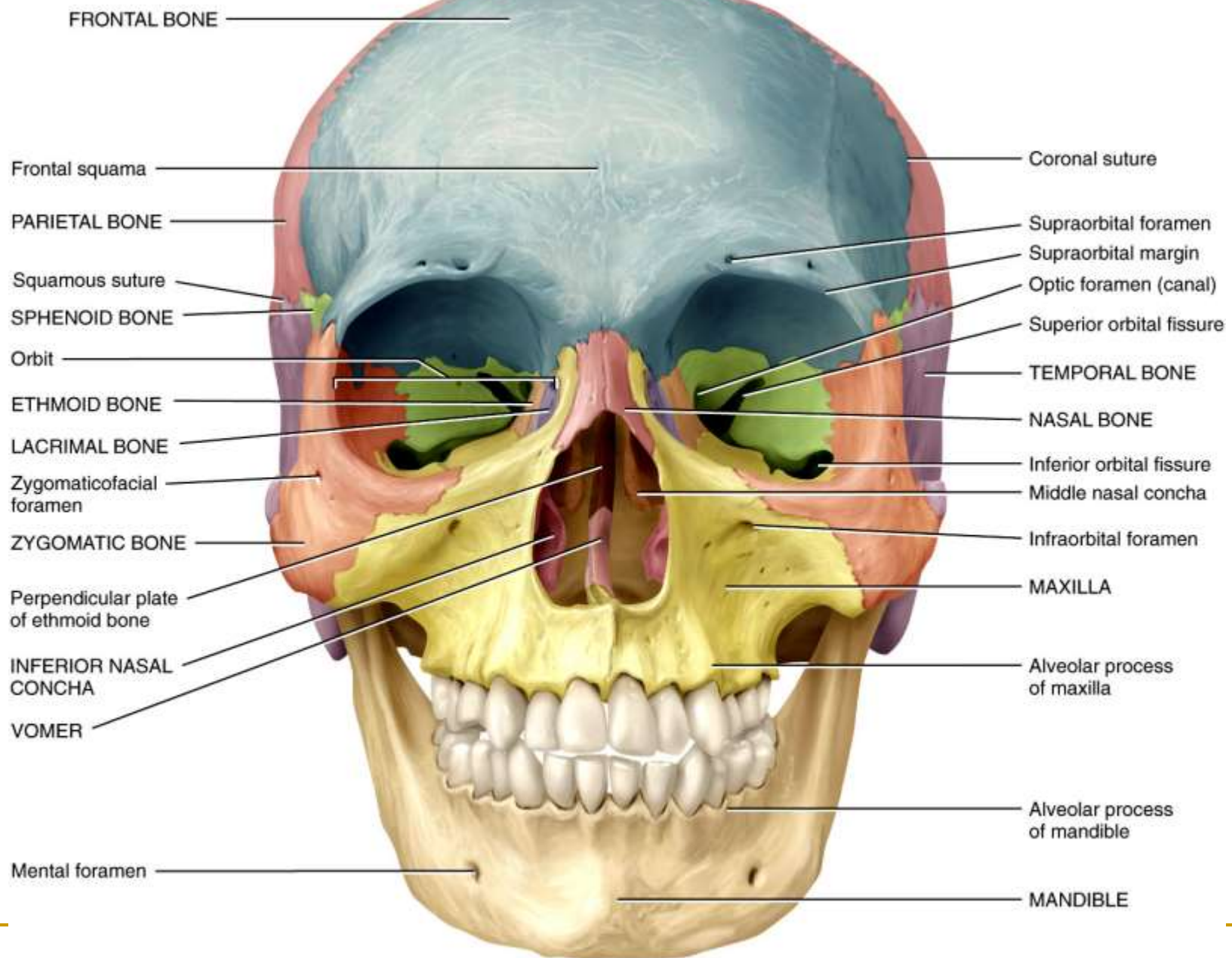
- Form the posterior portion of the hard palate

- **Inferior Nasal Conchae**

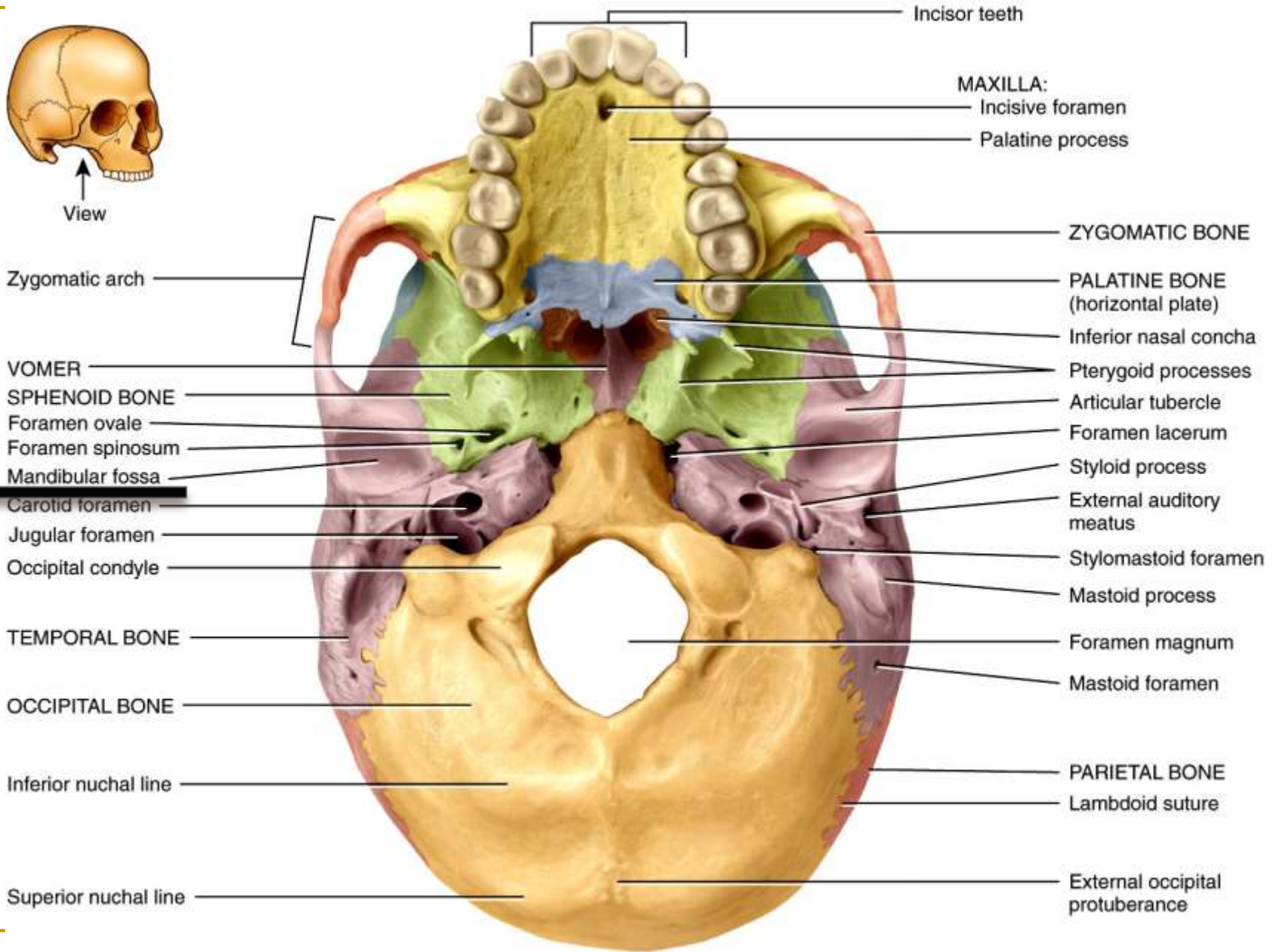
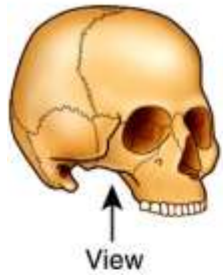
- Form a part of the inferior lateral wall of the nasal cavity

- **Vomer**

- Forms the inferior portion of the nasal septum
-



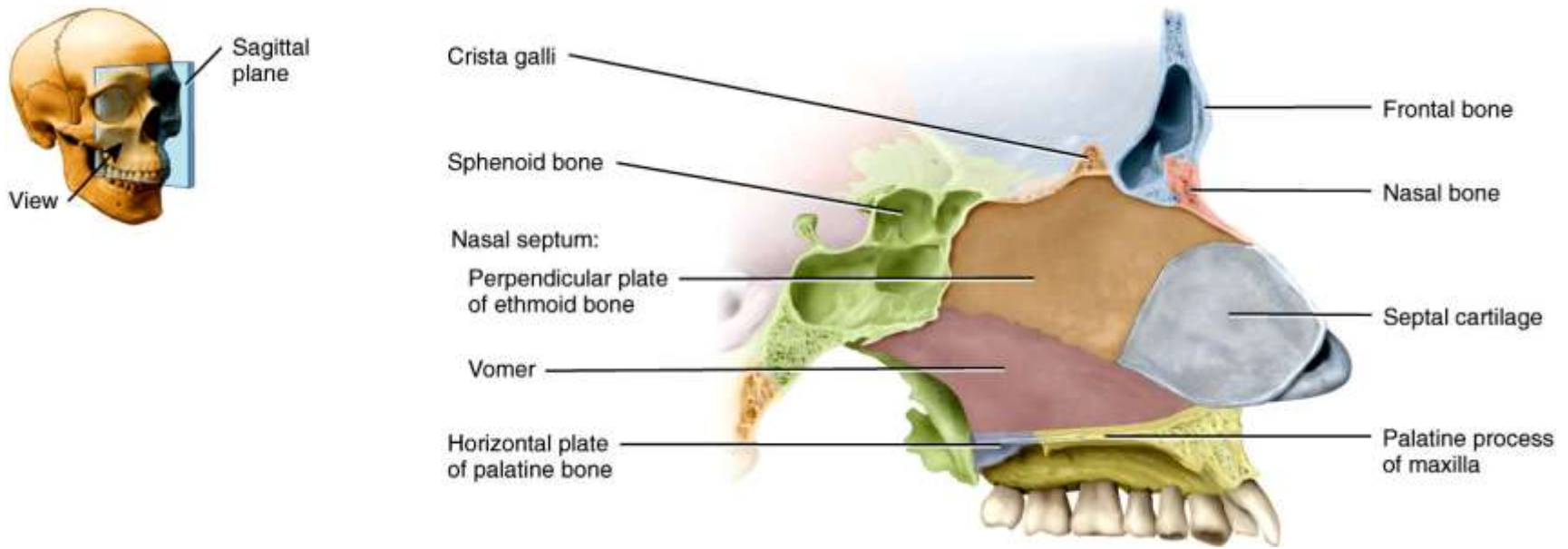
Anterior view



Inferior view

TMJ

The Nasal Septum:



A partition that divides the nasal cavity into right and left halves. It's formed of **2 bony part** and **1 cartilaginous part**:

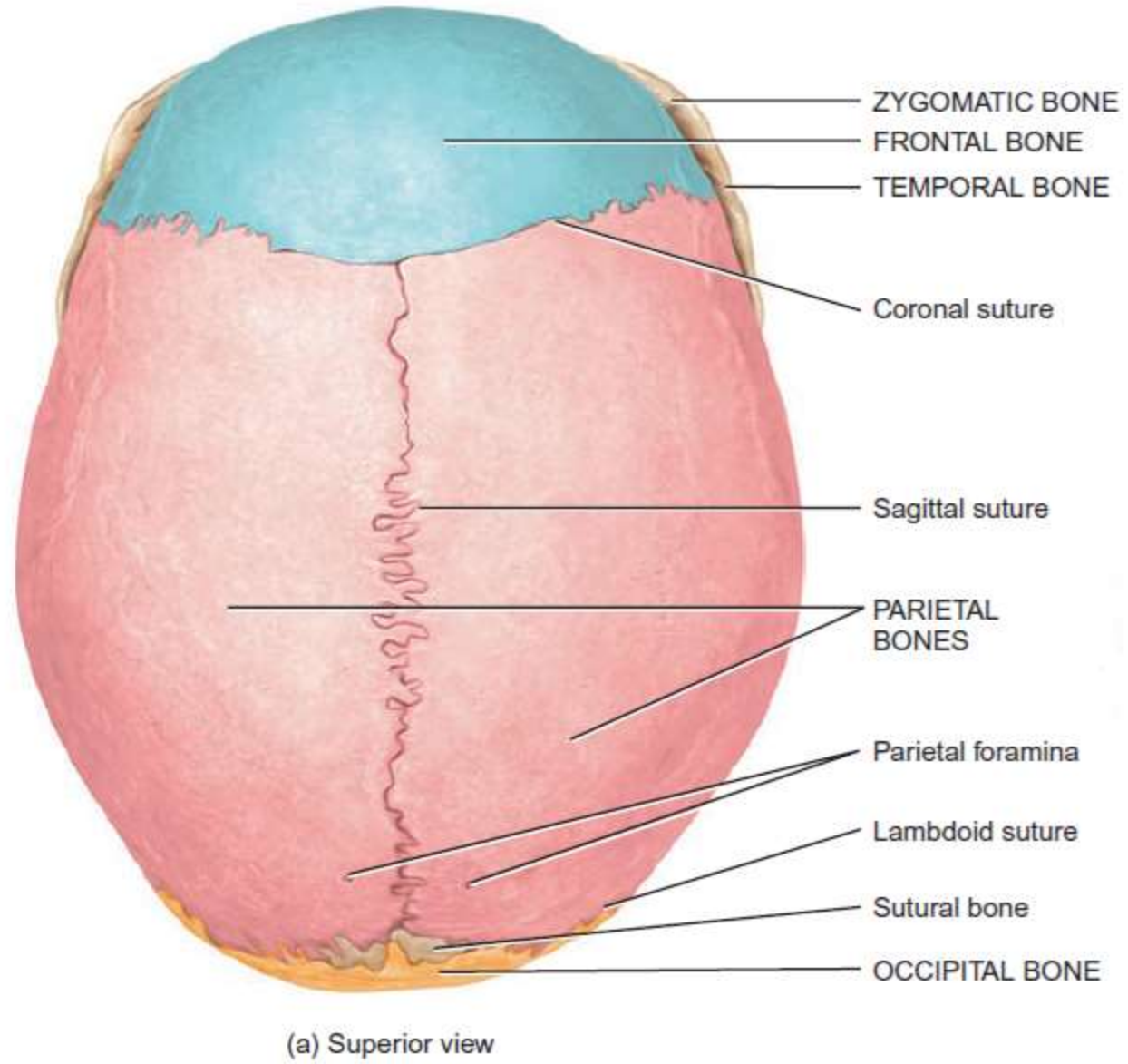
1. Ethmoid bone

2. The vomer bone

3. Septal cartilage (hyaline cartilage) anteriorly.

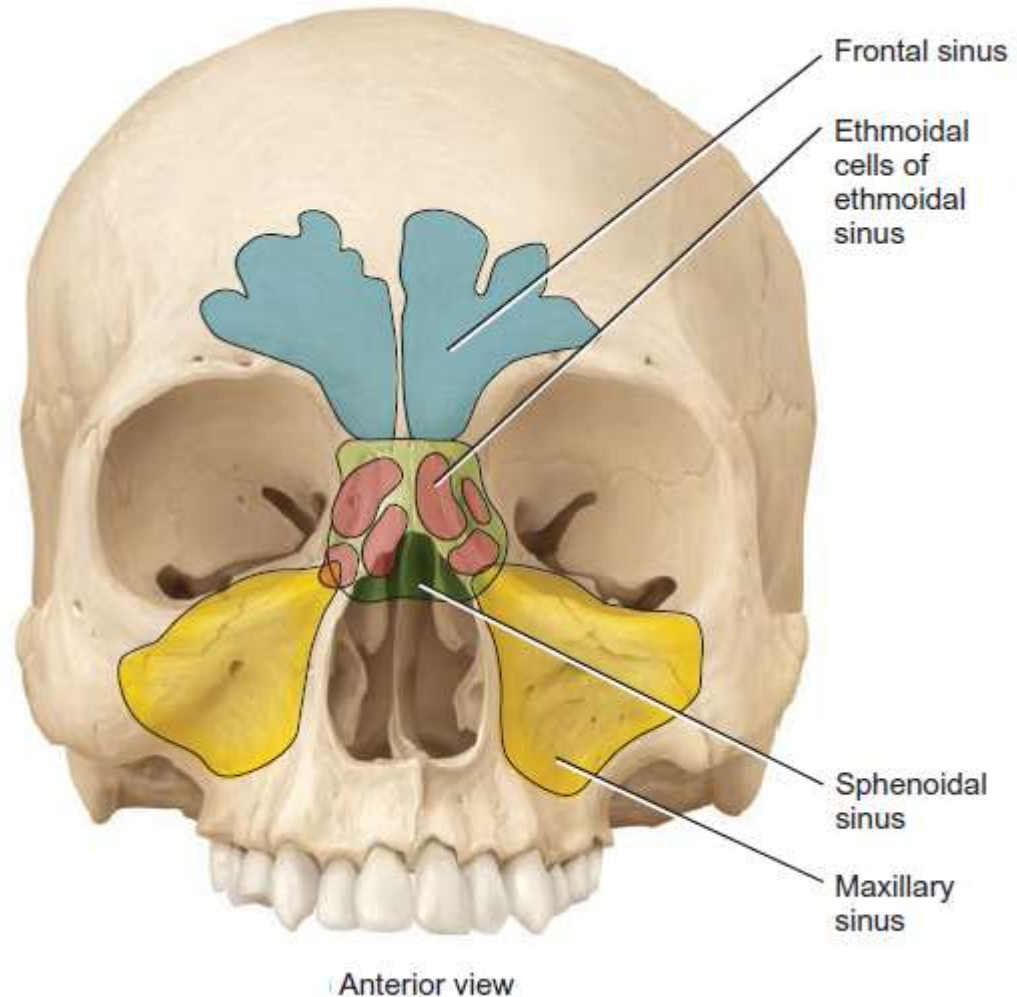
Main Sutures:

- 1) **Coronal Suture:**
between the frontal and the two parietal bones.
- 2) **Sagittal Suture:**
between the two parietal bones.
- 3) **Lambdoid Suture:**
between the two parietal and the occipital bones.
- 4) **Squamous suture:**
Temporal and parietal



Paranasal Sinuses:

- ❖ Cavities **within** cranial and facial bones near the nasal cavity
- ❖ Secretions produced by the **mucous membranes** which line the sinuses, **drain into the nasal cavity**
- ❖ Serve as **resonating chambers that intensify and prolong sounds**



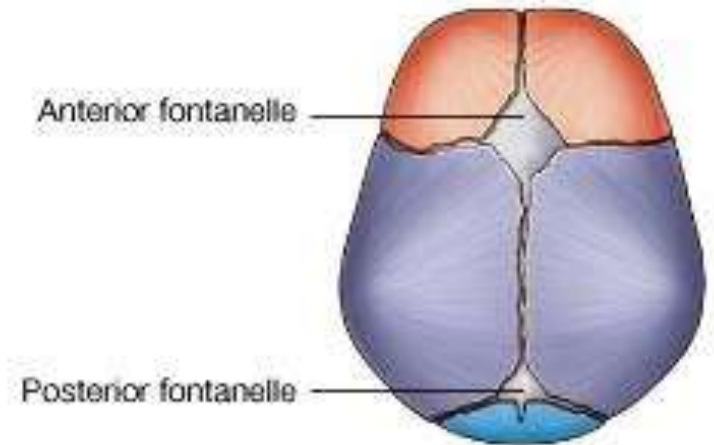
❖ Found in the following bones

1-Frontal **2-Ethmoid**
3-Sphenoid **4-Maxillary : Largest**

Sinusitis is an inflammation of the mucous membrane.

Fontanelles:

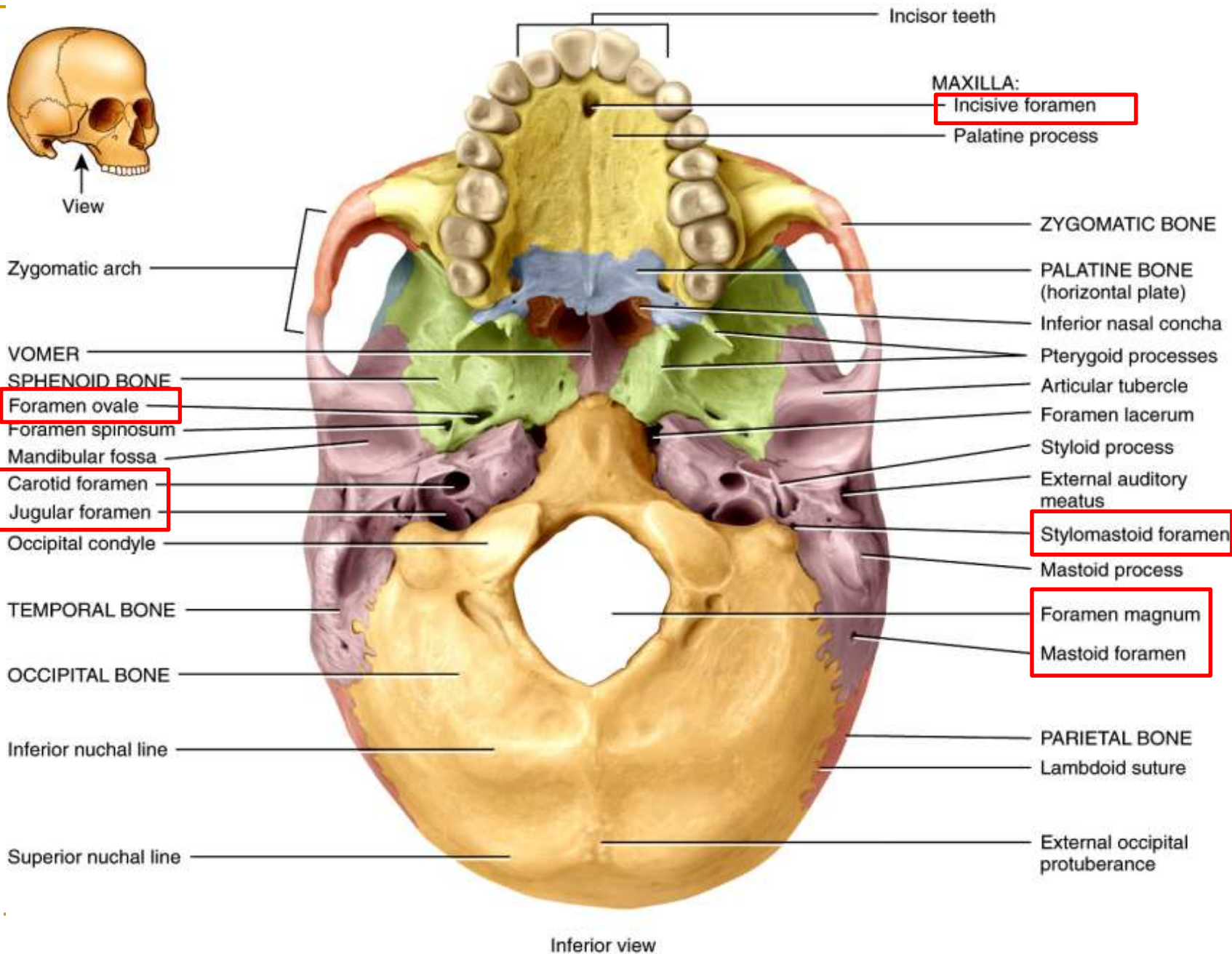
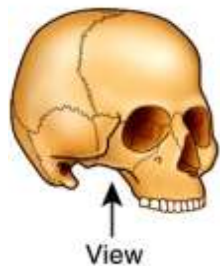
- ❑ Areas of **unossified** tissue that link the cranial bones at birth
- ❑ Eventually, they are **replaced with bone** to become sutures
- ❑ Provide **flexibility to the fetal skull**, allowing the skull to change shape as it passes through the birth canal

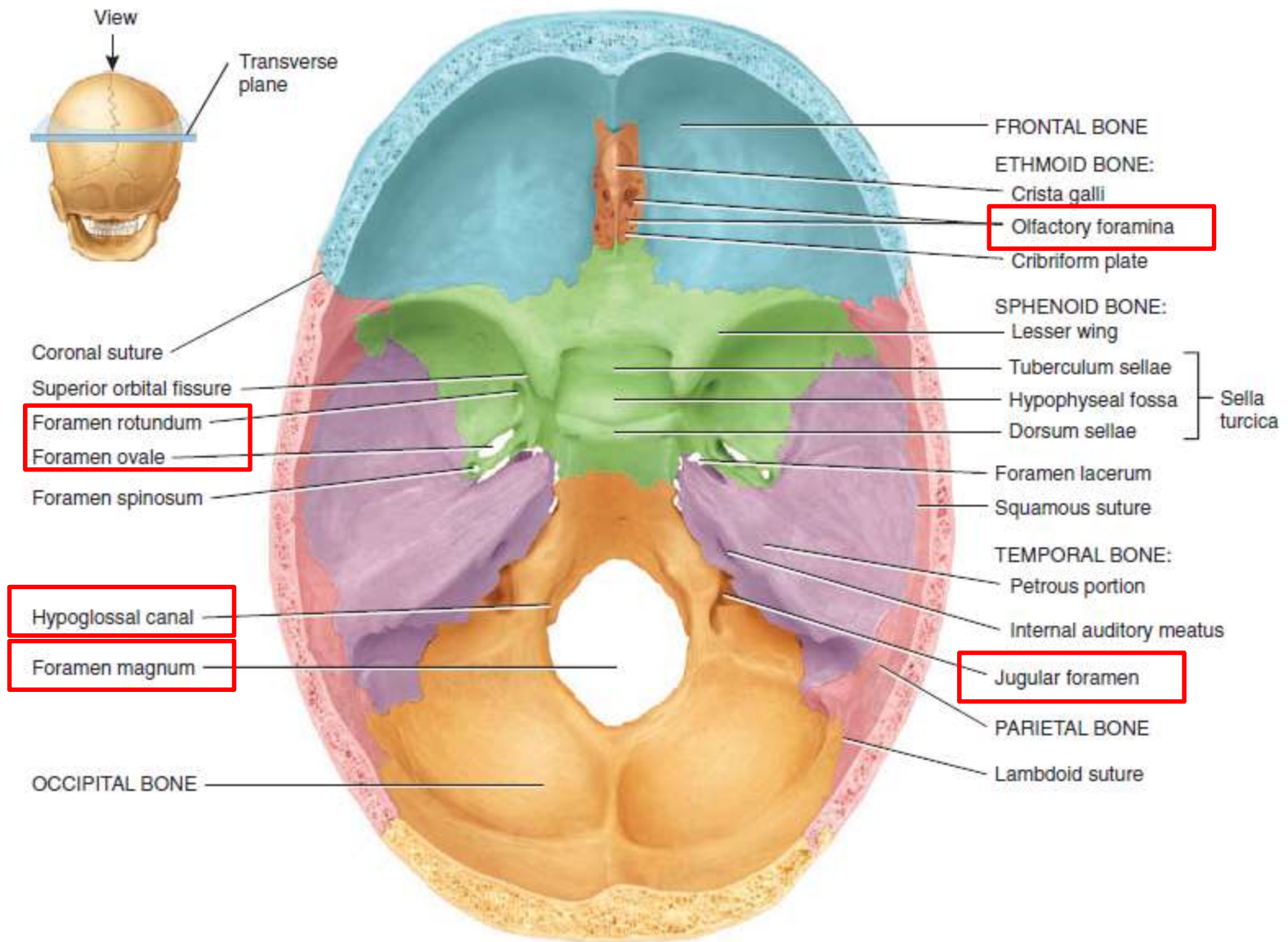


	Anterior Fontanel	Posterior Fontanel
Location	Between the frontal and parietal bones	Between the parietal and occipital bones
Shape	Diamond ◆	Triangular ▲
Size	Larger than the posterior	Smaller than the anterior
Closes	Later than the posterior (1.5 - 2 years)	Before the anterior (2 months)

Principal Foramina of the Skull

Foramen	Location	Structures passing through
Olfactory	Ethmoid	Cranial nerve I
Optic	Sphenoid	Cranial nerve II
Carotid	Temporal bone	Internal carotid artery
Jugular	Between Temporal and Occipital	Internal jugular vein
Mandibular	Mandible	Mandibular branch of cranial nerve V
Magnum	Occipital	Medulla oblongata and meninges





(a) Superior view of sphenoid bone in floor of cranium

Mandible

- Lower jawbone
- The largest, strongest facial bone
- The only movable skull bone

** Is formed of two bones, (right and left) which unite at the **symphysis menti** after the first year.

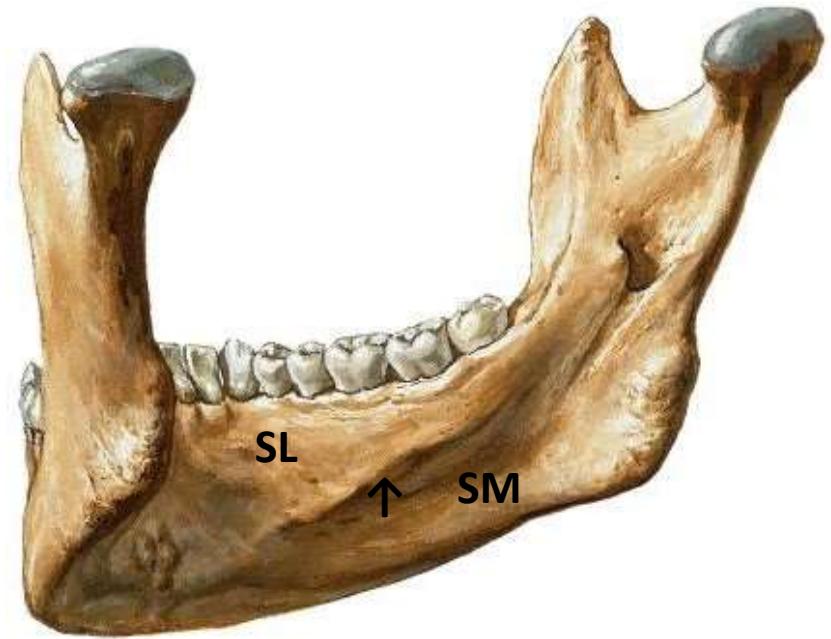
** The mandible is formed of **a body** and **two rami**.



A. The body

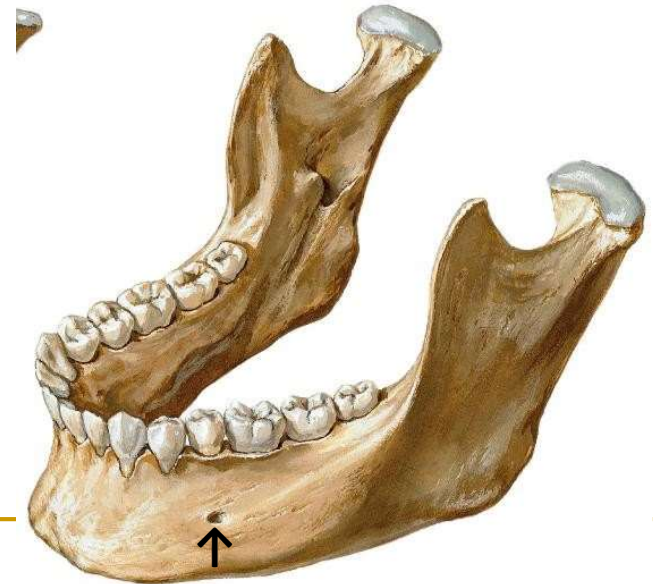
* Internal surface :

- It shows the **mylohyoid line** (↑).
- Below this line is the **submandibular fossa (SM)**, while above this line is the **sublingual fossa (SL)**.



* External surface:

- * **The mental foramen** lies midway between upper & lower borders, below 2nd premolar tooth.



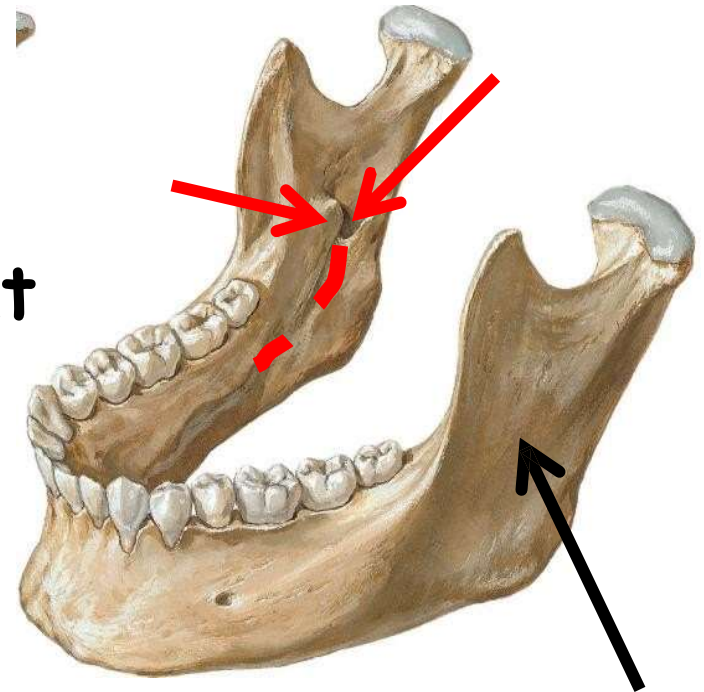
B. Ramus of mandible

* It has two surfaces.

1. The medial surface: shows the mandibular foramen which leads to mandibular canal.

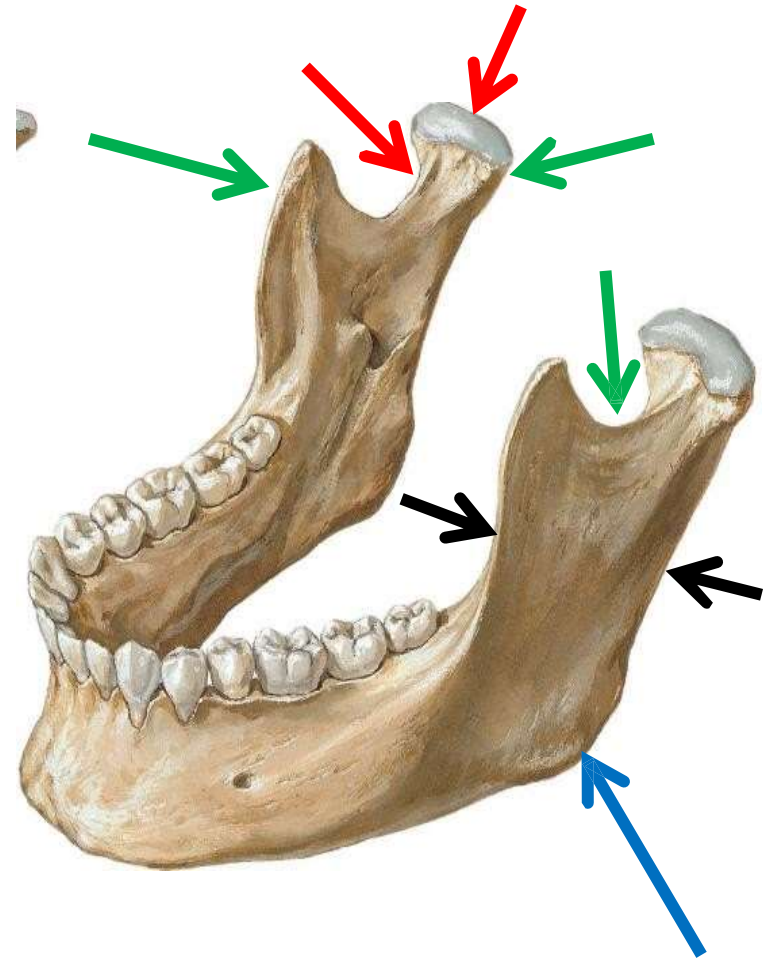
• Projecting over the foramen is the lingula .

2. The lateral surface: is flat



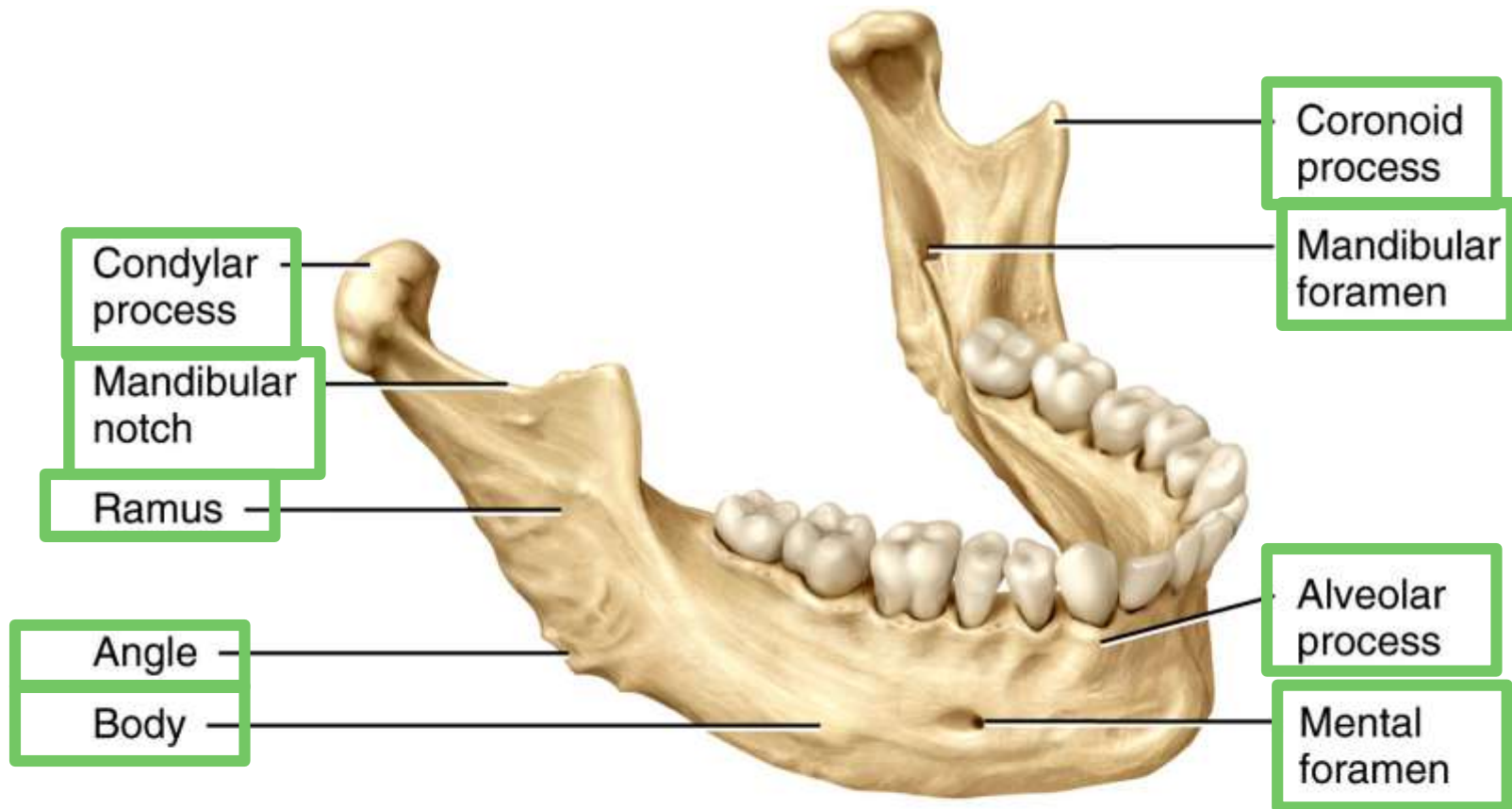
**** Upper border:**

- Shows two process **coronoid** anteriorly and **condylar** process posteriorly and in between **the mandibular notch**.
- The condylar process is expanded to form the **head** of the mandible (**TMJ**).
- The constricted area below the head is the **neck**.
- **Angle** of the mandible is the area of meeting of body and the ramus .



Temporomandibular joint (TMJ)
Temporal bone and the mandible

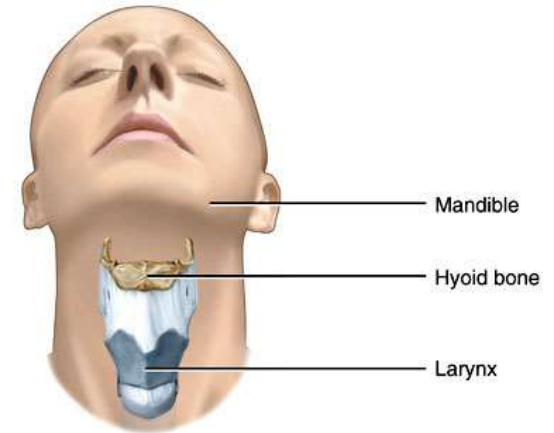
Parts of the Mandible:



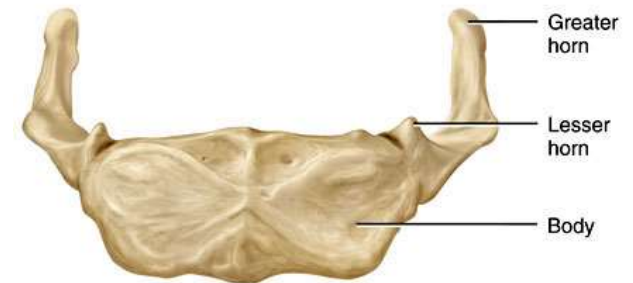
Right lateral view

The Hyoid Bone

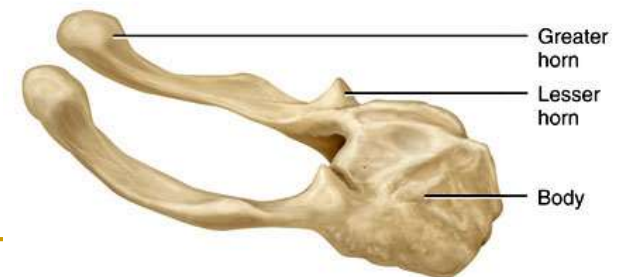
- Located in the **upper part of the neck**
- The only bone in the body that does **not articulate** with any other bone
- Supports the tongue, providing attachment sites for some tongue muscles and for muscles of the neck and pharynx and some ligaments
- Formed of **body, greater horns** and **lesser horns**



(a) Position of hyoid



(b) Anterior view



(c) Right lateral view

The Vertebral Column

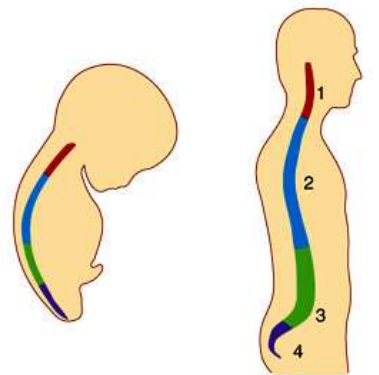
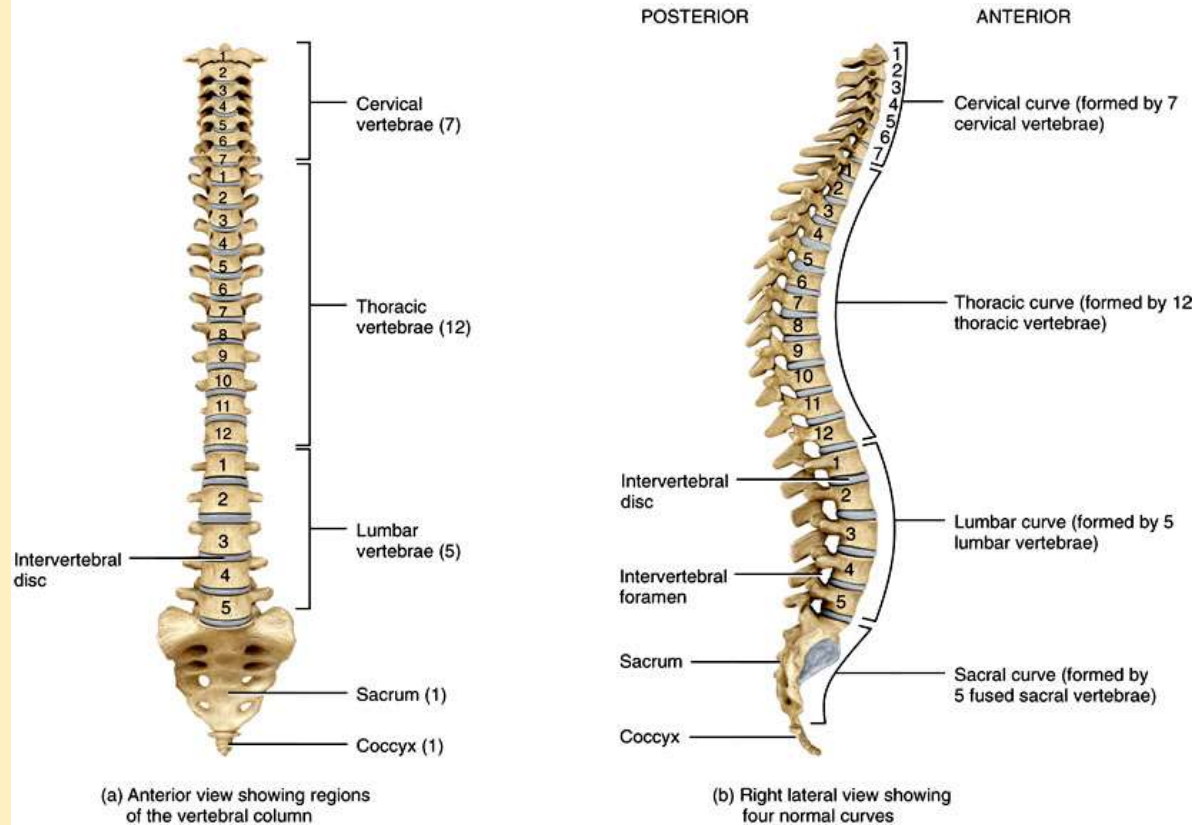
- Also called the spine, backbone, or spinal column
- Functions to:
 - Protect the spinal cord
 - Support the head
 - Serve as a point of attachment for the ribs, pelvic girdle, and muscles
- Composed of a series of bones called **vertebrae** (Adult=26)
 - 7 **cervical** are in the neck region
 - 12 **thoracic** are posterior to the thoracic cavity
 - 5 **lumbar** support the lower back
 - 1 **sacrum** consists of five fused sacral vertebrae
 - 1 **coccyx** consists of four fused coccygeal vertebrae

■ The vertebral column is curved to varying degrees in different locations

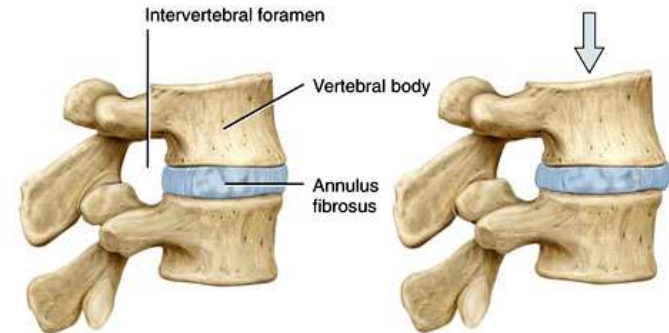
1. Curves increase the column strength
2. Help maintain balance in the upright position
3. Absorb shocks during walking, and help protect the vertebrae from fracture

■ These curves are:

1. Cervical
2. Thoracic
3. Lumbar
4. Sacral



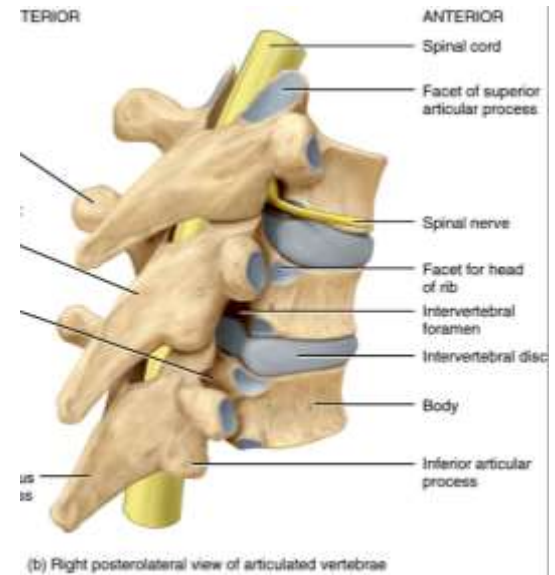
(c) Fetal and adult curves



(d) Intervertebral disc

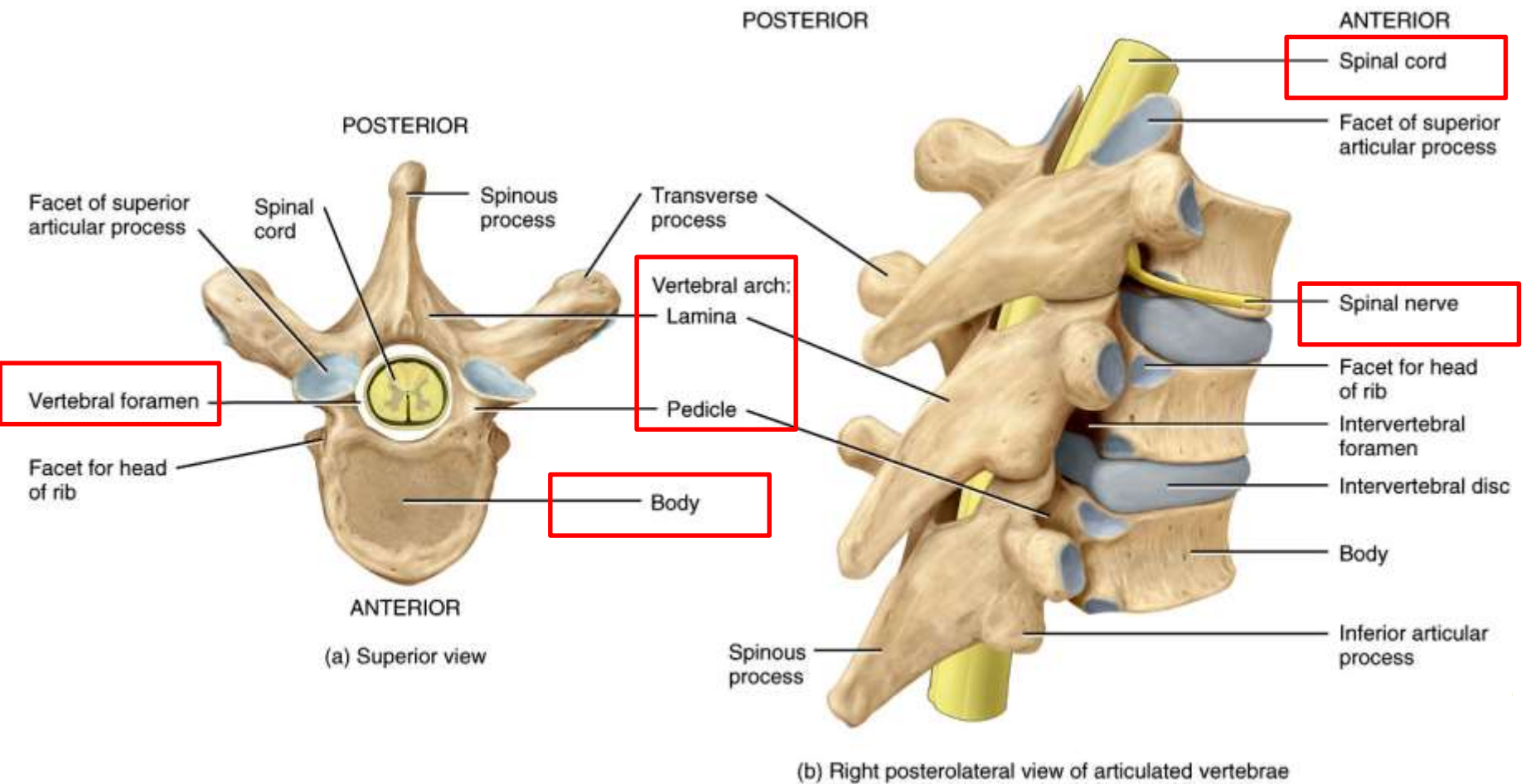
Intervertebral Disc

- It is formed of fibrocartilage- the hardest type of cartilage.
- Found between the bodies of adjacent vertebrae and function in:
 1. Form strong joints
 2. Permit various movements of the vertebral column
 3. Absorb vertical shock



Parts of vertebrae: Vertebrae typically consist of:

1. A Body (weight bearing)
2. A vertebral arch (surrounds the spinal cord)
3. Several processes (points of attachment for muscles +)



Differences between the typical vertebrae in the different regions:

	Cervical	Thoracic	Lumbar
Body	Small and rectangular	Large and heart-shaped	Large and kidney-shaped
Transverse Process	Small with foramina	Large with no foramina	Large with no foramina
Spinous Process	Short and bifid (7 th)	Long and directed inferiorly	Broad and directed posteriorly



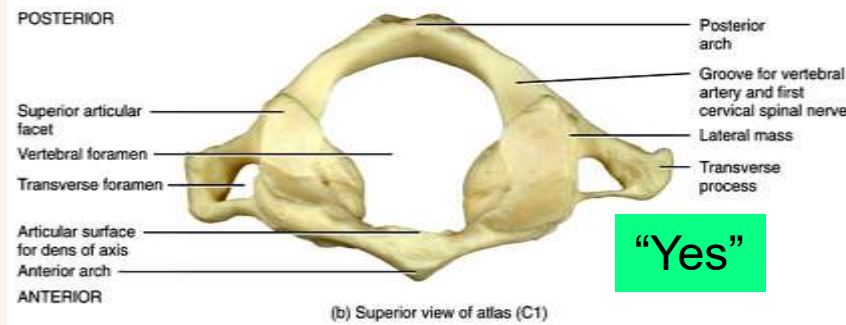
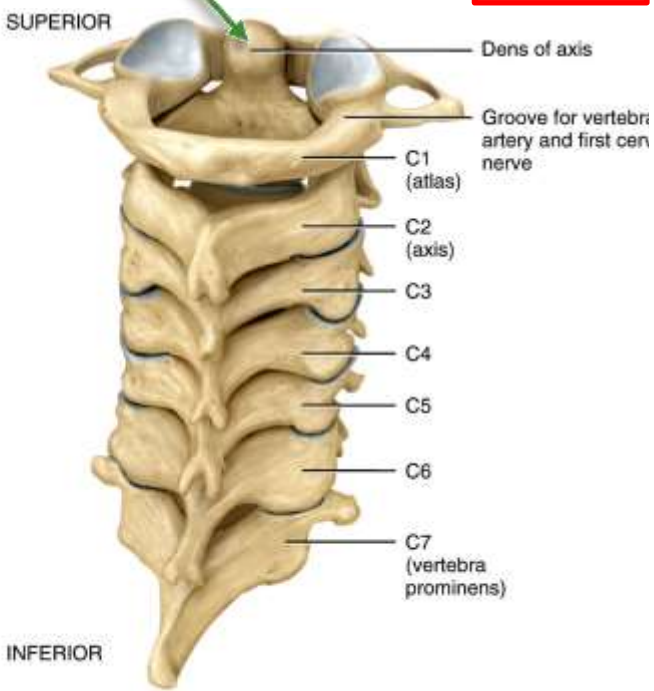
■ Cervical Region

Cervical vertebrae (C1–C7)

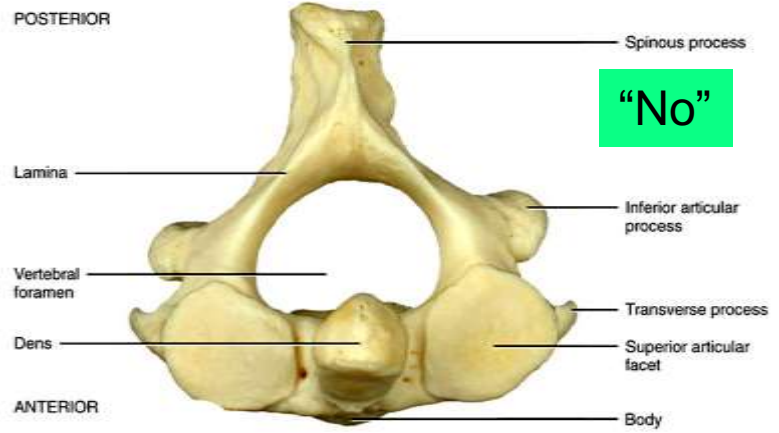
The atlas (C1) articulates with the skull (occipital)

The axis (C2) has a vertical process (**Odontoid or Dens**) that extends superiorly to articulate with atlas

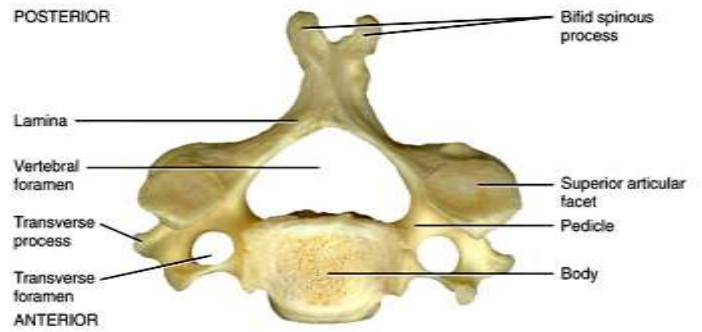
Odontoid process



(b) Superior view of atlas (C1)



(c) Superior view of axis (C2)

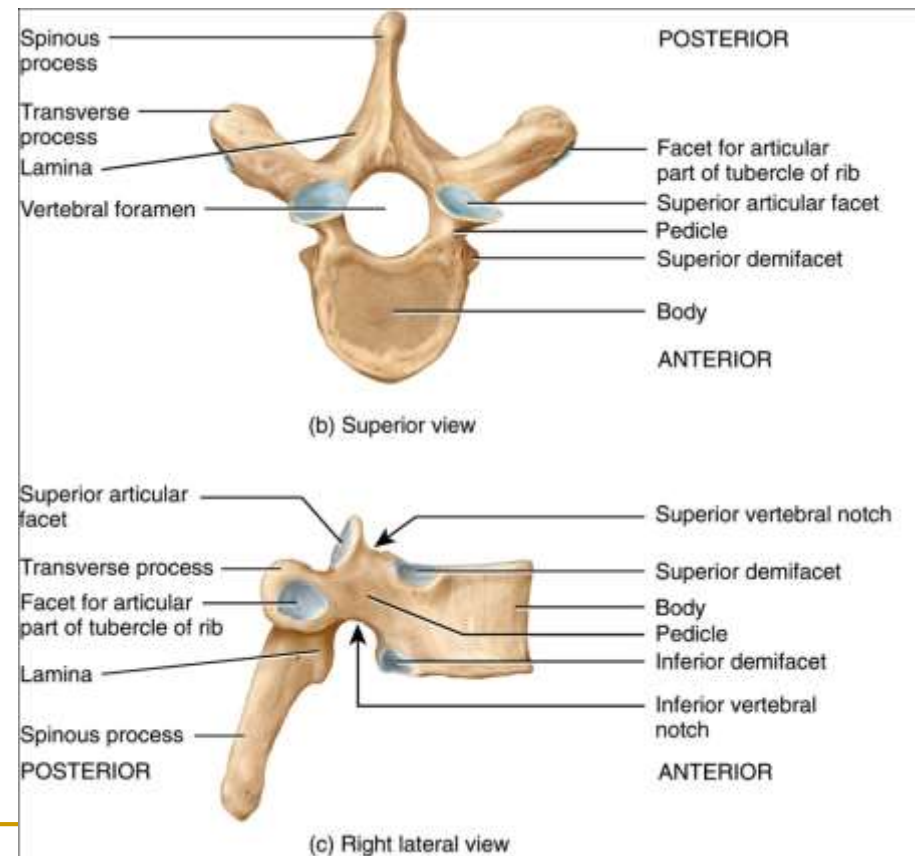
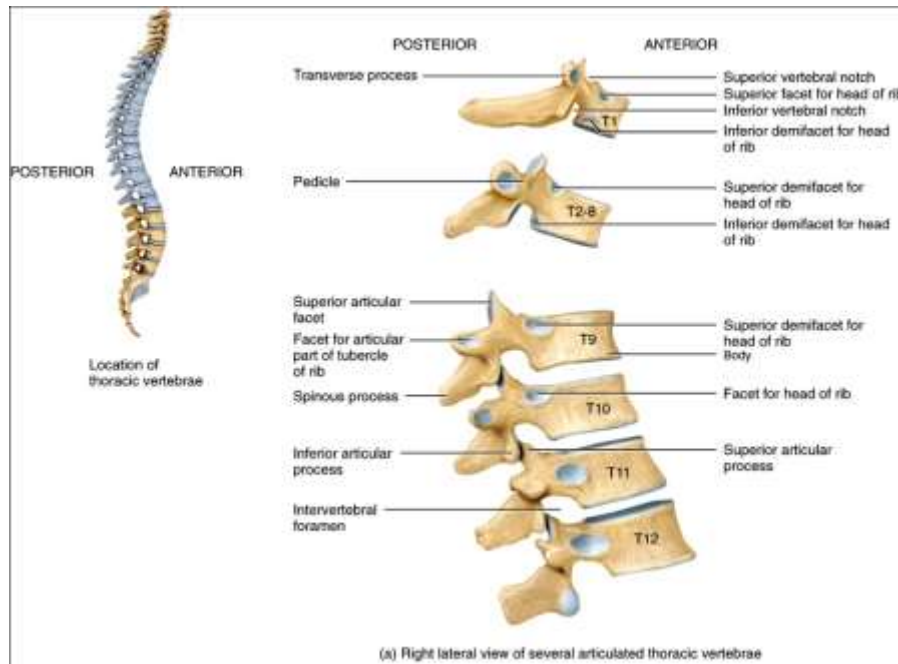


(d) Superior view of a typical cervical vertebra

Thoracic Region

Thoracic vertebrae (T1–T12)

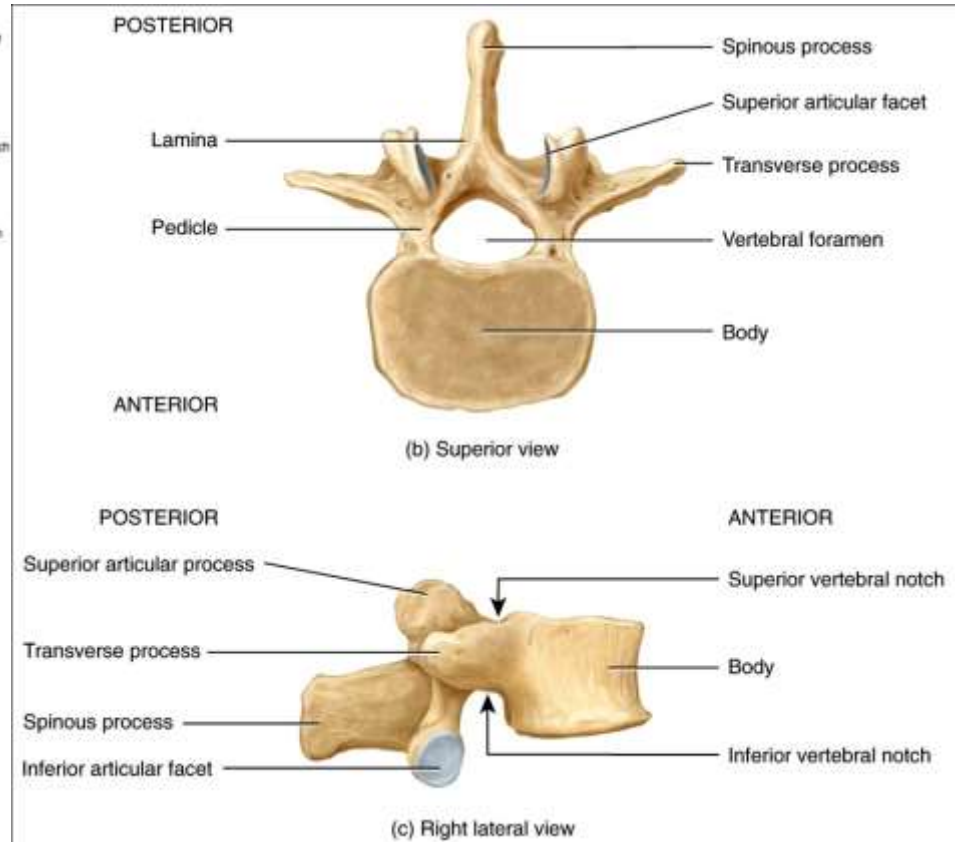
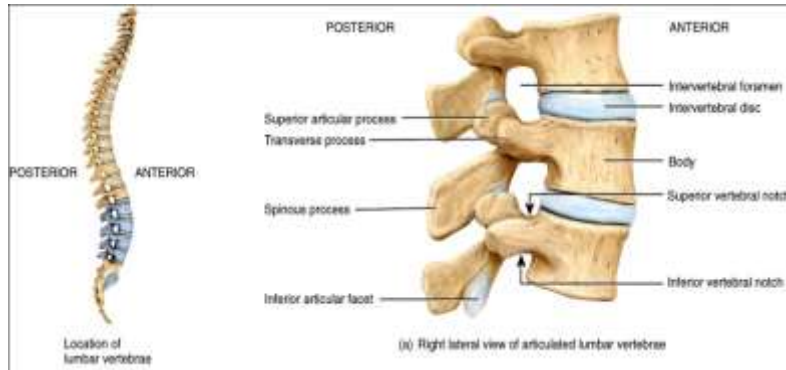
Articulate with the ribs



Lumbar Region

Lumbar vertebrae (L1–L5)

Provide for the attachment of the large back muscles



Sacrum

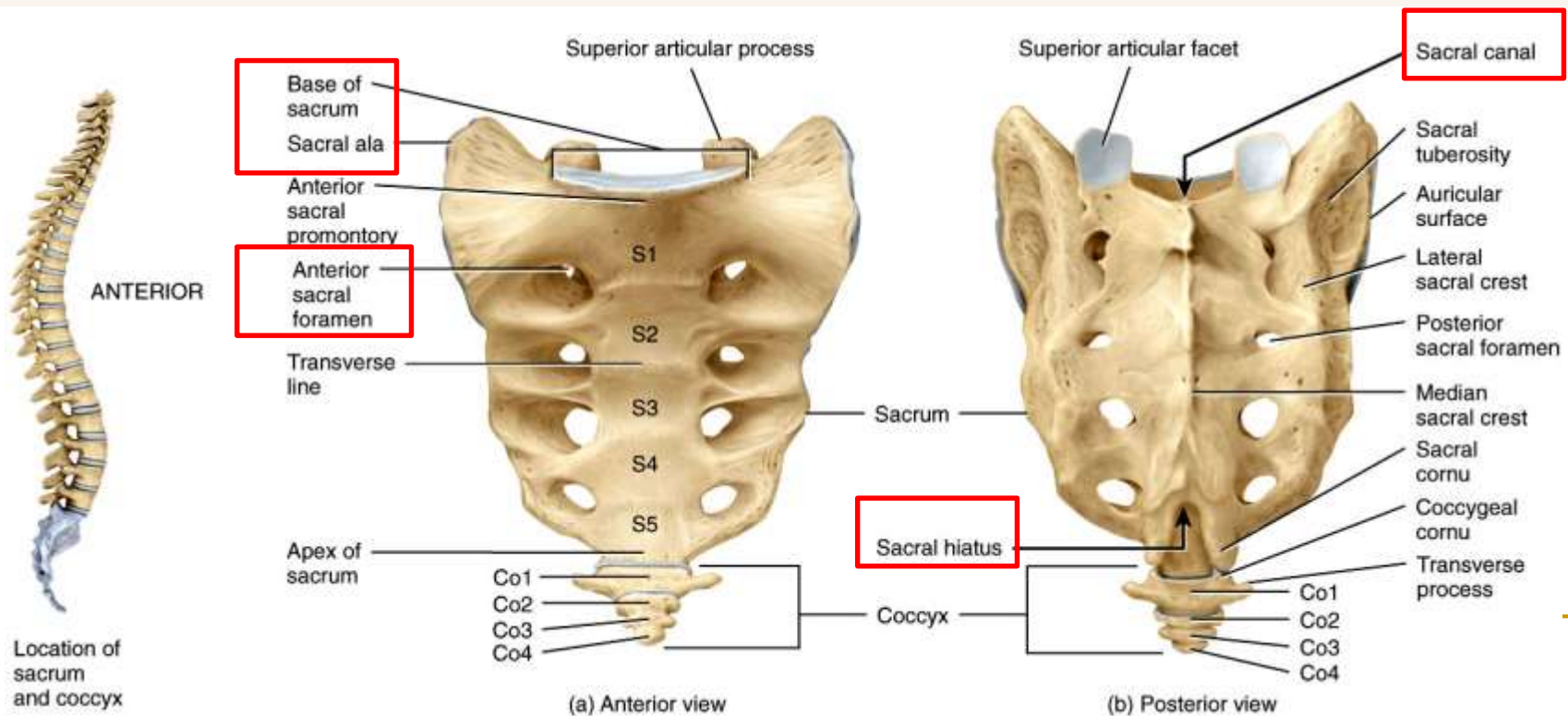
The sacrum is a triangular bone formed by the union of five sacral vertebrae (S1–S5)

Serves as a strong foundation for the **pelvic girdle**

Coccyx

The coccyx, like the sacrum, is triangular in shape

It is formed by the fusion of usually four coccygeal vertebrae

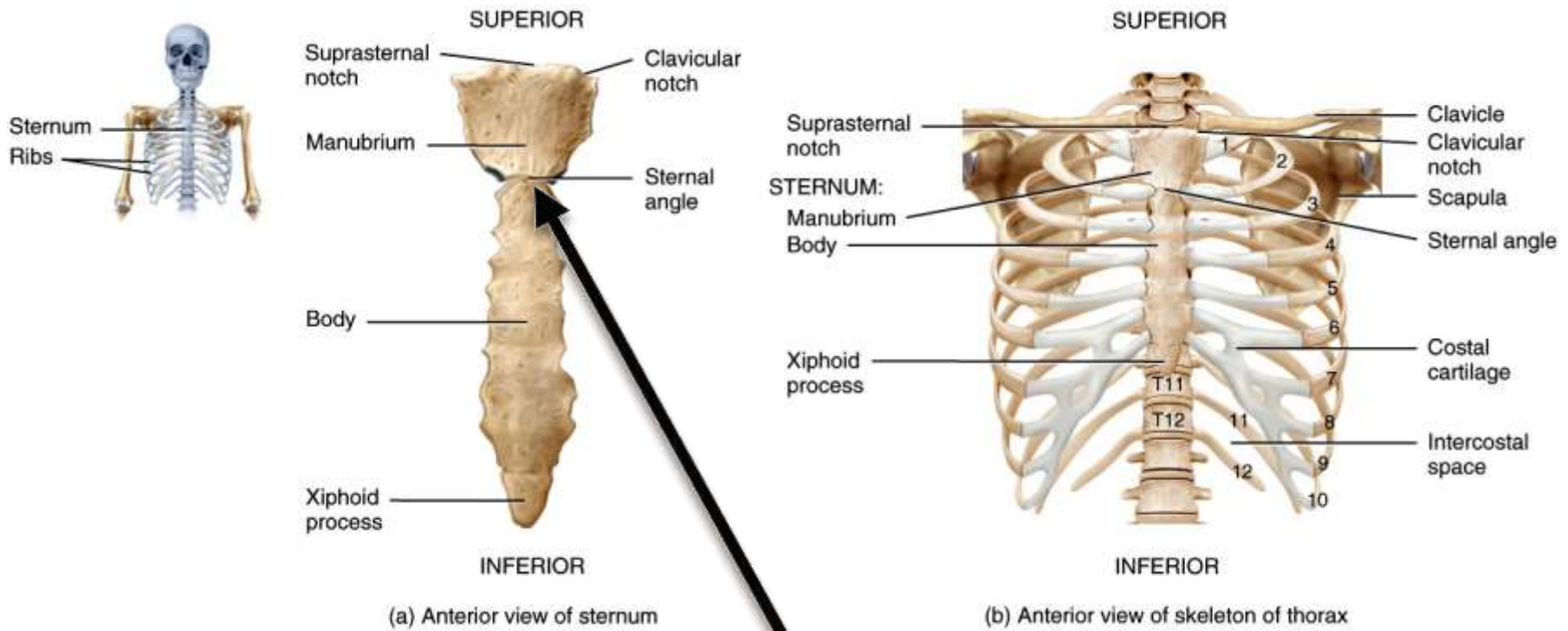


The Thoracic Cage

- Thoracic cage is formed by the:
 - ❑ **Sternum**
 - ❑ **Ribs**
 - ❑ **Costal cartilages (attach ribs to sternum)**
 - ❑ **Thoracic vertebrae**
- Functions to:
 - ❑ Enclose and protect the organs in the thoracic and abdominal cavities
 - ❑ Provide support for the bones of the upper limbs
 - ❑ Play a role in breathing

The Sternum:

- “Breastbone” located in the center of the thoracic wall
- Consists of the manubrium, body, xiphoid process

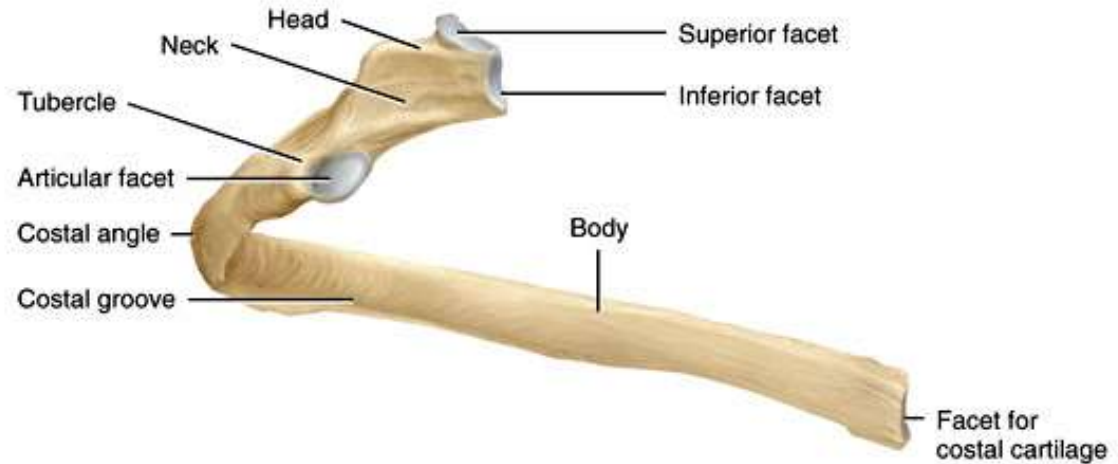


Angle of Louis
2nd rib
Level: T4&T5
Count ribs

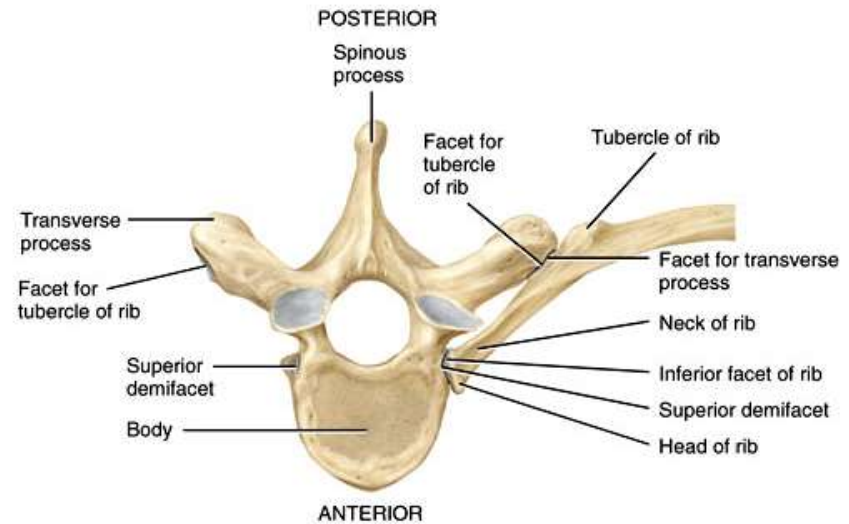
The Ribs:

Each rib is formed of:

- 1) **Head:** which articulates with the vertebrae.
- 2) **Neck:** a constricted region immediately after the head.
- 3) **Tubercle:** this contains an articular facet for the transverse process.
- 4) **Angle:** area where the shaft bends forwards.
- 5) **Shaft (Body).**
- 6) **Costal groove:** this runs along the inferior border of the inner surface of the shaft.



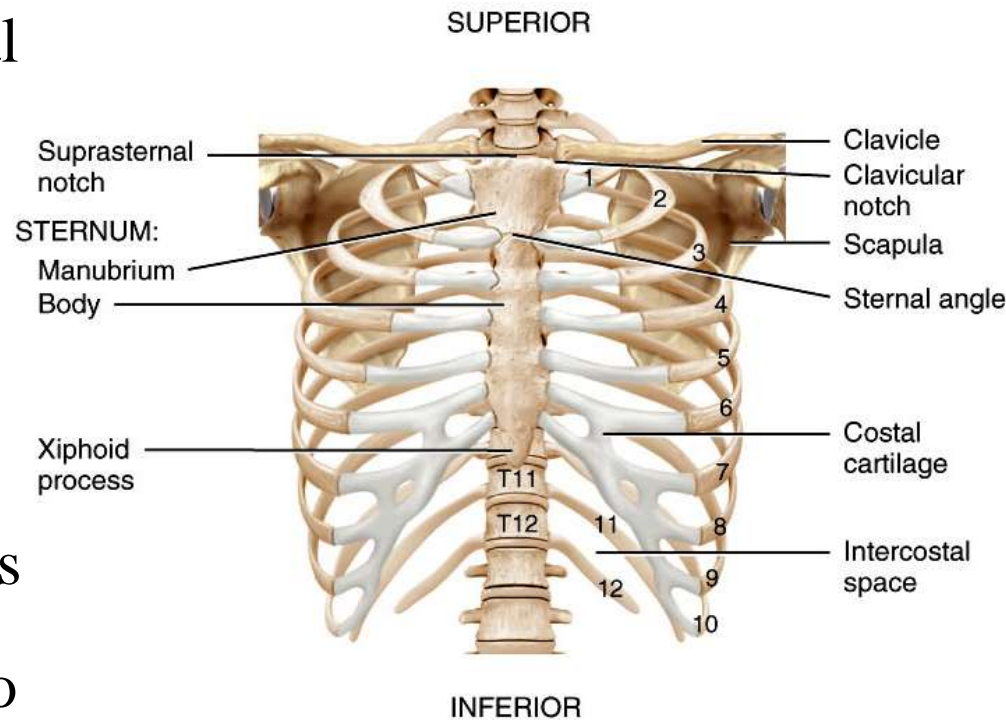
(a) Posterior view of left rib



(c) Superior view of left rib articulated with thoracic vertebra

The Ribs:

- ❑ 12 pairs of ribs give structural support to the sides of the thoracic cavity
- ❑ The upper 7 pairs are called true ribs because they're attached to the sternum through their own costal cartilage.
- ❑ Pairs 8-10 are called false ribs because they're attached anteriorly to each other and to the seventh rib by means of their costal cartilages.
- ❑ Pairs 11 and 12 are called floating ribs because they have no anterior attachment.



(b) Anterior view of skeleton of thorax