Exercise 10

The Axial Skeleton

The Axial Skeleton

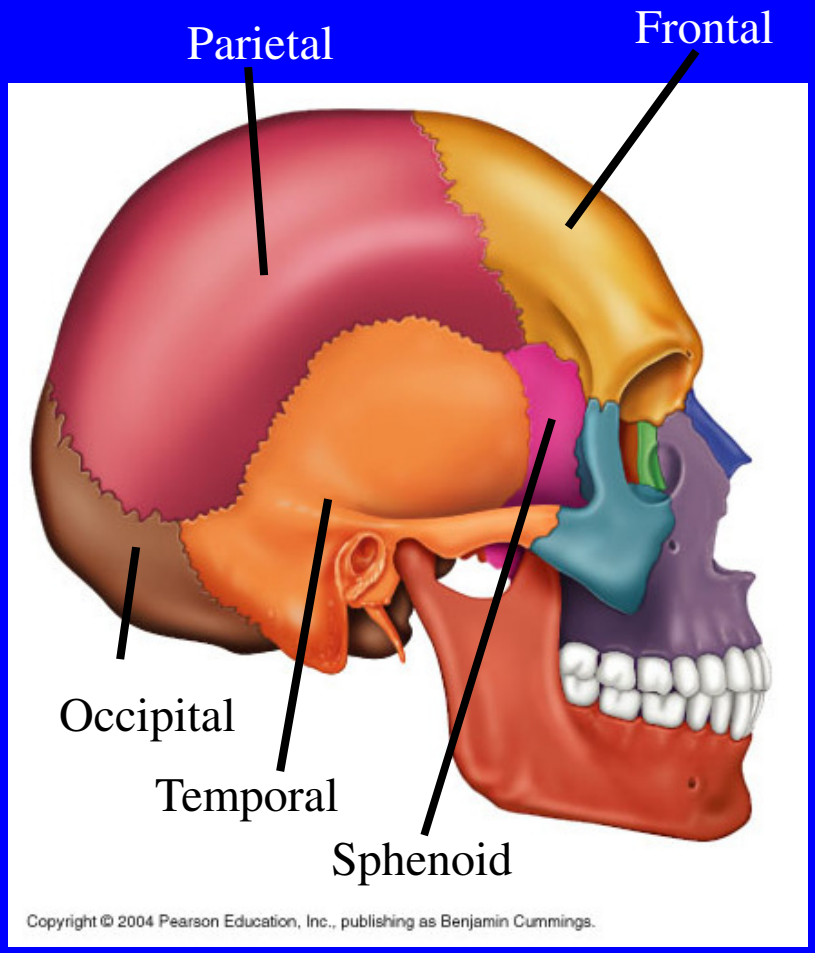
- Consists of the skeletal structures found along the midline of the body.
- Includes the skull, hyoid, vertebrae, ribs, sternum, and sacrum.
- The cartilages associated with these bones also contribute to the axial skeleton.
- The ribs, sternum, and thoracic vertebrae form a structure called the bony thorax.

The Skull

- Consists of 22 bones.
- Grouped into the cranial bones and the facial bones.
- Cranial bones (or cranium) enclose the brain.
- Facial bones form the structure of the face.

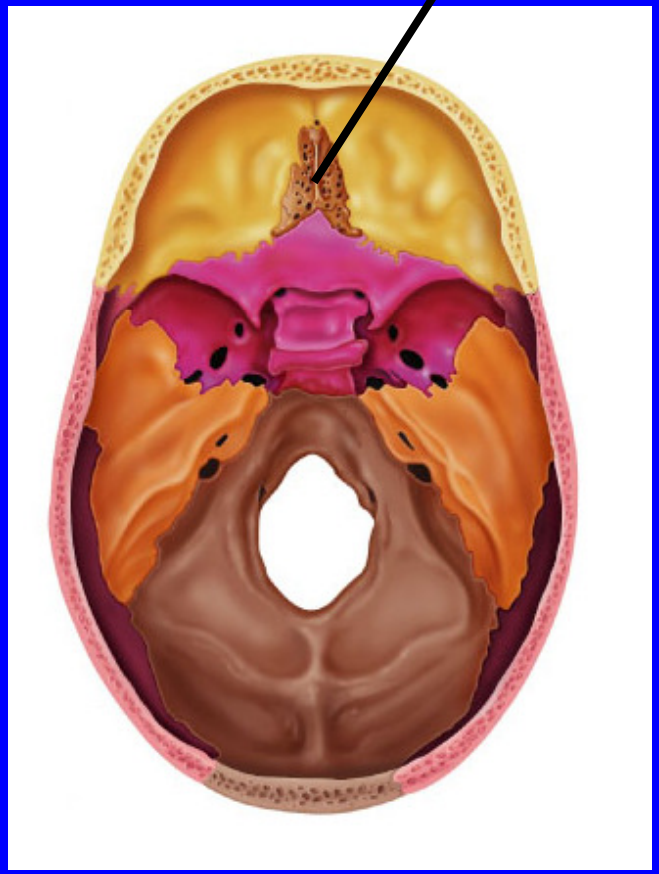
The Cranium

- Consists of 8 bones.
- Includes the frontal bone, the two parietal bones, the two temporal bones, the occipital bone, the sphenoid bone, and the ethmoid bone.



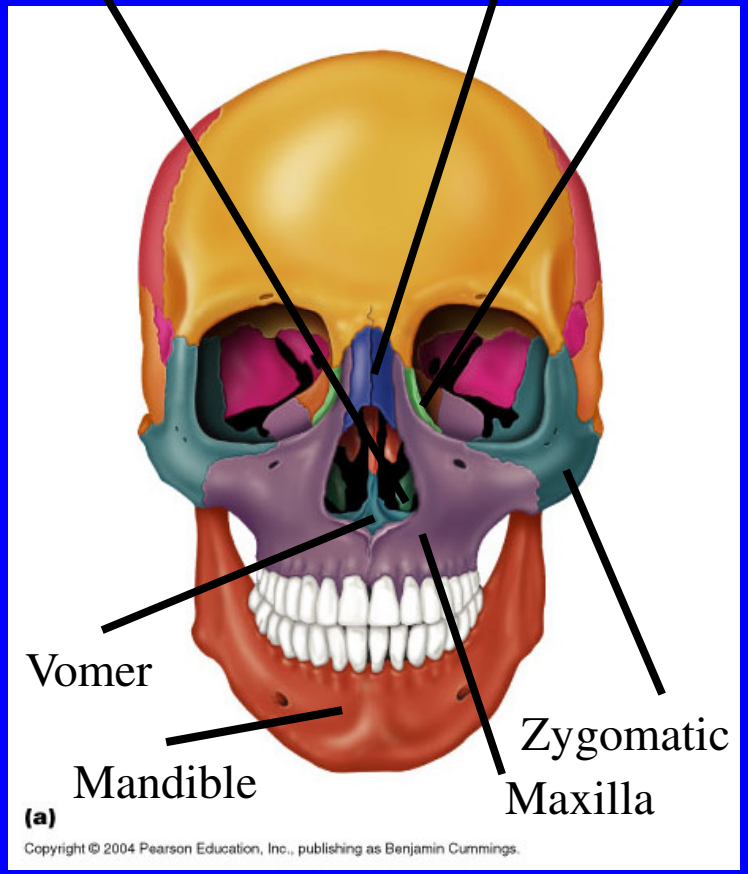
The Cranium

- The ethmoid bone is visible in this view.
- This is a view of the inside of the cranial cavity with the top of the cranium removed.



The Facial Bones

- Consist of 14 bones, 12 of which are paired.
- Includes the maxillae, the palatine bones, the zygomatic bones, the lacrimal bones, the nasal bones, the inferior nasal conchae, the mandible, and the vomer.
- Only the mandible and vomer are unpaired.

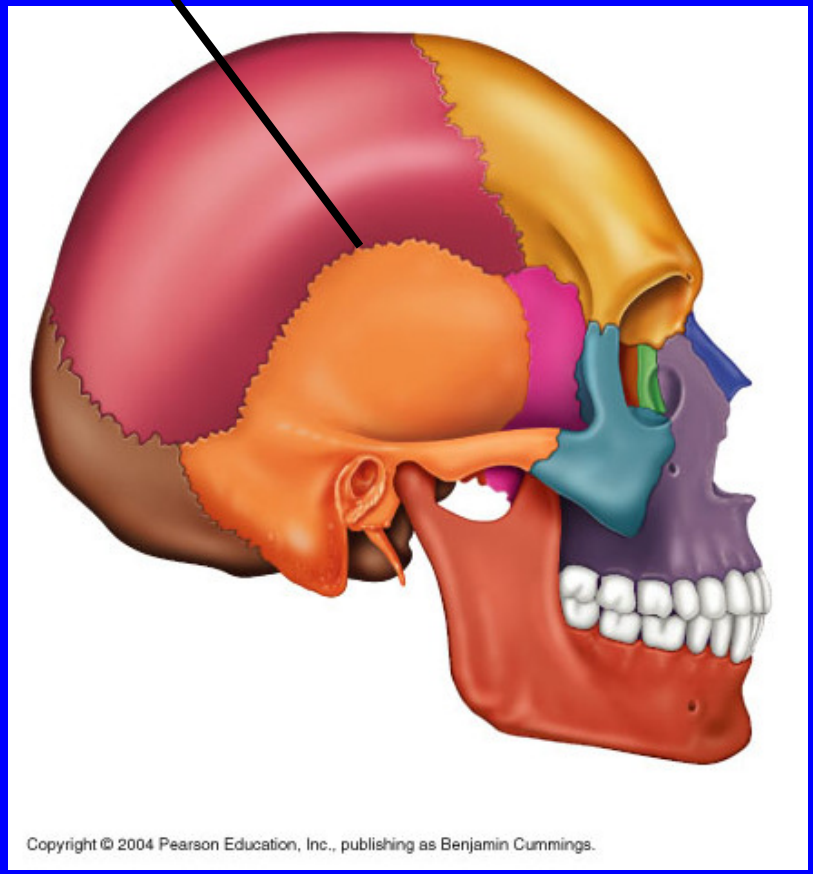


The Facial Bones

- The palatine bone is visible in this view.
- This is a view of the underside of the skull with the mandible removed.

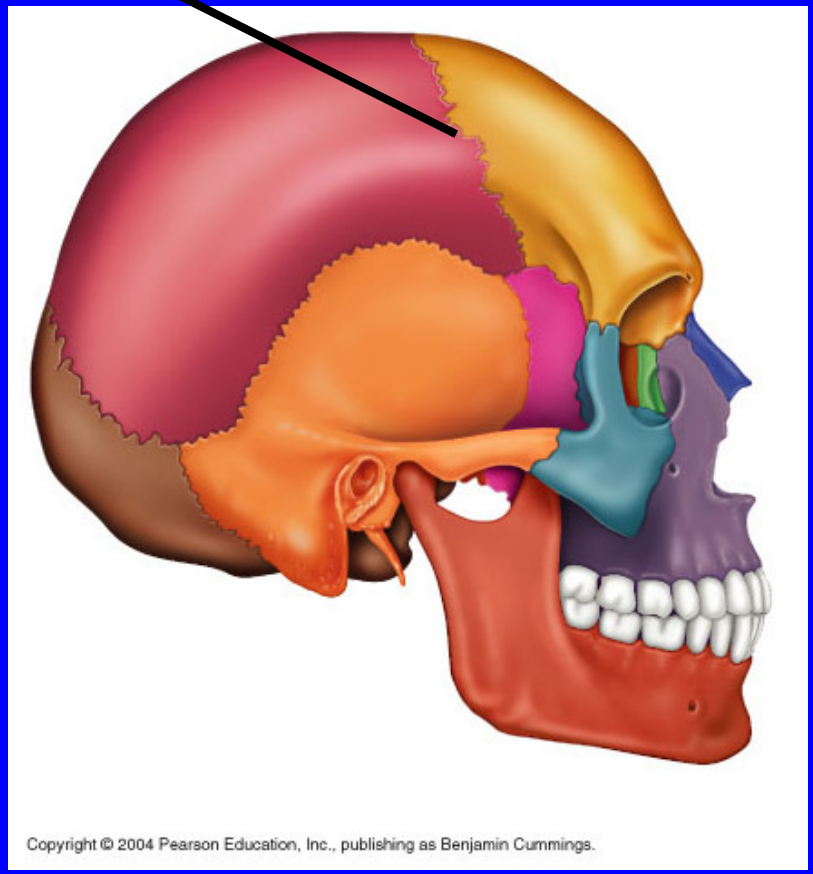
The Cranial Sutures

- The bones of the skull articulate with each other by joints called sutures.
- We will only be concerned with the sutures of the cranium.



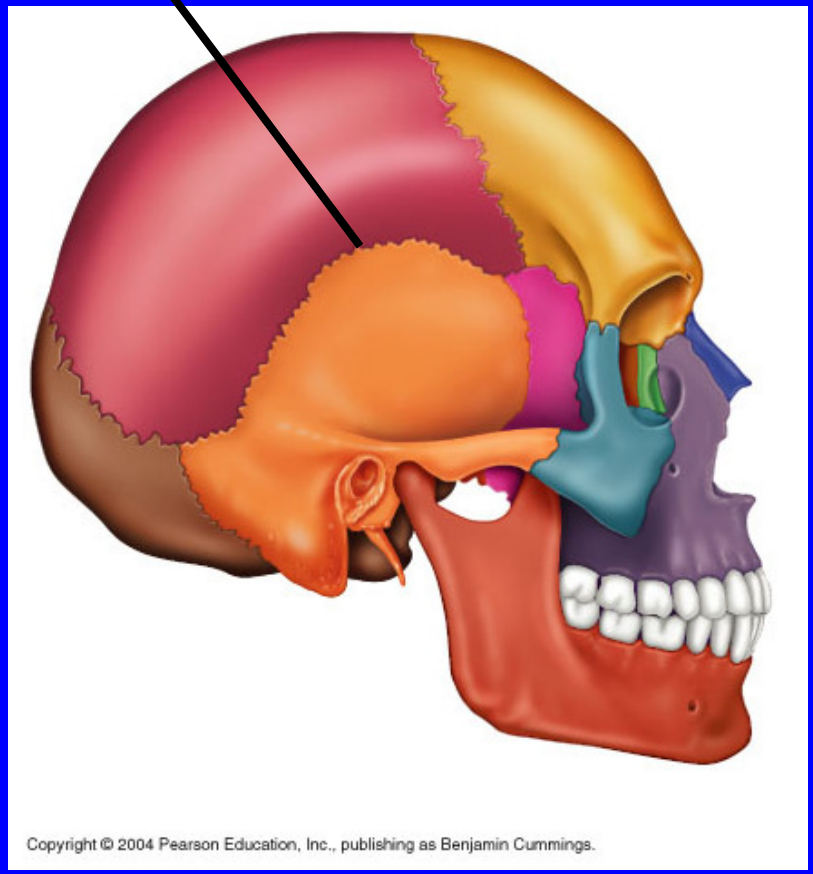
The Cranial Sutures

- The joint between the frontal bone and the parietal bones is the coronal suture.
- Corona is Latin for crown. The coronal suture traverses the crown of the skull.



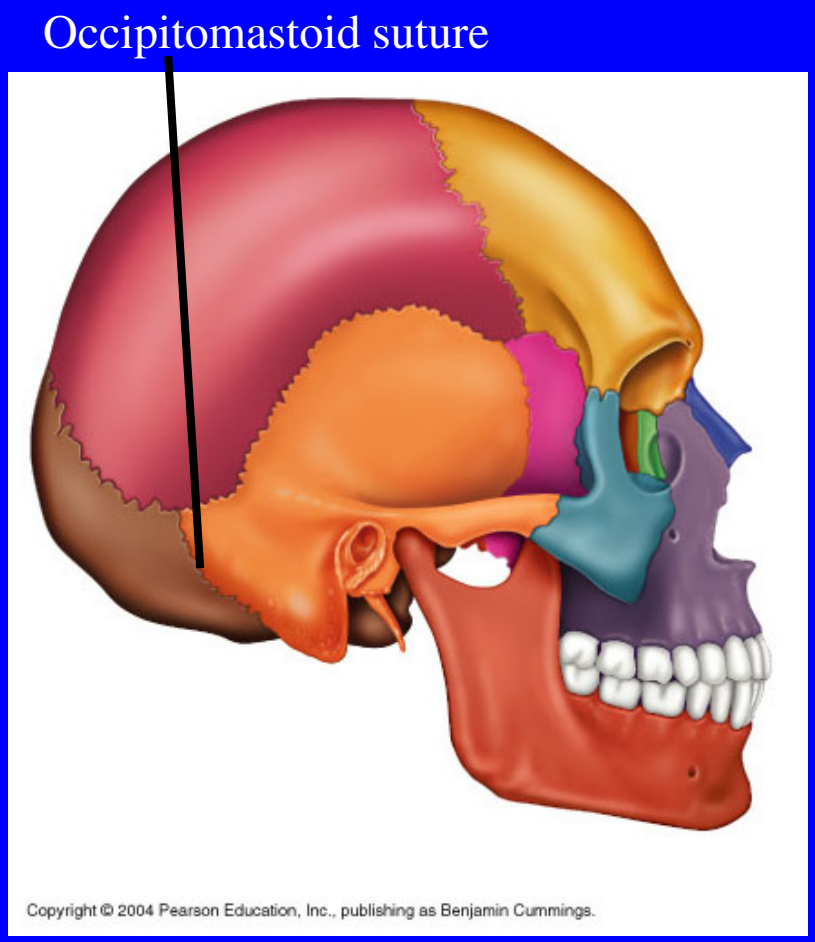
The Cranial Sutures

- The joint between each parietal bone and the corresponding temporal bone is the squamosal suture.
- Squamous means flat, and the overlapping portions of each bones is a large, flat shelf.



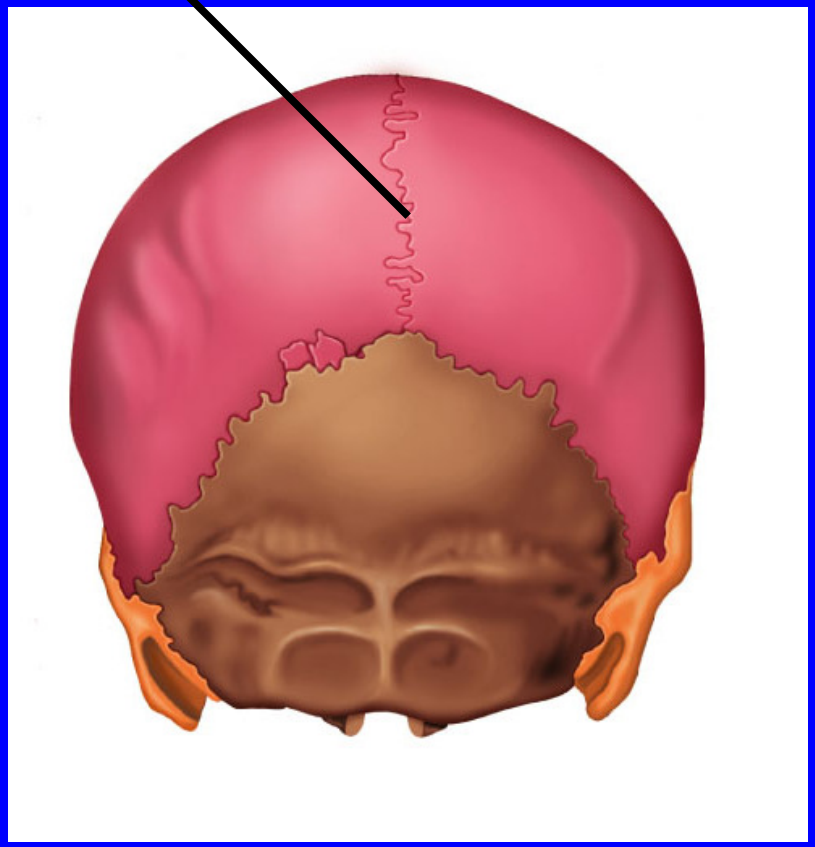
The Cranial Sutures

- The joint between the occipital bone and the mastoid process of each temporal bone. Is the occipitomastoid suture.



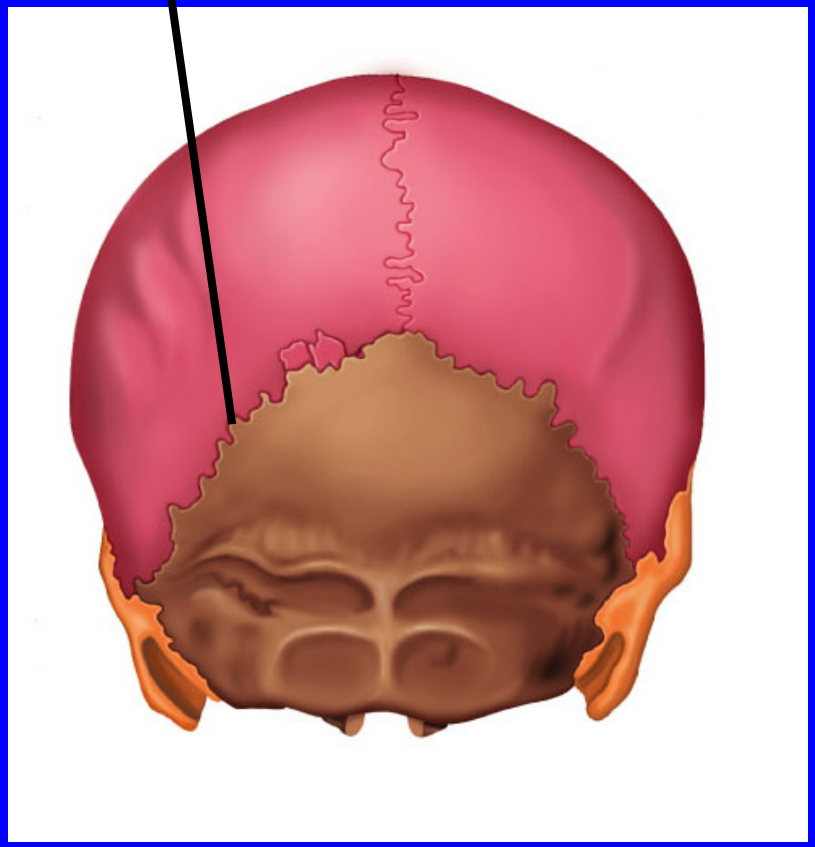
The Cranial Sutures

- The joint between the left and right parietal bones is the sagittal suture.
- The sagittal suture follows the sagittal plane of the skull.



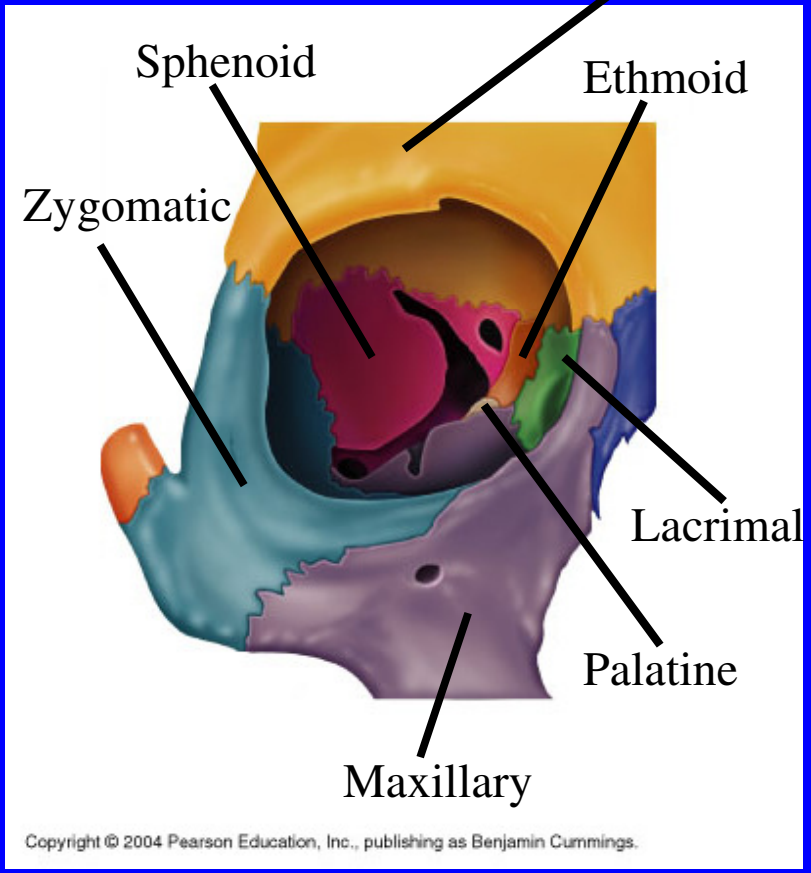
The Cranial Sutures

- The joint between the left and right parietal bones and the occipital bone is the lambdoid suture.
- This suture is named for its resemblance to the Greek letter lambda, which looks like this - Λ.



The Orbits

- The orbits, or eye-sockets, are formed by seven bones.
- These are the frontal, the sphenoid, the zygomatic, the maxillary, the lacrimal, the ethmoid, and the palatine.

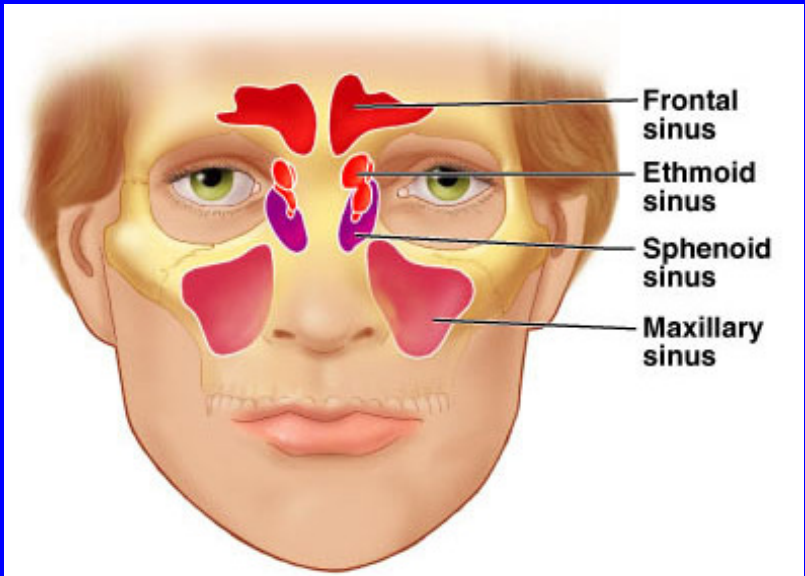


The Paranasal Sinuses

- Four sets of bones in the skull (maxillae, frontal, sphenoid, and ethmoid), contain cavities called sinuses.
- The sinuses are air-filled, mucous membrane lined spaces within each bone.
- The sinuses communicate with the nasal cavity via openings called ostia.

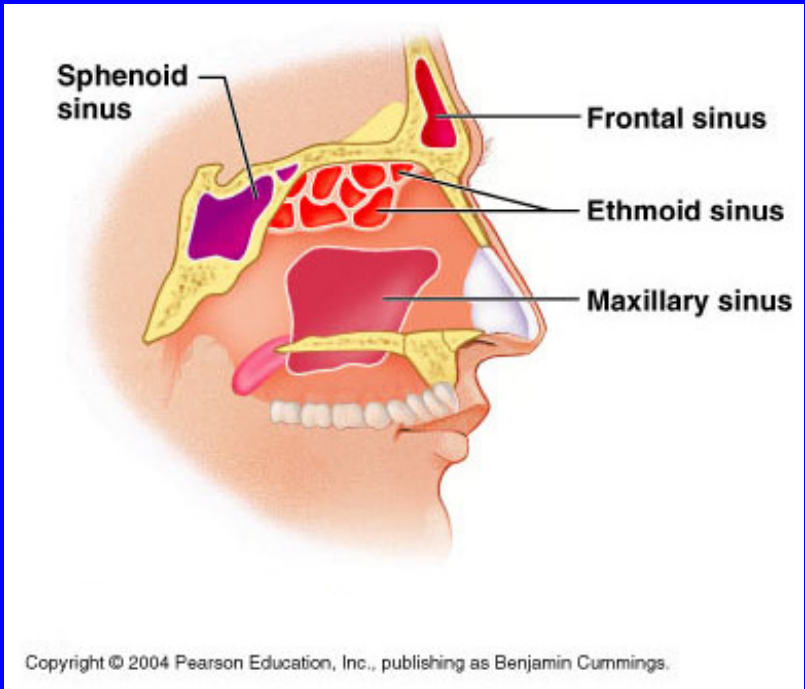
The Paranasal Sinuses

- The maxillary sinuses are the largest.
- The sinuses lighten the bones of the face and provide resonance chambers for the voice.



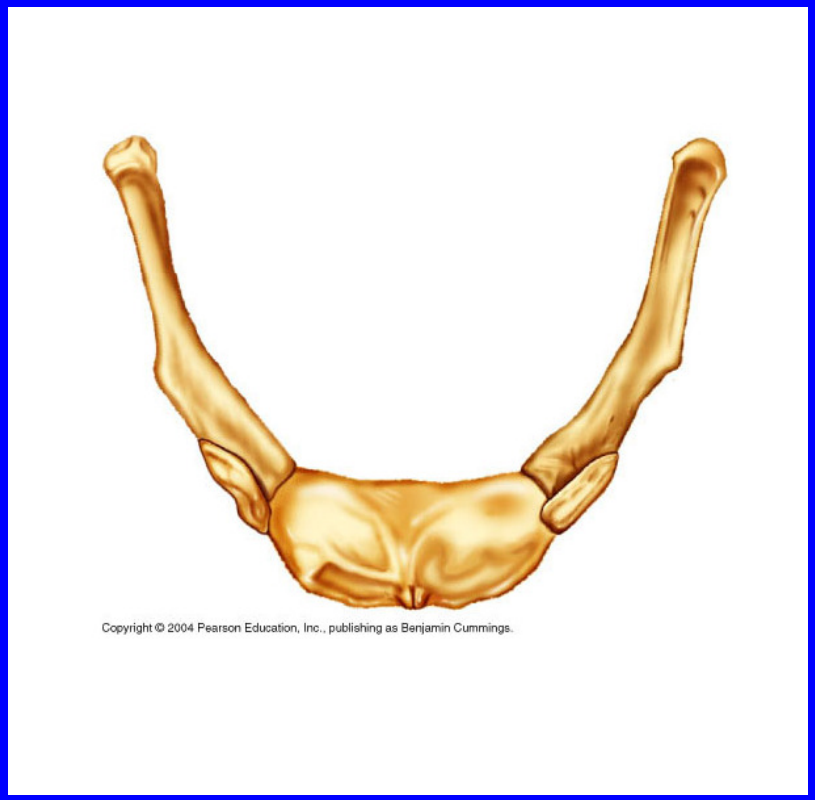
The Paranasal Sinuses

- Inflammation of the sinuses, or sinusitis, results from allergy or infection.
- Blockage of the ostia results in the formation of a partial vacuum within the cavity, causing pain.



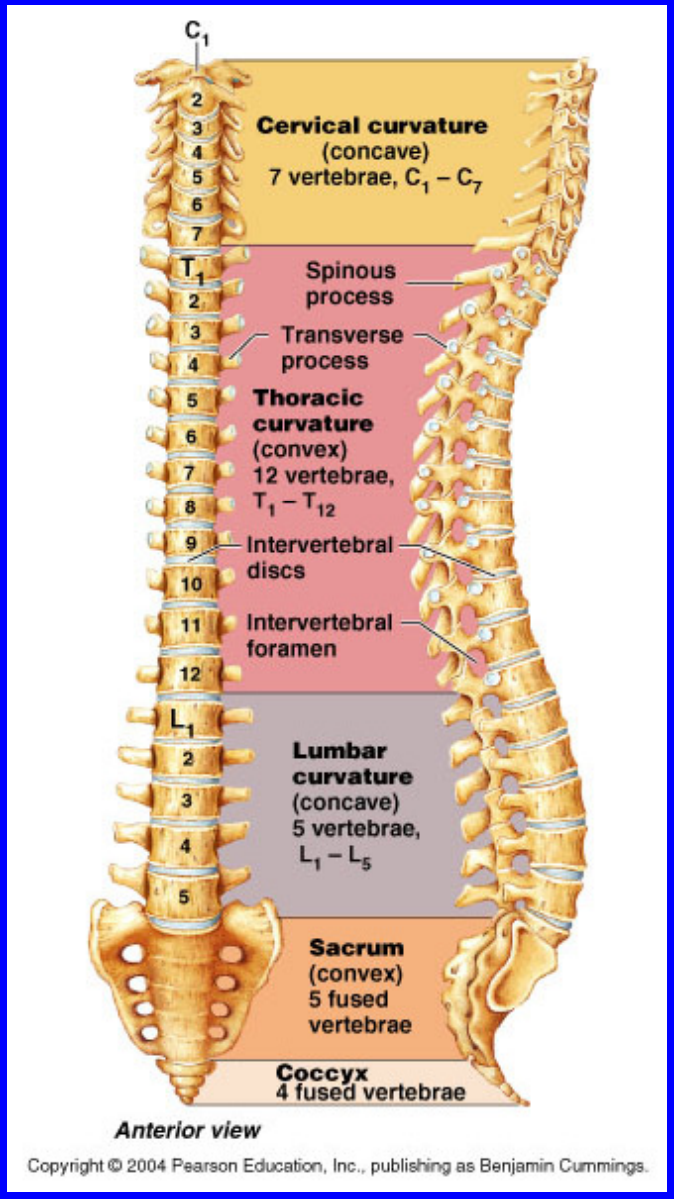
The Hyoid Bone

- The hyoid is located in the throat superior to the larynx.
- It is the only bone that does not articulate with any other bone.
- It serves as a site of attachment for many muscles of the tongue and neck.



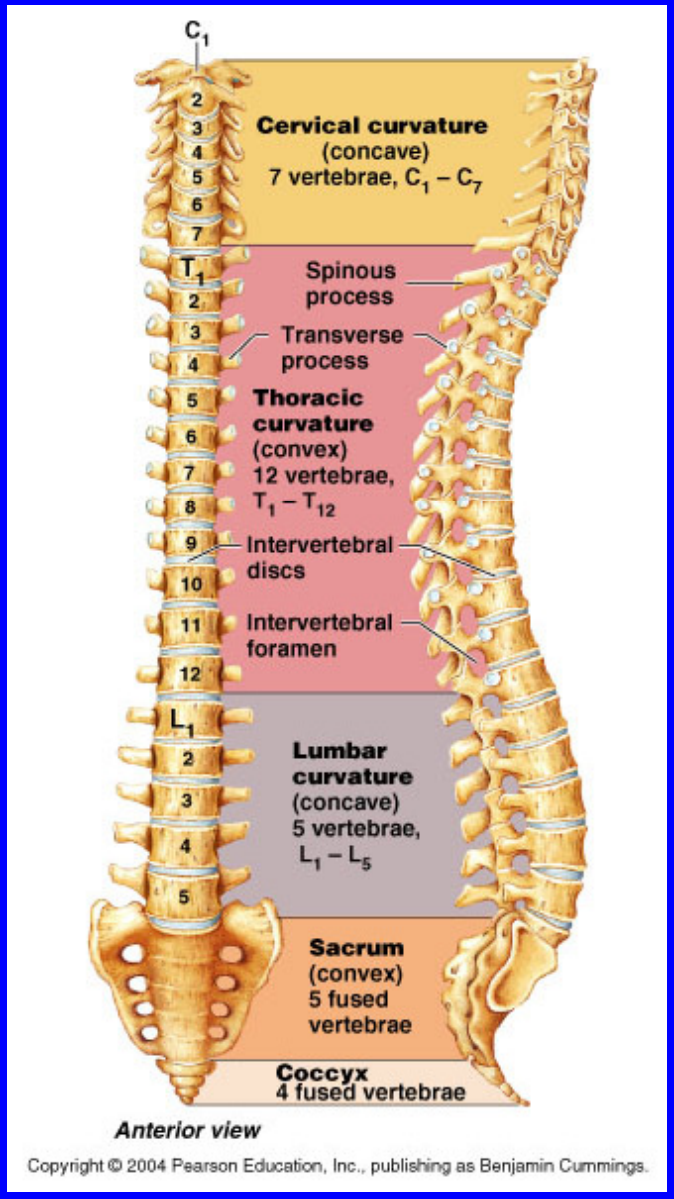
The Vertebral Column

- The vertebral column is composed of 24 bones and five types of vertebrae.
- The five types are cervical, thoracic, lumbar, sacral, and coccyx.



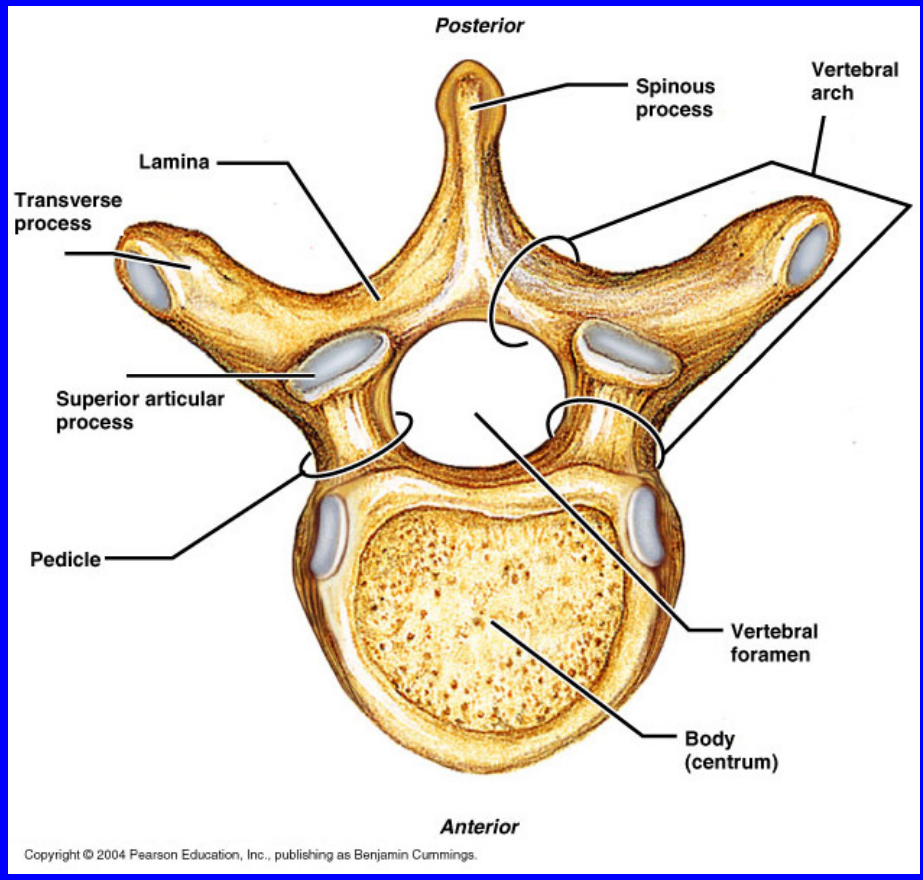
The Vertebral Column

- There are 7 cervical vertebrae, 12 thoracic vertebrae, 5 lumbar vertebrae, 5 sacral vertebrae (fused), and 4 coccygeal vertebrae (fused).



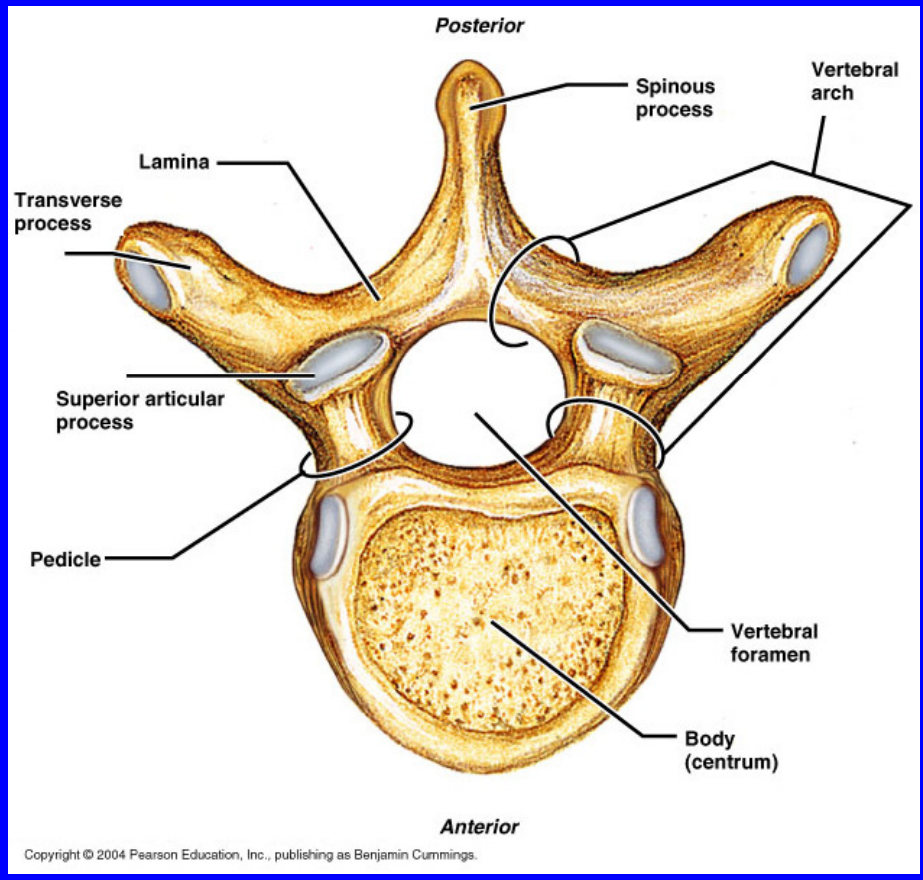
The Typical Vertebra

- The typical vertebra has 4 main features.
- The body (centrum) faces the anterior side of the column.
- The vertebral arch faces the posterior side of the column.



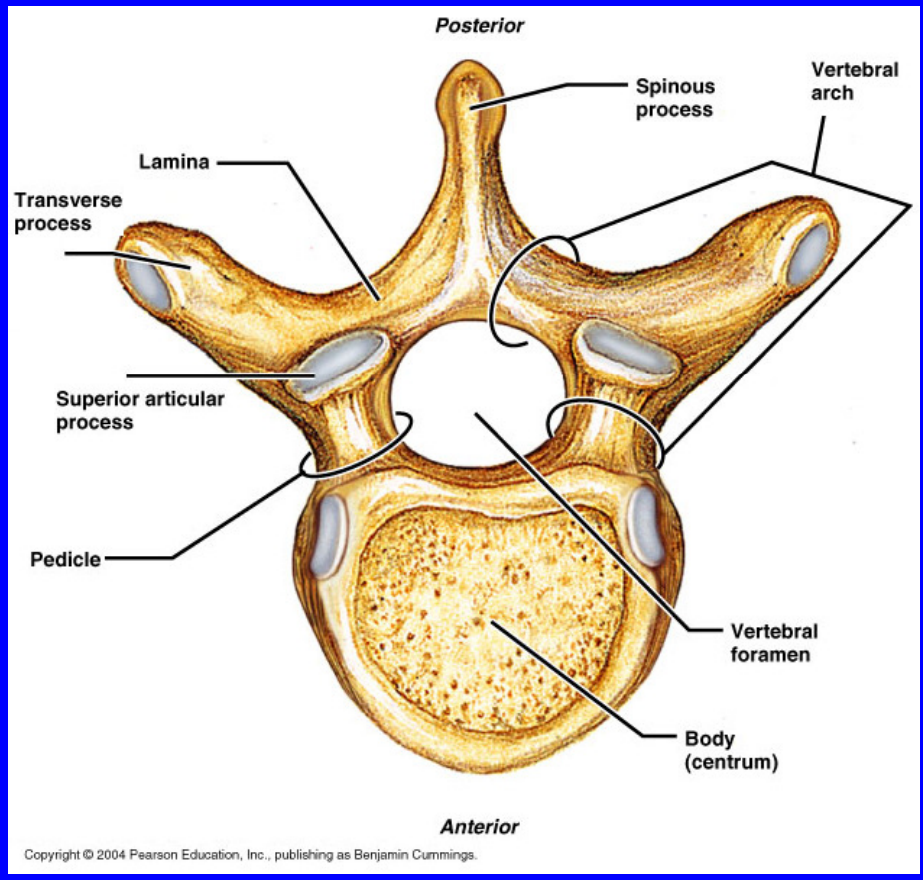
The Typical Vertebra

- The body and arch together form the vertebral foramen.
- The vertebral foramina of all of the vertebra forms the spinal cavity.



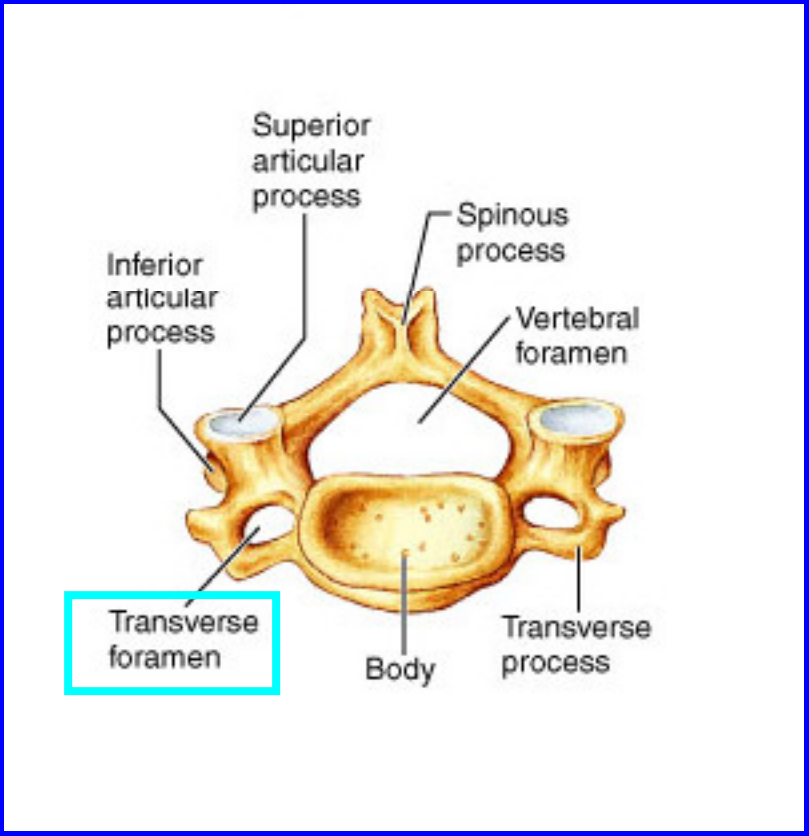
The Typical Vertebra

- The processes (transverse, spinous, and articular) project from the vertebral arch.
- Variations in these features will help distinguish each type of vertebra.



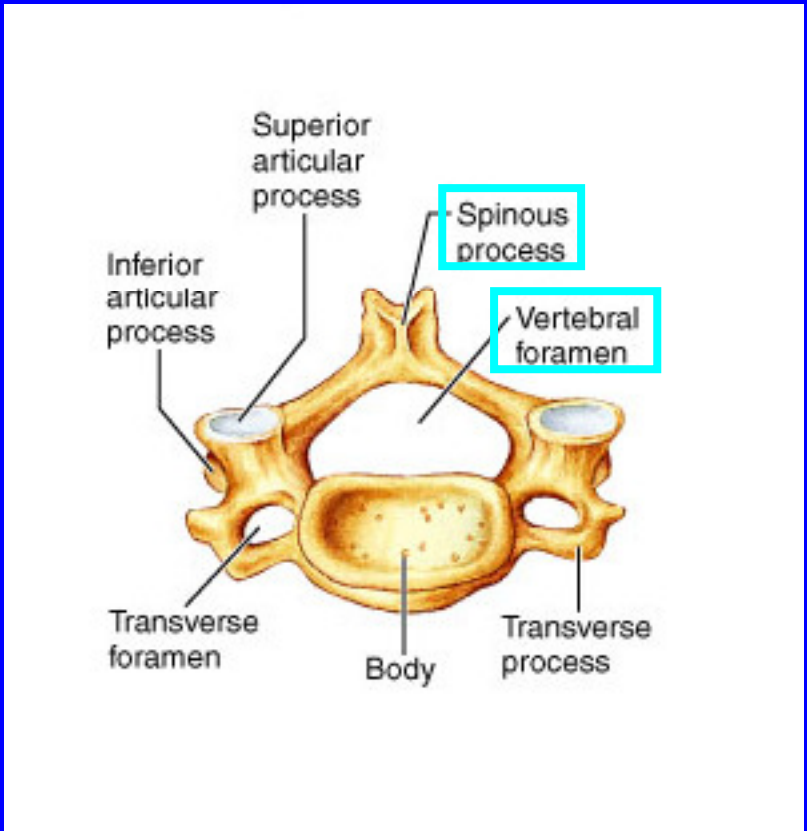
The Cervical Vertebra

- The primary distinguishing features of the cervical vertebrae are the transverse foramina.
- The transverse foramina form the passages for the vertebral arteries.



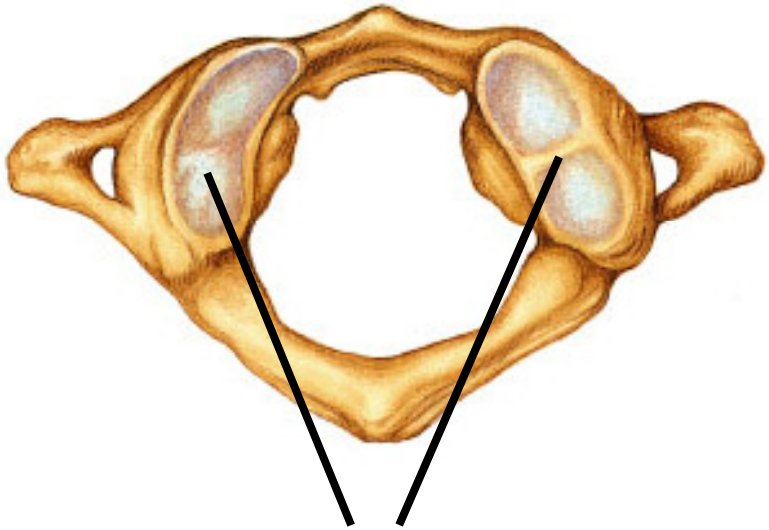
The Cervical Vertebra

- The vertebral foramen is triangular in C_3 – C_7.
- The spinous process is bifurcated in C_2 – C_6.
- The cervical vertebrae tend to be smaller and lighter than other vertebrae.



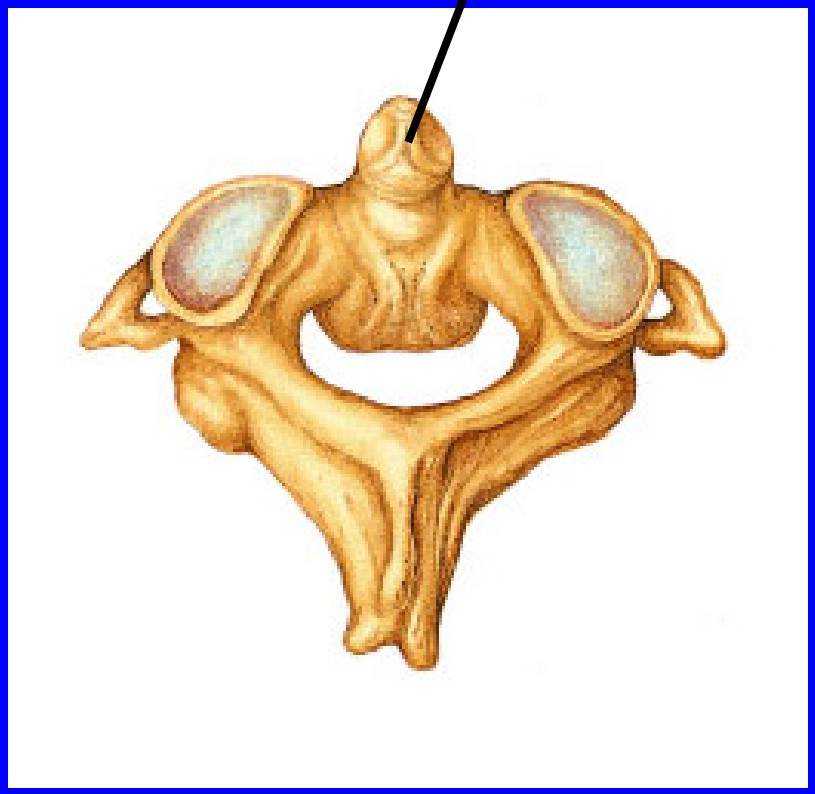
The Atlas

- The first cervical vertebra (C_1) is called the atlas.
- The atlas lacks a body.
- It has two large superior articular processes to receive the occipital condyles of the skull.



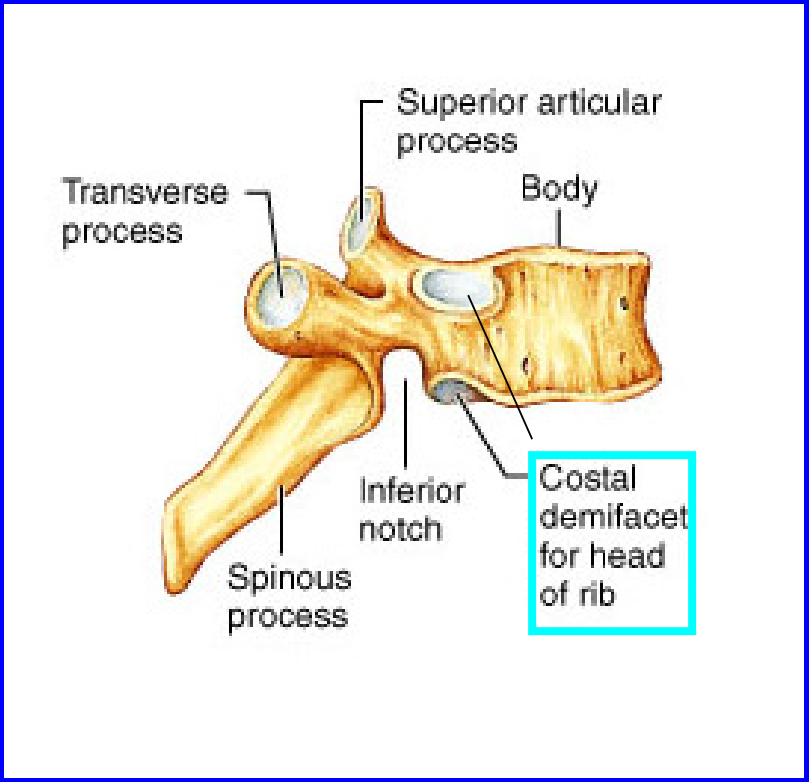
The Axis

- The second cervical vertebra (C_2) is called the axis.
- The superior portion of the body of the axis is modified into an odontoid process (dens).
- The odontoid process articulates with the atlas.



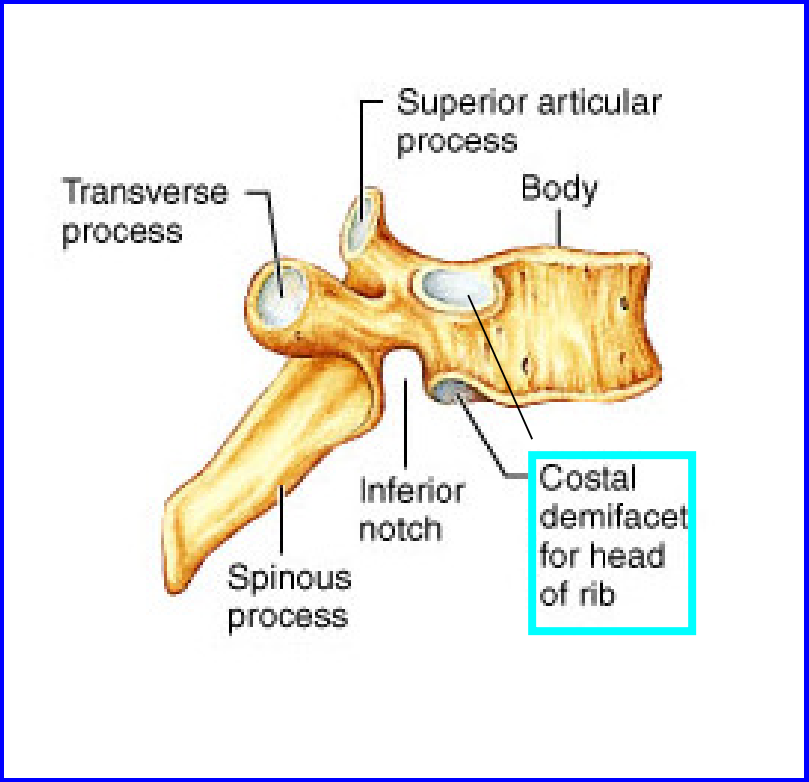
The Thoracic Vertebrae

- The primary distinguishing feature of the thoracic vertebrae are the costal demifacets.
- The surfaces articulate with the heads of the ribs



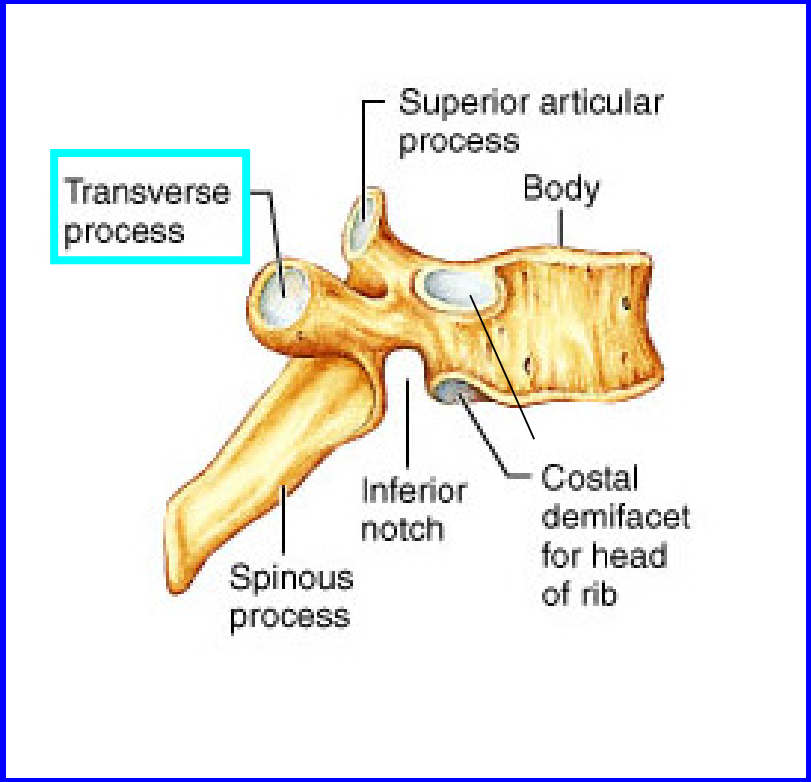
The Thoracic Vertebrae

- The inferior demifacet of one vertebra, and the superior demifacet of the next inferior vertebrae together receive the head of a single rib.



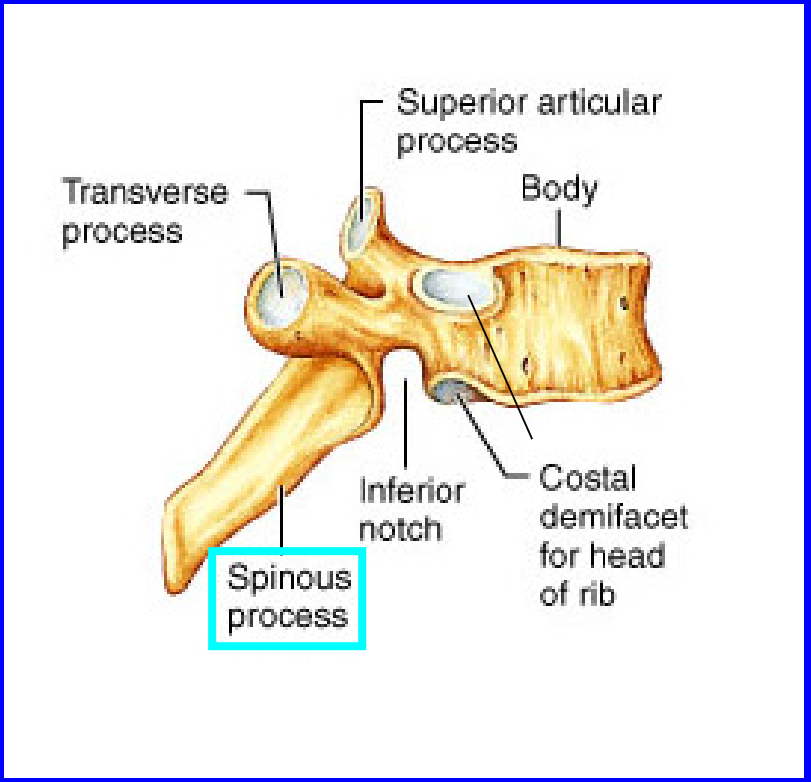
The Thoracic Vertebrae

- The first 11 thoracic vertebrae (T1 – T11) also have an articular facet on the transverse process for the tubercle of a rib.
- The twelfth thoracic vertebra lacks this facet.



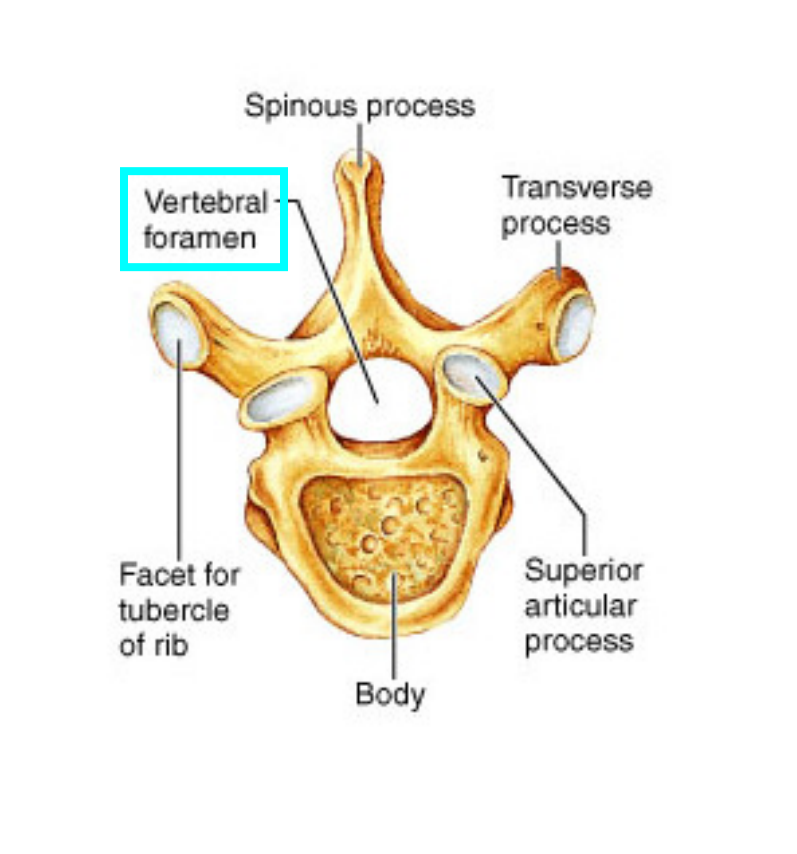
The Thoracic Vertebrae

- The spinous process of the typical thoracic vertebra is long and is angled sharply downward.



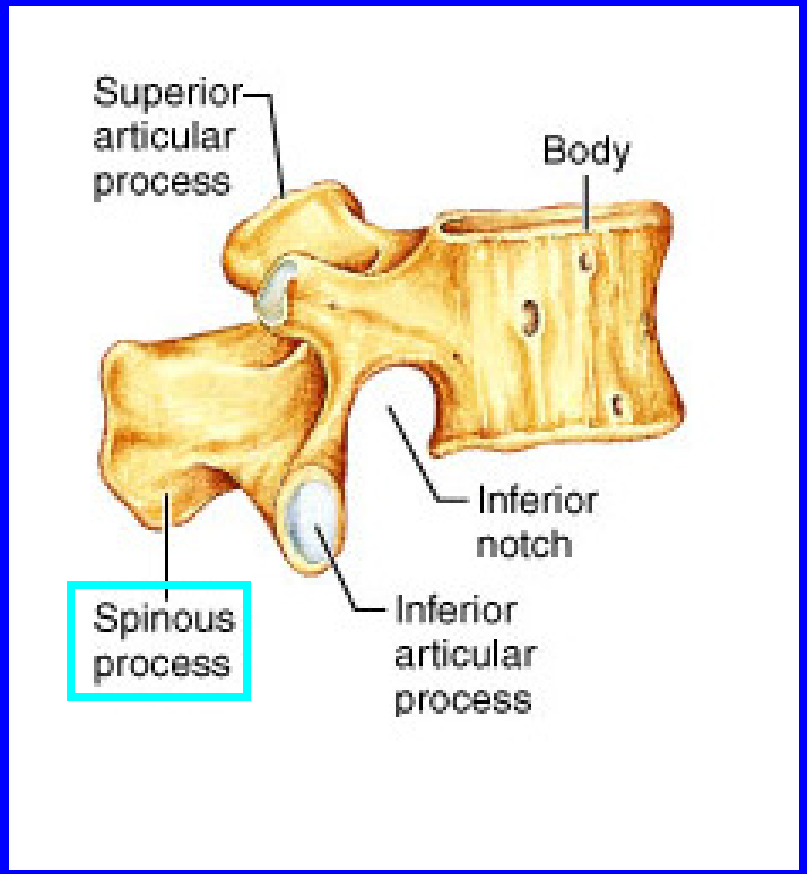
The Thoracic Vertebrae

- The vertebral foramen tends to be oval or round.
- The thoracic vertebrae form the posterior portion of the bony thorax.



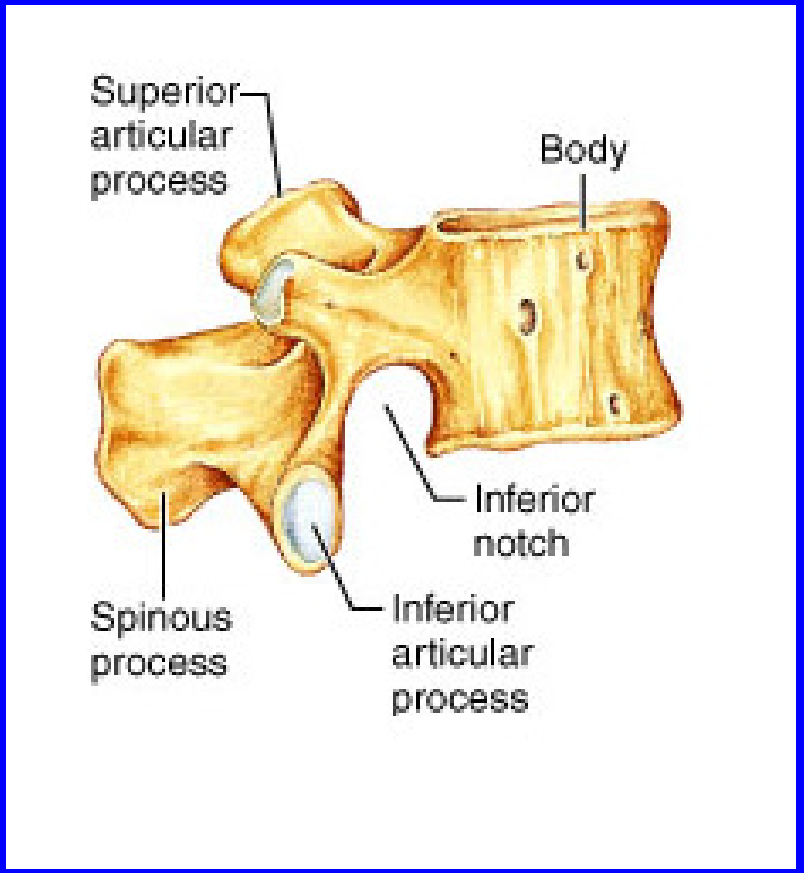
The Lumbar Vertebrae

- The lumbar vertebrae tend to be larger and heavier than other vertebrae.
- The spinous process tends to be blunt and square.



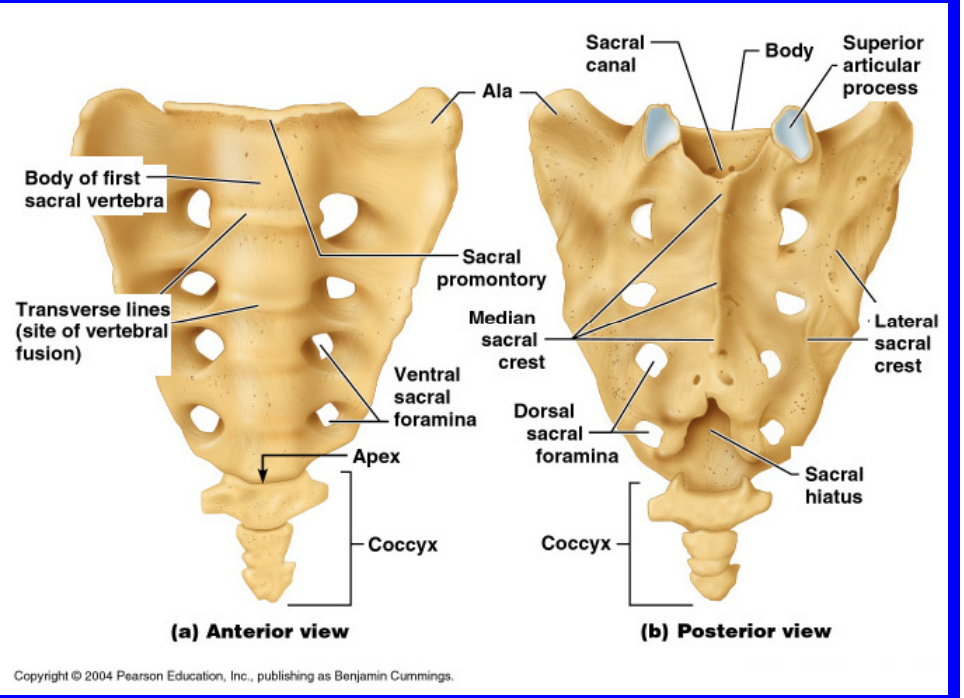
The Lumbar Vertebrae

- The primary diagnostic feature of the lumbar vertebrae is that they lack the features of the other vertebrae (transverse foramina and costal demifacets).



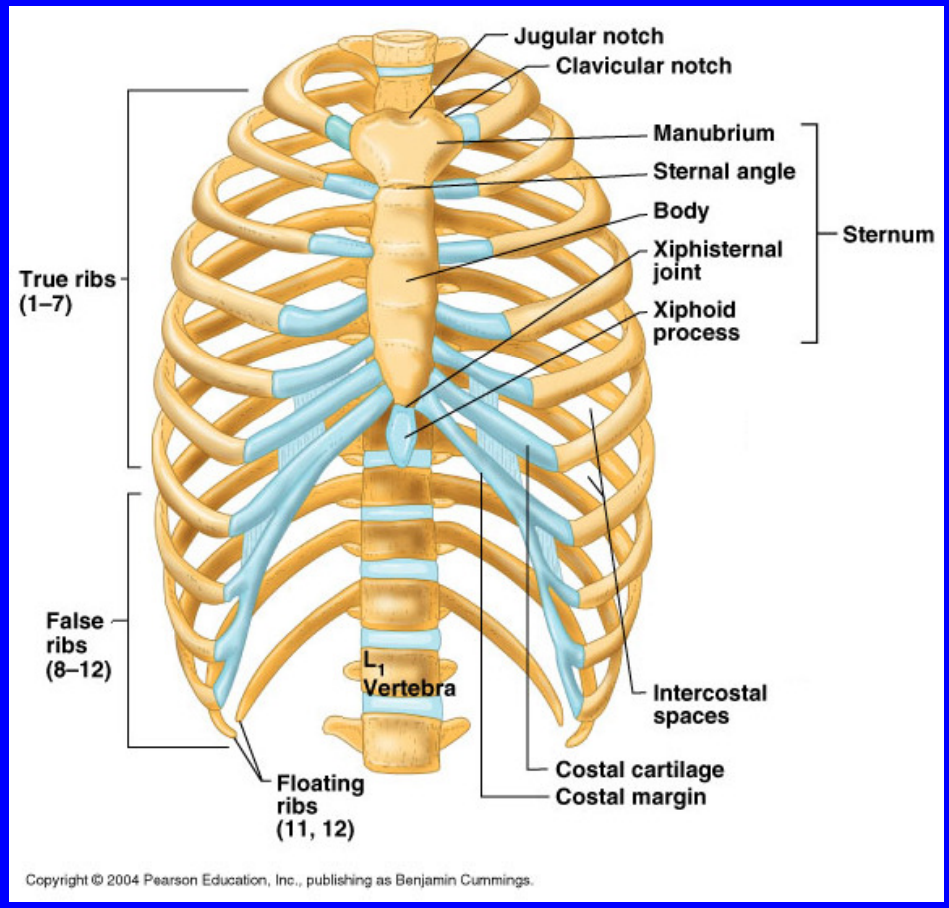
The Sacrum

- The sacrum consists of five vertebrae that fuse together during development.
- Together with the innominate bones it forms the bony pelvis.



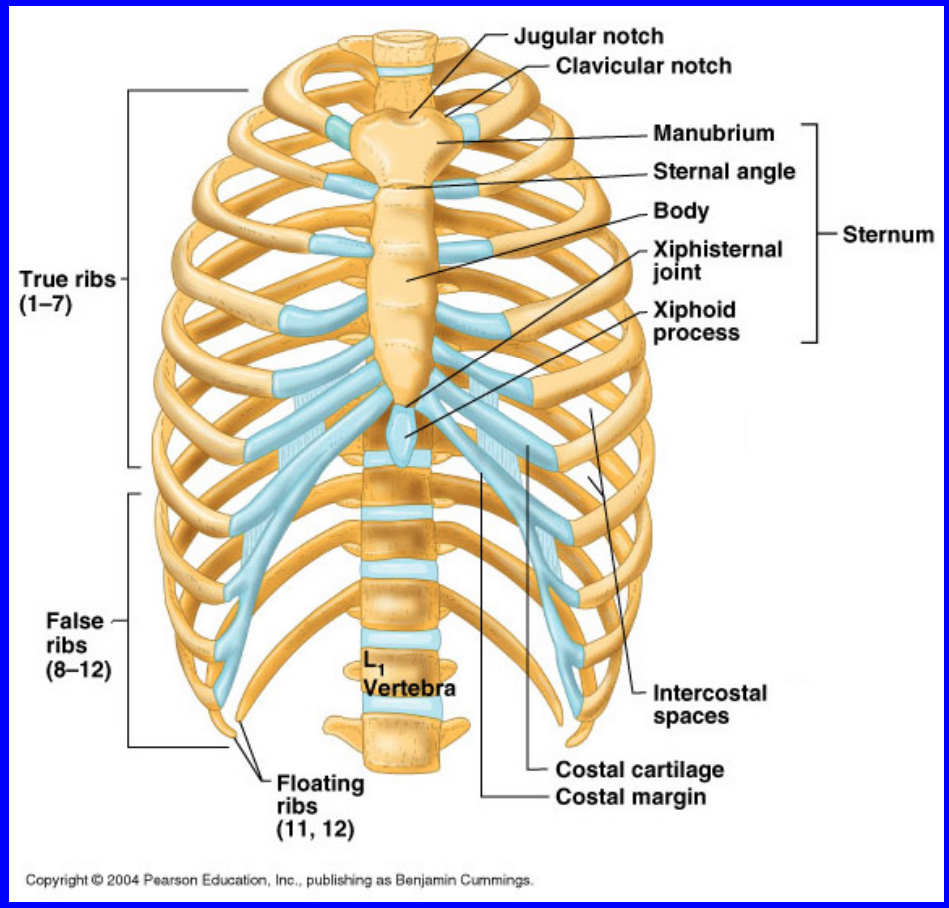
The Bony Thorax

- The bony thorax consists of the ribs, sternum, costal cartilages, and thoracic vertebrae.
- It encloses and protects the internal organs of the thoracic cavity.



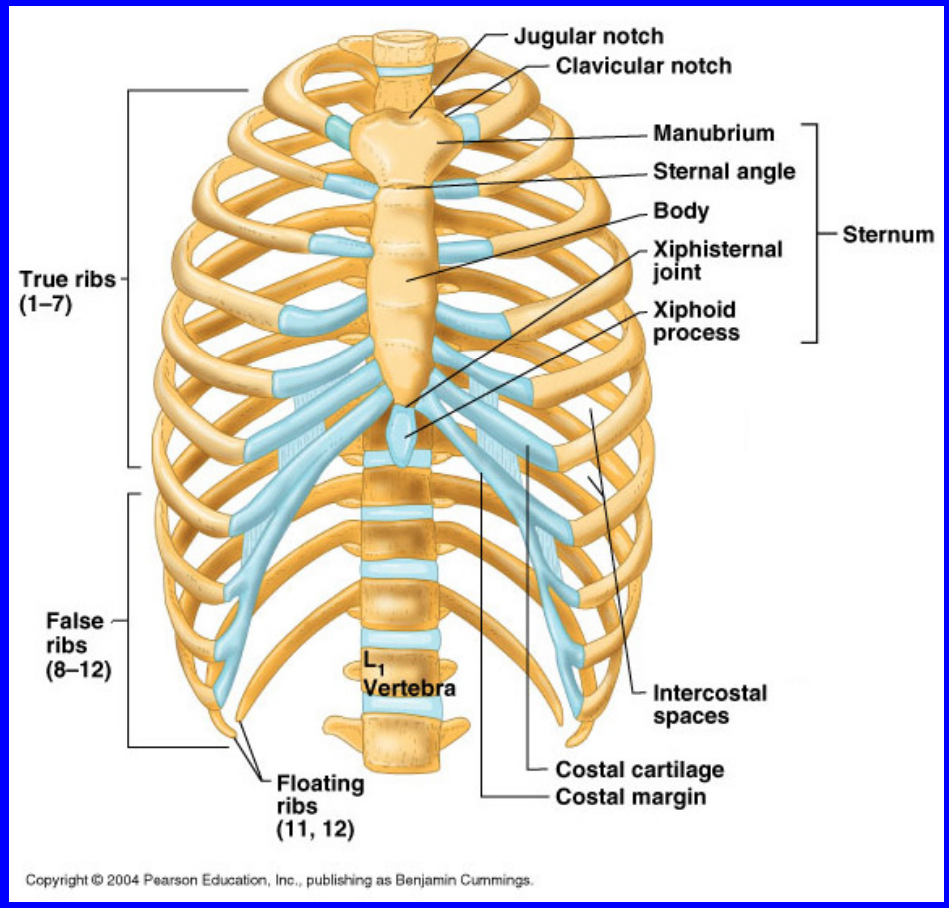
The Sternum

- The sternum consists of three parts that fuse together during development (sometimes incompletely)
- They are the manubrium, the body, and the xiphoid process.



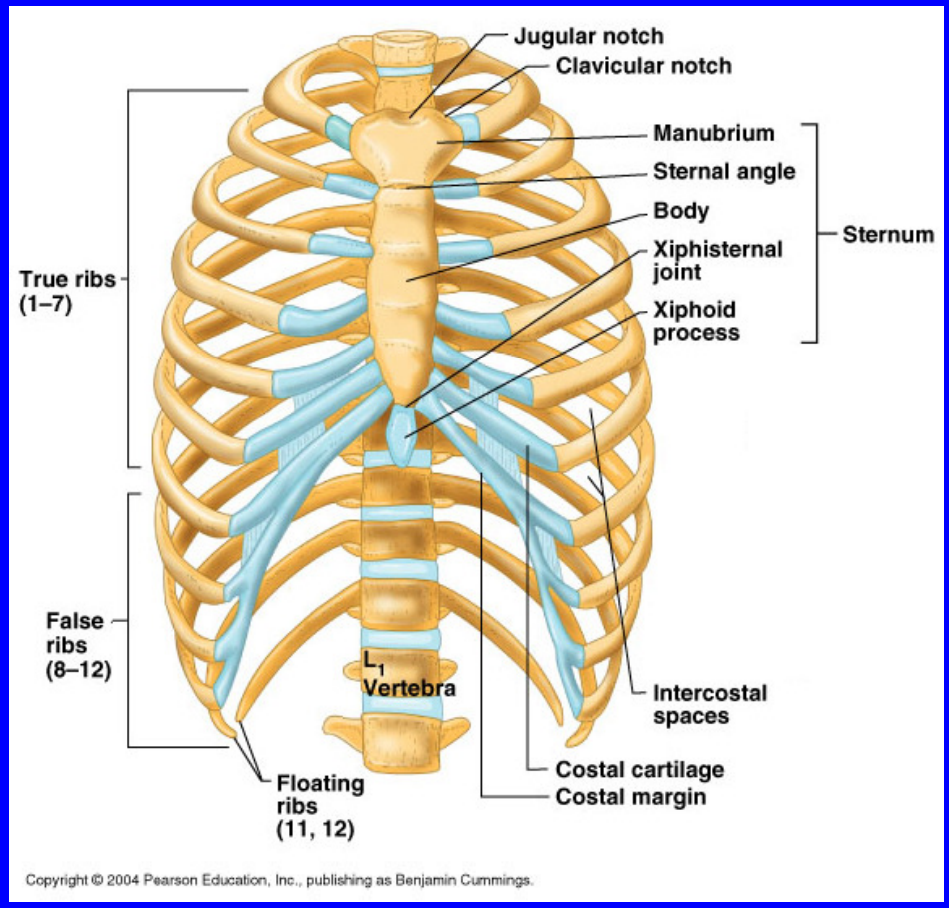
The Sternum

- The xiphoid process tends to ossify with age, but in most younger people it is still cartilage.
- The sternum articulates with the ribs via the costal cartilages.



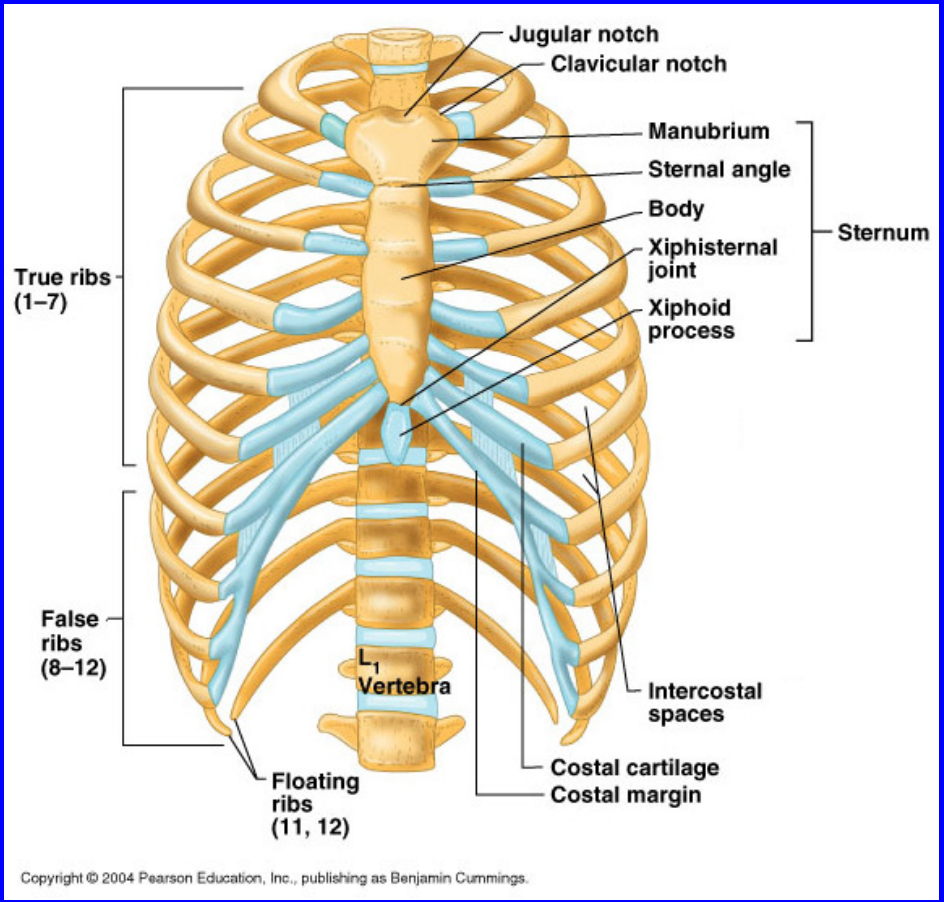
The Ribs

- There are 12 pairs of ribs, which are divided into 3 categories.
- The true ribs (1-7) each have their own cartilage joining them to the sternum.
- The false ribs (8-12) share or lack a cartilage joining them to the sternum.



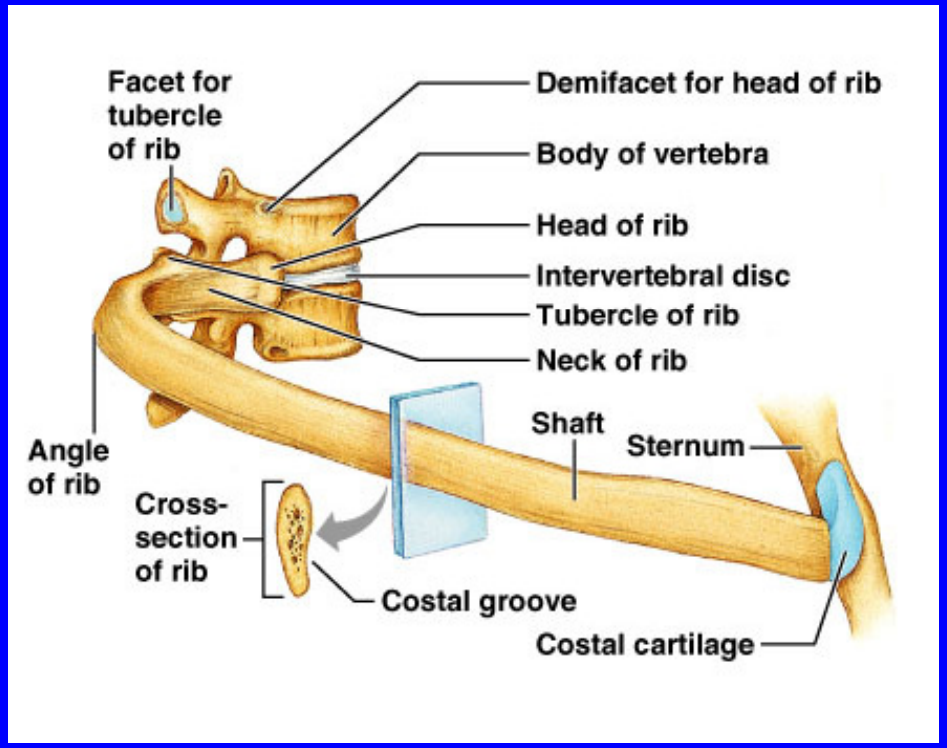
The Ribs

- The last two ribs (11, 12) are the floating ribs.
- The floating ribs lack a connection to the sternum.
- Floating ribs are a subcategory of false ribs.



The Ribs

- A typical rib has a head, an neck, a tubercle, an angle, and a shaft.
- The head articulates with the costal demifacets of two thoracic vertebrae.
- The tubercle articulates with the transverse facets of a single thoracic vertebra.



General Considerations

- Study the bones and bone markings listed on your structure list.
- Use not only the diagrams in your manual, but also the bones in class.
- You will be not be required to learn right from left for the axial skeleton.
- You will not be required to identify the disarticulated skull bones.

General Considerations

- On the exam, make sure that you provide the full name for a bone or bone marking, especially if there is more than one of a particular structure.
- For example, styloid process (or just styloid) is not enough. You must specify styloid process of the radius (or ulna, or temporal bone).

General Considerations

- Finally, do not point to the bones with the tip of a pen or pencil. Use a mall probe.
- It is too easy to inadvertently mark a bone, and the marks are extremely difficult to clean off.
- Anyone caught deliberately marking on a bone will have their highest quiz grade converted to a zero.