

# **SKELETAL SYSTEM**

Prepared by,

Abhay Shripad Joshi

Assistant Professor

Yash Institute of Pharmacy, Aurangabad

[abhay.joshirss@gmail.com](mailto:abhay.joshirss@gmail.com)

# SKELATAL SYSTEM

- Bone tissues makes up about 18% of the total human body weight.
- The skeletal system supports and protects the body while giving it shape and form.
- **Osteology:** It is the branch of science that deals with the study of the skeletal system, their structure and functions.

# **SKELETAL SYSTEM**

- **COMPOSED OF:**

- Bones

- Cartilage

- Joints

- Ligaments

# **FUNCTIONS OF SKELETAL SYSTEM**

- **SUPPORT:** Hard framework that supports and anchors the soft organs of the body.
- **PROTECTION:** Surrounds organs such as the brain and spinal cord.
- **MOVEMENT:** Allows for muscle attachment therefore the bones are used as levers.
- **STORAGE:** Minerals and lipids are stored within bone material.
- **BLOOD CELL FORMATION:** The bone marrow is responsible for blood cell production.



# DIVISIONS OF THE SKELETAL SYSTEM

- The human skeleton consists of 206 named bones
- Bones of the skeleton are grouped into two principal divisions:
  - **Axial skeleton**
    - Skull bones, auditory ossicles (ear bones), hyoid bone, ribs, sternum (breastbone), and bones of the vertebral column
  - **Appendicular skeleton**
    - Consists of the bones of the **upper** and **lower limbs (extremities)**, plus the bones forming the **girdles** that connect the limbs to the axial skeleton

# DIVISIONS OF THE SKELETAL SYSTEM

**TABLE 7.1**

The Bones of the Adult Skeletal System

DIVISION OF THE SKELETON	STRUCTURE	NUMBER OF BONES	DIVISION OF THE SKELETON	STRUCTURE	NUMBER OF BONES
<b>Axial Skeleton</b> 	<b>Skull</b>		<b>Appendicular Skeleton</b> 	<b>Pectoral (shoulder) girdles</b>	
	Cranium	8		Clavicle	2
	Face	14		Scapula	2
	<b>Hyoid</b>	1		<b>Upper limbs</b>	
	<b>Auditory ossicles</b>	6		Humerus	2
	<b>Vertebral column</b>	26		Ulna	2
	<b>Thorax</b>			Radius	2
	Sternum	1		Carpals	16
	Ribs	<u>24</u>		Metacarpals	10
	Subtotal = 80			Phalanges	28
				<b>Pelvic (hip) girdle</b>	
				Hip, pelvic, or coxal bone	2
				<b>Lower limbs</b>	
				Femur	2
				Patella	2
				Fibula	2
				Tibia	2
				Tarsals	14
				Metatarsals	10
				Phalanges	<u>28</u>
				Subtotal = 126	
				<b>Total in an adult skeleton = 206</b>	

# CLASSIFICATION OF BONE BASED ON SHAPE

- Bones can be classified into five types based on shape:
- **Long**
- **Short**
- **Flat**
- **Irregular**
- **Sesamoid**

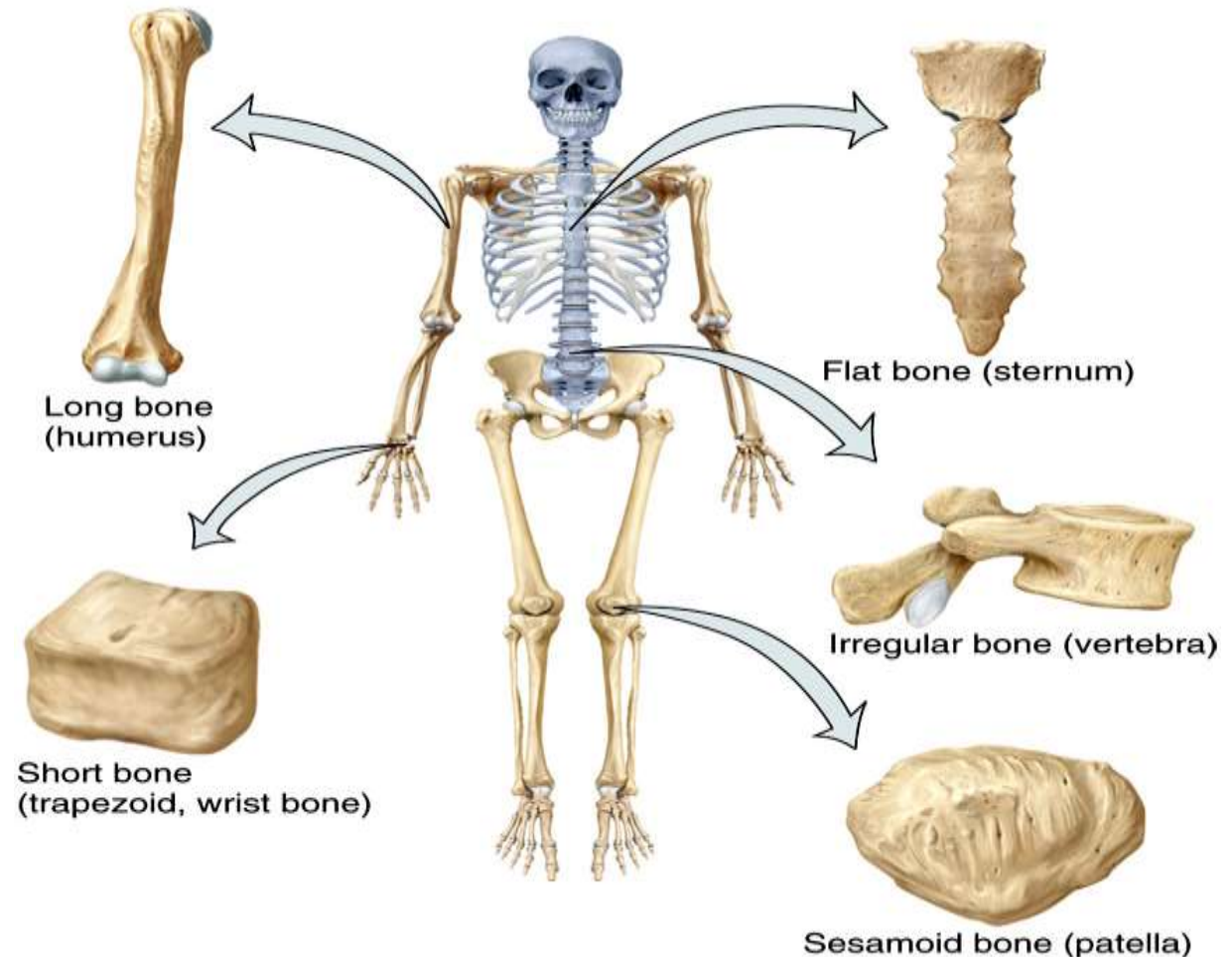


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# CLASSIFICATION OF BONE BASED ON SHAPE

- **Long Bones**
  - Greater length than width and are slightly curved for strength
  - Femur, tibia, fibula, humerus, ulna, radius, phalanges
- **Short bones**
  - Cube-shaped and are nearly equal in length and width
  - Carpal, tarsal
- **Flat bones**
  - Thin and composed of two nearly parallel plates of compact bone tissue enclosing a layer of spongy bone tissue
  - Cranial, sternum, ribs, scapulae
- **Irregular bones**
  - Complex shapes and cannot be grouped into any of the previous categories
  - Vertebrae, hip bones, some facial bones, calcaneus
- **Sesamoid bones**
  - Protect tendons from excessive wear and tear
  - Patellae, foot, hand



# THE AXIAL SKELETON

The axial skeleton consists of :

- 1. Skull.**
- 2. Vertebral column (spinal column).**
- 3. Thoracic cage.**
- 4. Sternum.**

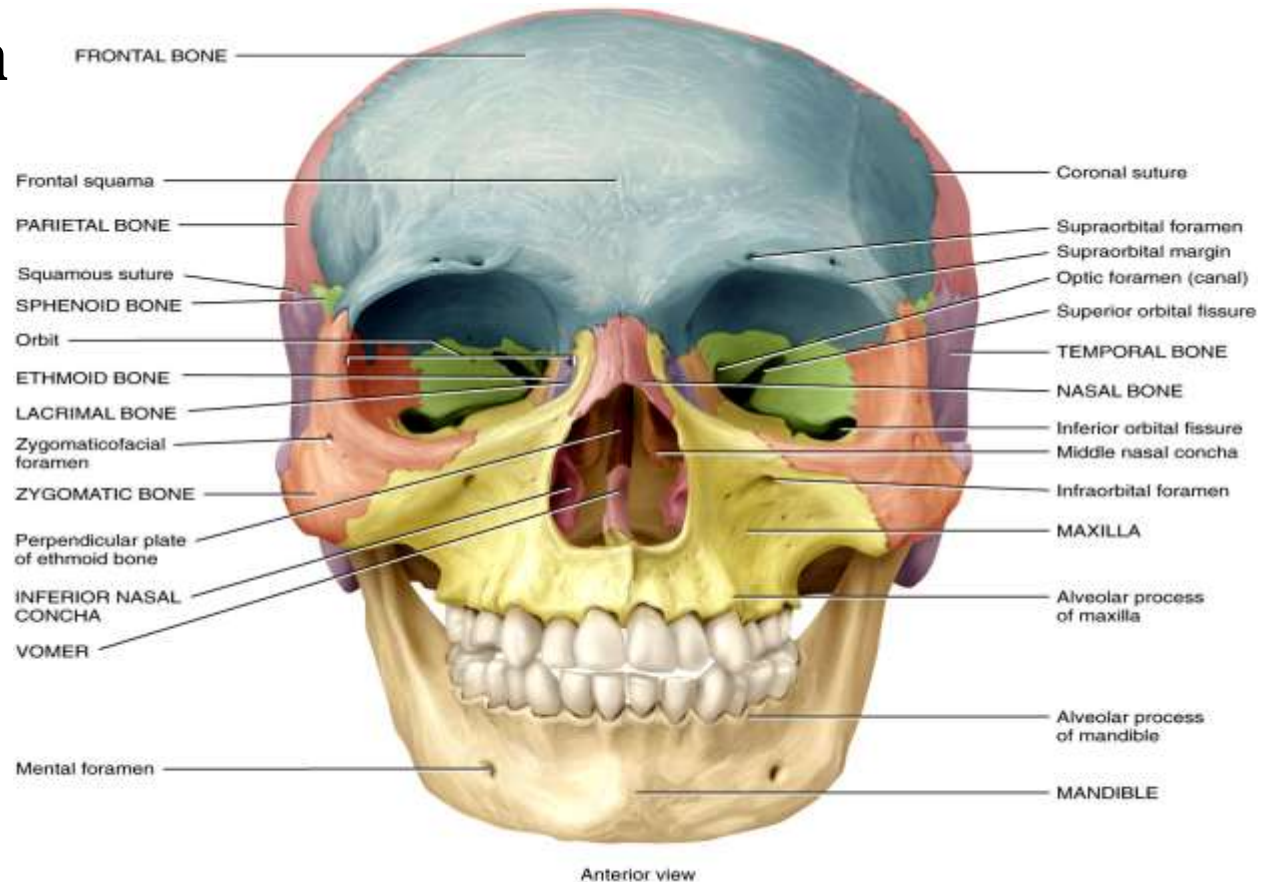
# THE AXIAL SKELETON

## Skull

- The skull is situated on the upper end of vertebral column and its bony structure is divided into 2 parts.

### 1. The cranium

### 2. The face



# THE AXIAL SKELETON

## A. Cranium:

- It is formed by flat and irregular bones that provides a bony protection to the brain.
- **1 Frontal Bone**
  - It forms the forehead, It forms parts of eye sockets
  - The **coronal suture** joins the frontal and parietal bones.
- **2 Parietal Bones**
  - It form the sides and roof of the cranial cavity, it articulates with each other at the sagittal suture.
  - It joins the frontal bone with **coronal suture** and occipital bone with **lambdoidal suture** and the temporal bones at the **squamous suture**.
- **2 Temporal Bones**
  - These bones lie one on each side of the head and form immovable joints with the parietal, occipital, sphenoid and zygomatic bones.
  - The temporal bone articulates with the mandible at the tempo-mandibular joint.

# THE AXIAL SKELETON

- **1 Occipital Bone**

- It forms back of head and most of the base of the skull.
- It has immovable joints with the parietal, temporal and sphenoid bones.

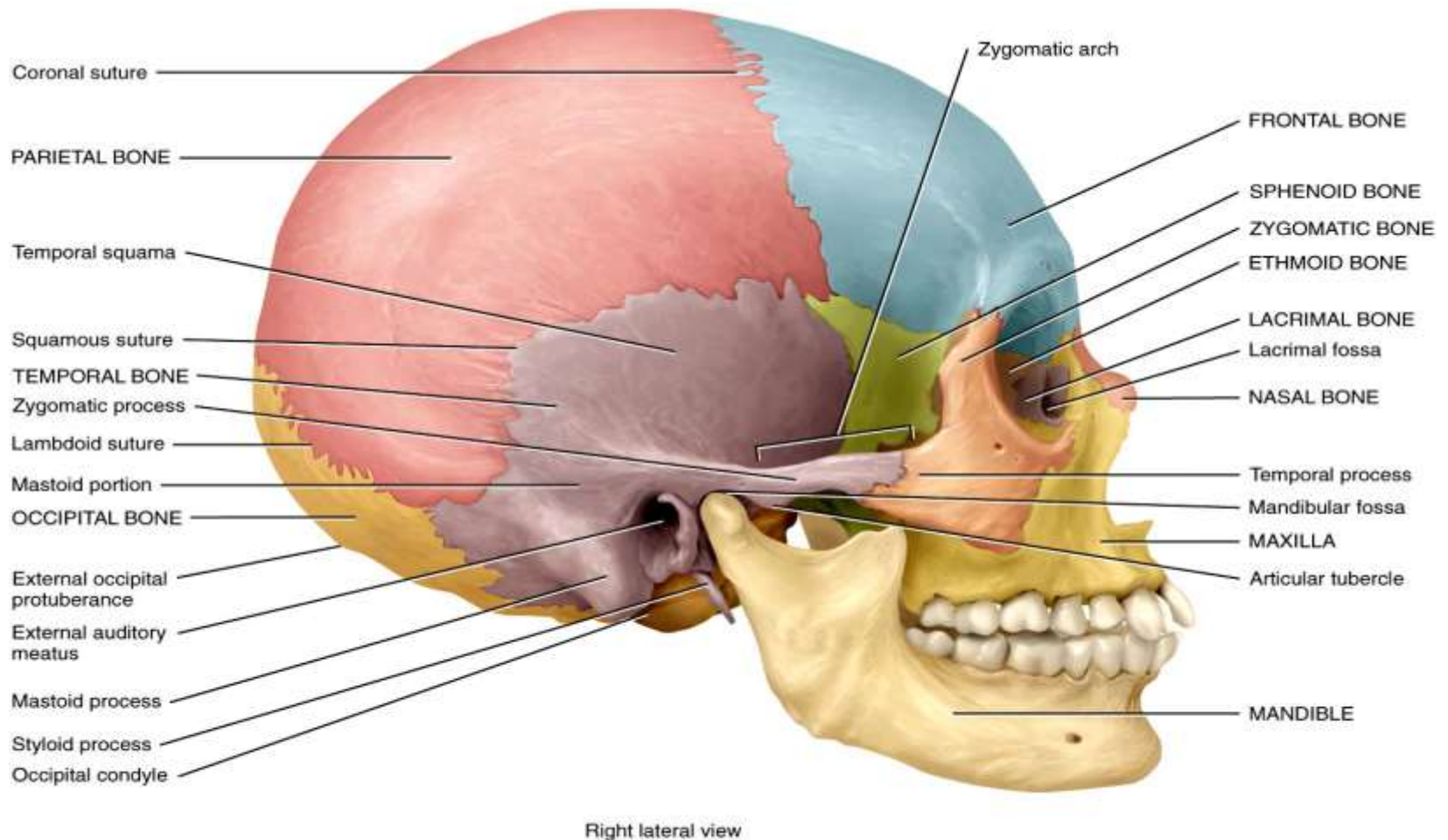
- **1 Sphenoid Bone**

- It occupies the middle portion of base of skull and it articulates with the occipital, temporal, parietal and frontal bones.

- **1 Ethmoid Bone**

- It occupies the anterior part of base of the skull and helps to form the orbital cavity, the nasal septum and the lateral walls of the nasal cavity.
- It is very delicate bone containing many air sinuses that opens into the nasal cavity.

# THE AXIAL SKELETON



# THE AXIAL SKELETON

## B. The Face (Facial bones)

- **Nasal Bones**
  - Form the bridge of the nose
- **Maxillae**
  - Form the upper jawbone
  - 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
- **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

# THE AXIAL SKELETON

- **Vomer**
  - Forms the inferior portion of the nasal septum
- **Mandible**
  - Lower jawbone
  - The largest, strongest facial bone
  - The only movable skull bone
- **Nasal Septum**
  - Divides the interior of the nasal cavity into right and left sides
  - “Broken nose,” in most cases, refers to septal damage rather than the nasal bones themselves
- **Orbits**
  - Eye socket
- **Foramina**
  - Openings for blood vessels , nerves , or ligaments of the skull



# THE AXIAL SKELETON

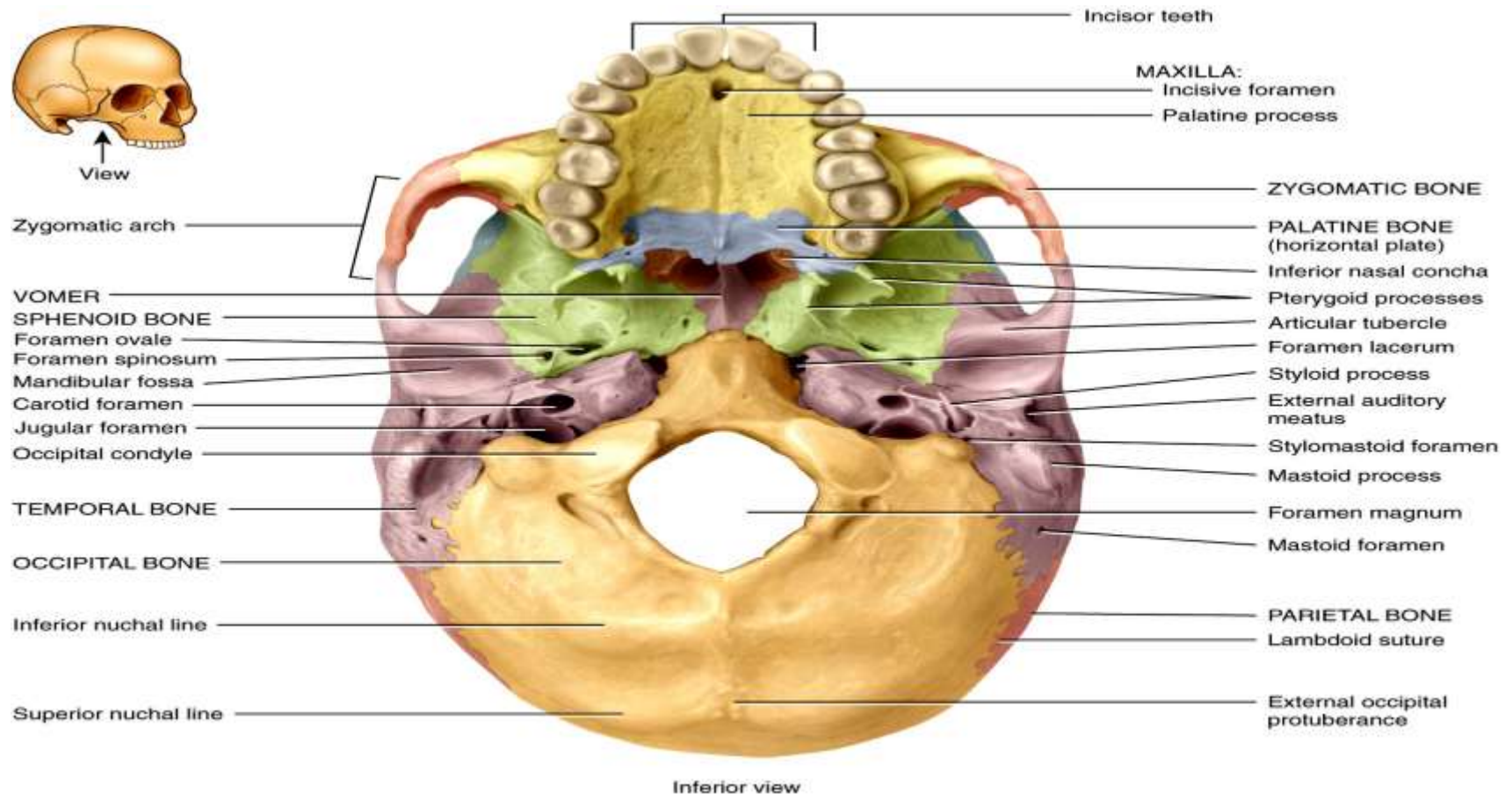
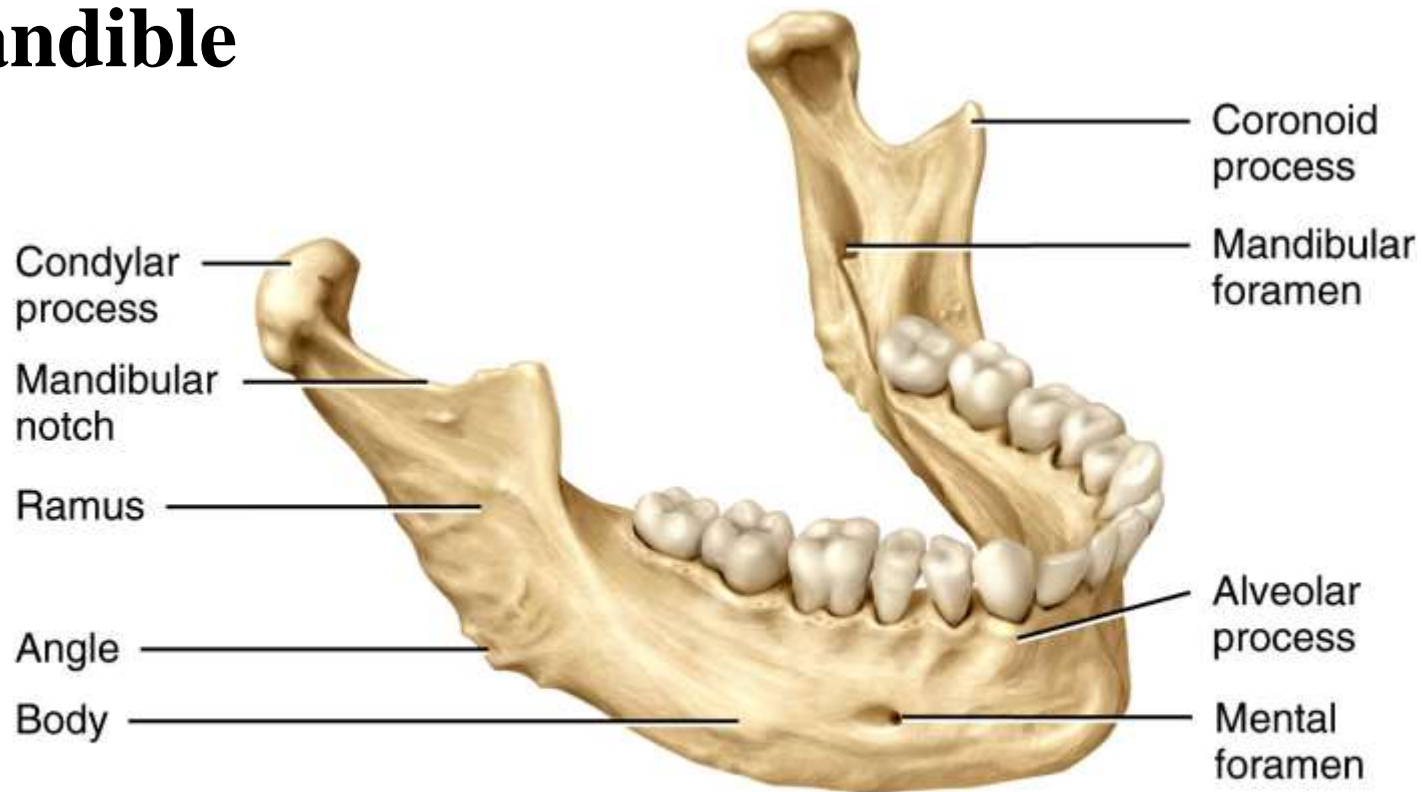


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# THE AXIAL SKELETON

## Mandible

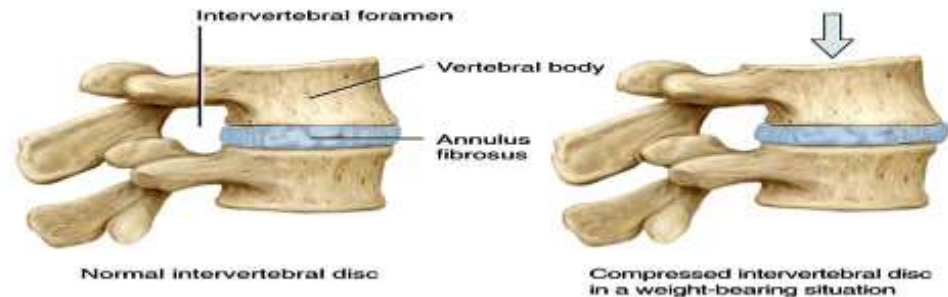
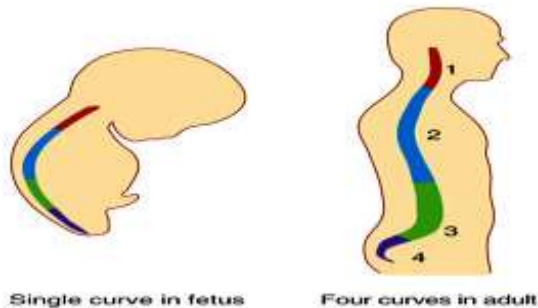
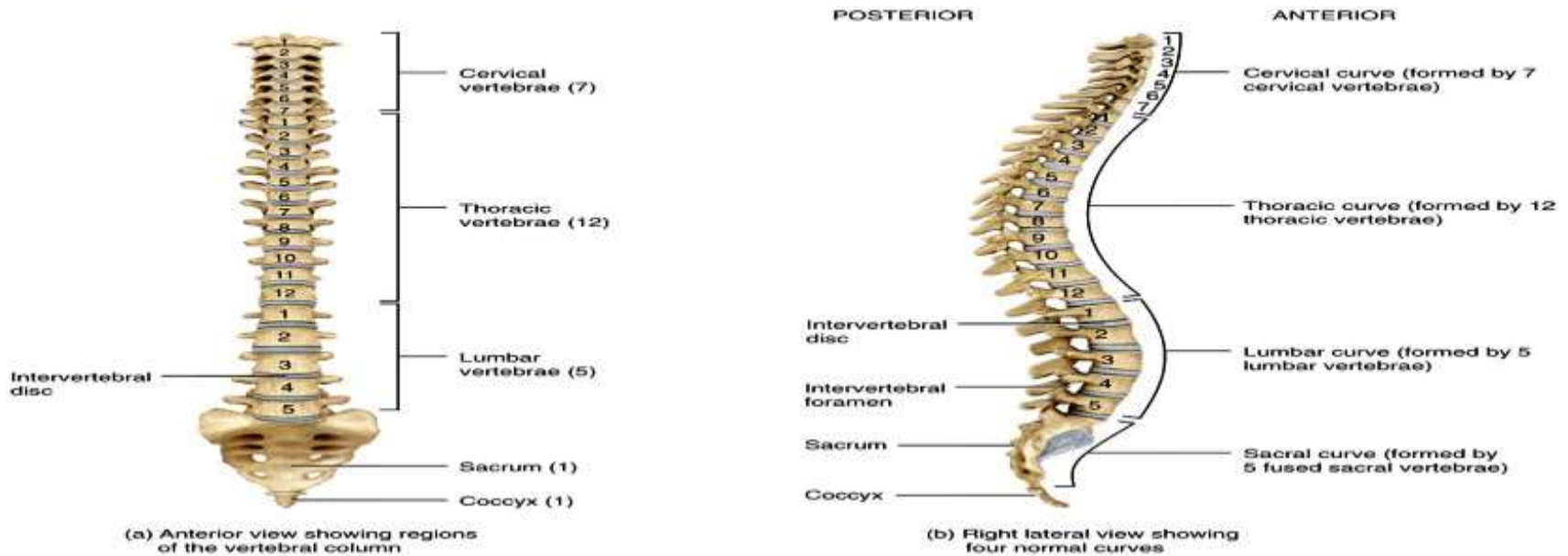


Right lateral view

# THE AXIAL SKELETON

- **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
- **The vertebral column is curved to varying degrees in different locations**
  - Curves increase the column strength
  - Help maintain balance in the upright position
  - Absorb shocks during walking, and help protect the vertebrae from fracture

# THE AXIAL SKELETON



# THE AXIAL SKELETON

- **The vertebral column:**
- 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 AXIAL SKELETON

- **Intervertebral Discs:**
- Found between the bodies of adjacent vertebrae
- Functions to:
  - Form strong joints
  - Permit various movements of the vertebral column
  - Absorb vertical shock
- Vertebrae typically consist of:
  - A Body (weight bearing)
  - A vertebral arch (surrounds the spinal cord)
  - Several processes (points of attachment for muscles)

# THE AXIAL SKELETON

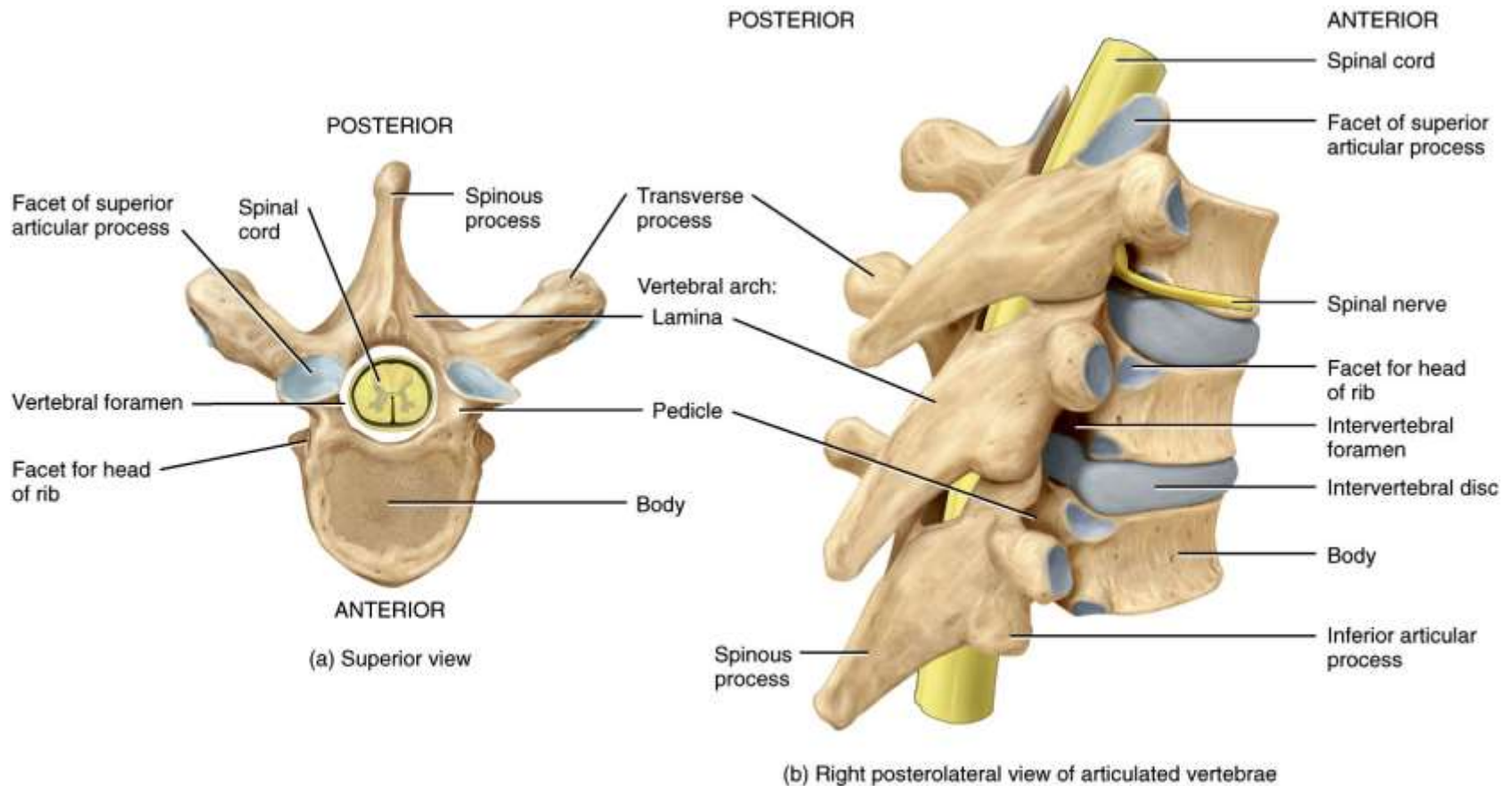


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# THE AXIAL SKELETON

- **Thorax: (Thoracic cage)**
- Thoracic cage is formed by the:
  - Sternum
  - Ribs
  - Costal cartilages
  - 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 AXIAL SKELETON

- **Sternum**

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

- **Ribs**

- Twelve pairs of ribs give structural support to the sides of the thoracic cavity

- **Costal cartilages**

- Costal cartilages contribute to the elasticity of the thoracic cage



# THE AXIAL SKELETON

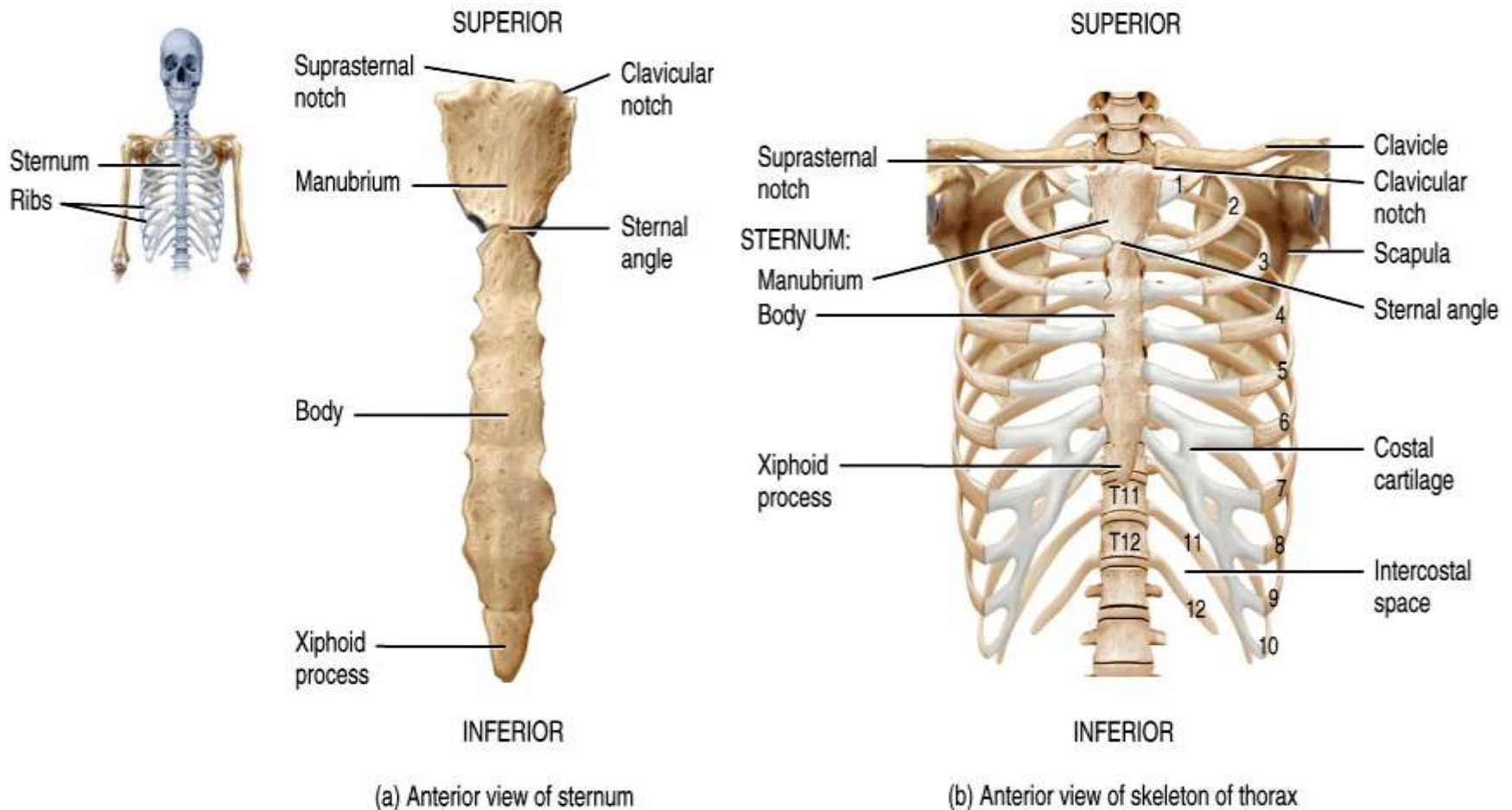
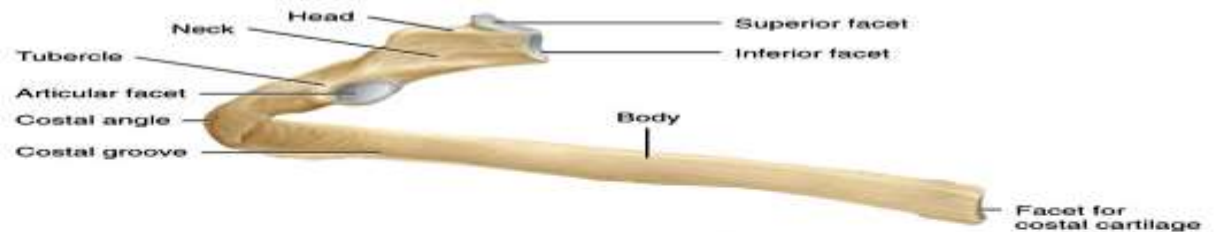


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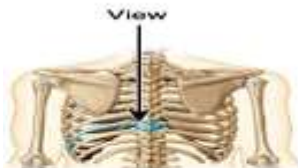
# THE AXIAL SKELETON



(a) Posterior view of left rib



(b) Posterior view of left ribs articulated with thoracic vertebrae and sternum



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

**THANK YOU**