

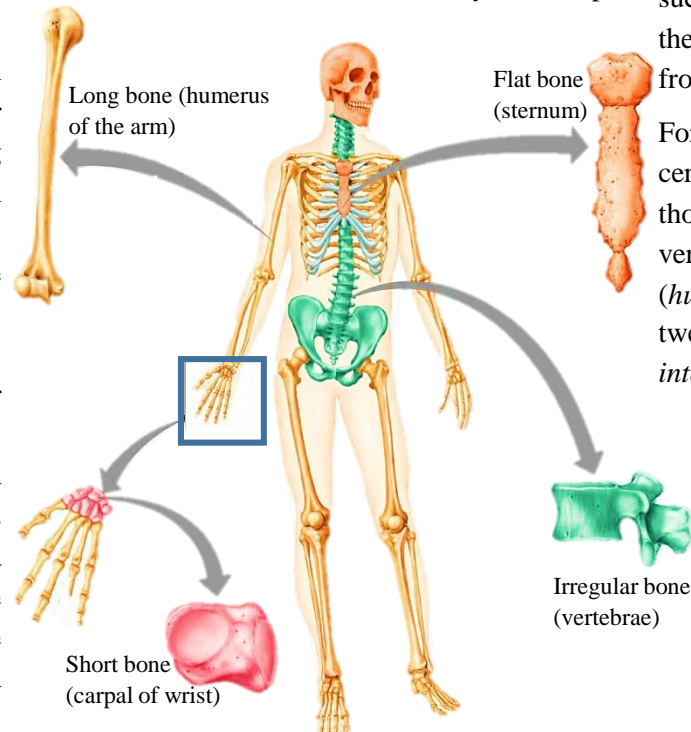
Osteoclasts are terminally differentiated multinucleated cells, which originate from mononuclear cells of the hematopoietic stem cell. Osteoclasts are the cells responsible for dissolving of bones for remodeling to be done. However, you should know that abnormal increase in osteoclast formation and activity leads to some bone diseases such as osteoporosis, where resorption exceeds formation causing decreased bone density and hence increased bone fractures.

In osteopetrosis, which is a rare genetic bone disease that affect formation and resorption functions in osteoclasts lead to decreased bone resorption, resulting in a disproportionate accumulation of bone mass. These diseases demonstrate the importance of the normal bone remodeling process for the maintenance of bone homeostasis.

Furthermore, there is evidence that osteoclasts display several other functions. For example, it has been shown that osteoclasts produce factors called clastokines that control osteoblast during the bone remodeling cycle. Other recent evidence is that osteoclasts may also directly regulate the hematopoietic stem cell activities. These findings indicate that osteoclasts are not only bone resorbing cells, but also a source of cytokines that influence the activity of other cells.

Classification Of Bones: Bones can be classified into two common ways i.e. shape and location. In terms of **shapes**,

bones are classified into four main shapes i.e. long, short, flat and irregular *as illustrated on the right*. The long bones are those that are longer than wide such as bones of the arm, forearm, fingers, thigh, and leg. Short bones are more or less equal in all dimensions, such as bones of the wrist, and ankle. Flat bones are the bones that appear compressed into a large surface, such as bones of the cranium (skull) and sternum. Irregular bones are the bones that are pointed anyhow without a defined shape, such bones include facial bones, vertebrae, bones at the floor of the skull, pelvic bones and pectoral girdle bones.



Classification Of Bones

In terms of **location**, all the bones can be grouped to belong to only two locations i.e. axial bones and appendicular bones that are actually interconnected into a system known as skeletal system and therefore those groups of bones can also be called as axial skeletons and appendicular skeletons.

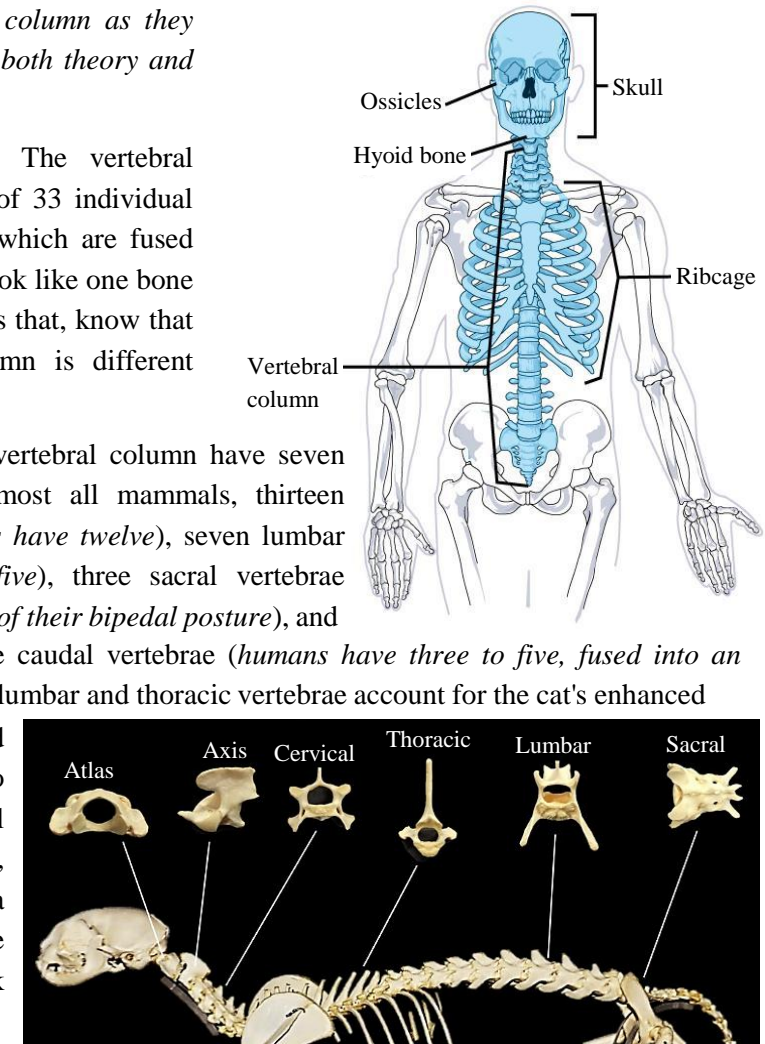
The Axial Skeletal

The axial skeleton consists of 80 bones that make up the skull, hyoid bone, vertebral column, sternum and ribs *as shown below*. Among all those bones, I will pay more attention on the vertebral column as they appear more frequently in both theory and practical examinations.

The Vertebral Column: The vertebral column in human consist of 33 individual vertebrae bones, some of which are fused into larger structures that look like one bone such as the sacrum. Besides that, know that the human vertebral column is different from other mammals.

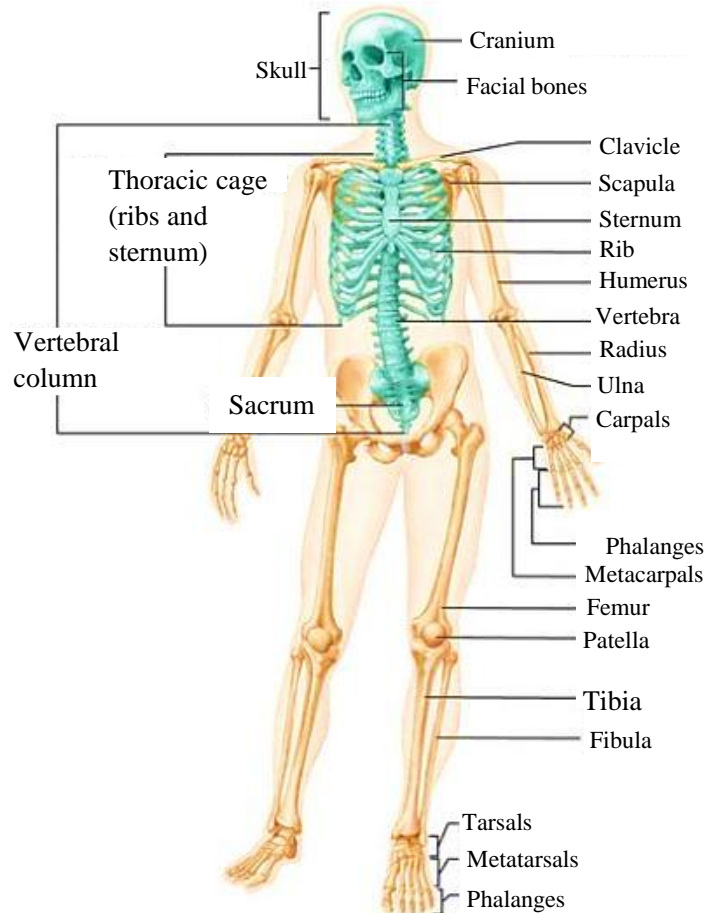
For instance, in cats, the vertebral column have seven cervical vertebrae like almost all mammals, thirteen thoracic vertebrae (*humans have twelve*), seven lumbar vertebrae (*humans have five because of their bipedal posture*), and twenty-two or twenty-three caudal vertebrae (*humans have three to five, fused into an internal coccyx*). The extra lumbar and thoracic vertebrae account for the cat's enhanced

spinal mobility and flexibility, compared to humans. The caudal vertebrae form the tail, used by the cat as a counterbalance to the body during quick movements. Between



The Appendicular Skeleton

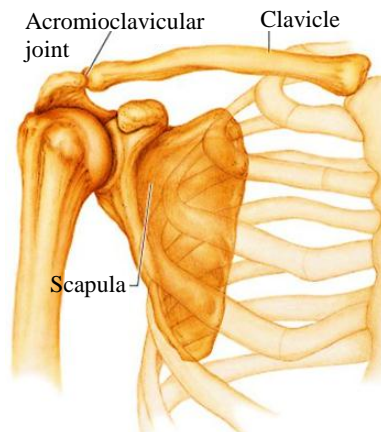
The appendicular skeleton consist of approximately 126 bones that can all be put into four major groupings only i.e. pectoral girdles (*scapula bones and clavicle bones*), upper extremity with a total of 30 bones (*humerus, radius, ulna, carpals of the wrist, metacarpals of the palm and phalanges of the fingers*), pelvic girdle (*the os coxae or hip bones made up of three fused bones i.e. ilium, ischium and pubis*), and then the lower extremity also with a total of 30 bones(*femur, patella, tibia, fibula, tarsals of the ankle, metatarsals of the foot and phalanges of the toes*). **See the illustration below for quick visual understanding. Note all the bones not colored green as the appendicular bones.**



Anterior view of the human skeleton

The pectoral girdles: The pectoral girdles, also referred to as the shoulder girdles, connect our upper limbs to the bones along the axis of our body. The pectoral girdle consists of the two sets of bones that make up our shoulder i.e. the left and right clavicle also known as collarbone and the left and right scapula also known as shoulder blade. *Don't think of any other bone apart from these left and right scapula and clavicles as bones of the pectoral girdles. See the illustration on the top right of this page for your visual understanding pleasure just because seeing is believing in biology.*

Our pectoral girdles are responsible for providing structural support to our shoulder region on the left and right side of our body. They also allow for a large range of motion,



Anterior view of the pectoral girdle Our clavicle provides the only direct connection between our pectoral girdle and axial skeleton. The clavicle has three parts i.e. the medial end, lateral end and the shaft. **See the illustration below for visual understanding pleasure.**

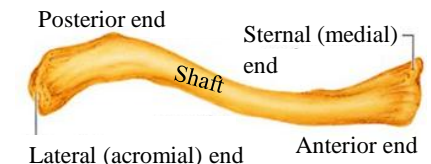
The medial end (Sternal end). This portion of the clavicle attaches to the sternum. The sternal end of the clavicle is triangular and forms the sternoclavicular joint. **The lateral end (acromial end).** This portion of the clavicle attaches to the scapula. This flat piece is often referred to as the acromial end, and forms the acromioclavicular joint.

The shaft. This is the body of the clavicle. It has a double curve in a horizontal plane. Its medial half is convex anteriorly and its sternal end is enlarged and triangular where it articulates with the manubrium of the sternum at the sternoclavicular joint. The medial two thirds of the shaft of clavicle are convex anteriorly, whereas the lateral two third is flattened and concave anteriorly. These curvatures increase the resilience of the clavicle and give it the appearance of an elongated capital S.

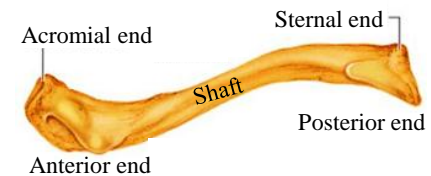
Know that the clavicle is one of the most commonly fractured bones in the body. There are also some physical differences in men and women. This bone is often shorter and less curved in women, while in men it's longer and heavier with a more defined curve.

connecting muscles necessary for shoulder and arm movement. The pectoral girdles on either side of our body are not joined together. This allows for your shoulder and arms to move and function independently.

Structure of the clavicle bone: The clavicle or collarbone is an S-shaped bone situated at the front of our body in a horizontal position. It supports our shoulder, encourages a full range of motion, and protects our nerves and blood vessels that pass between the trunk of our body and our upper limbs.



Right clavicle: Superior view



Right clavicle: Anterior view