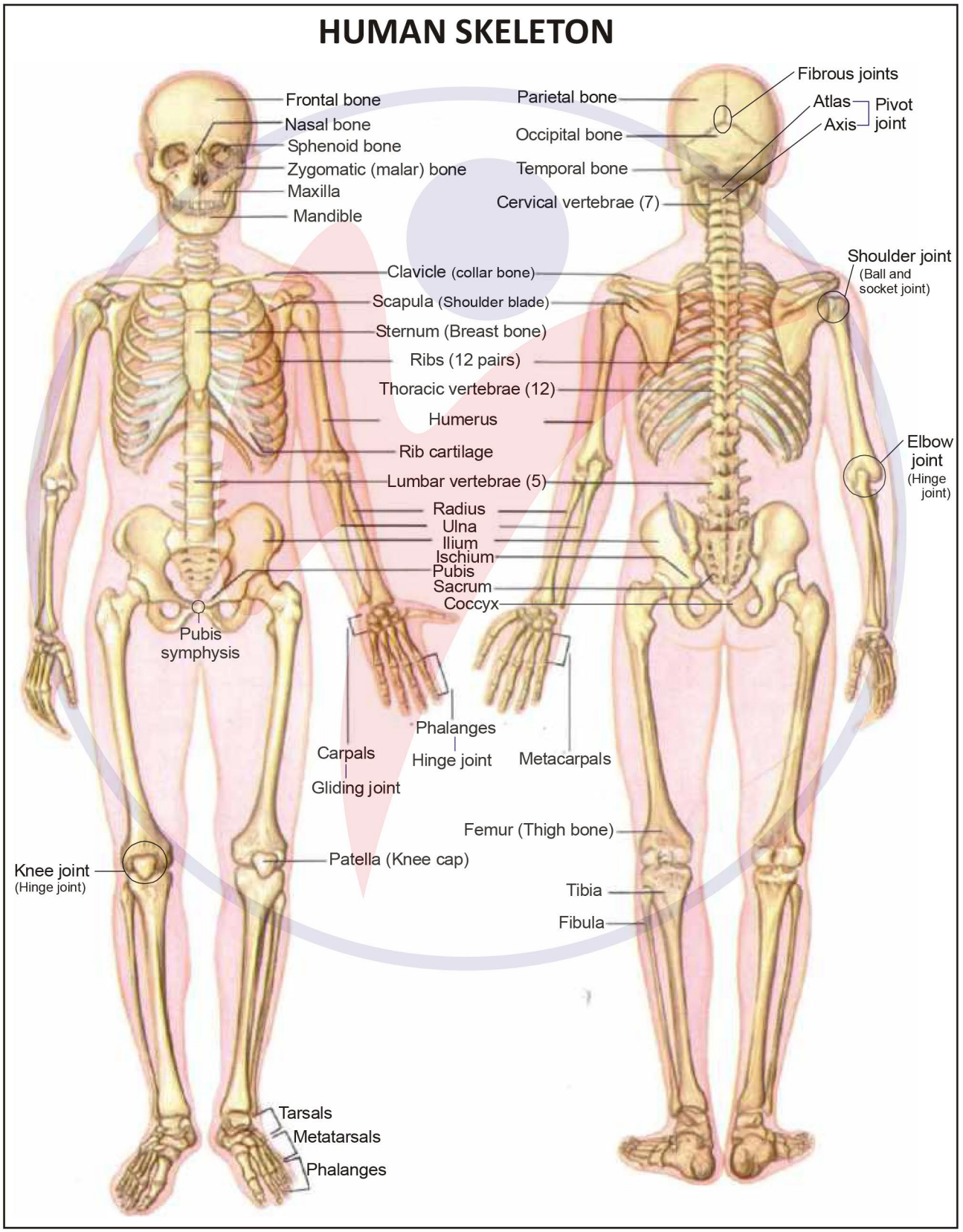
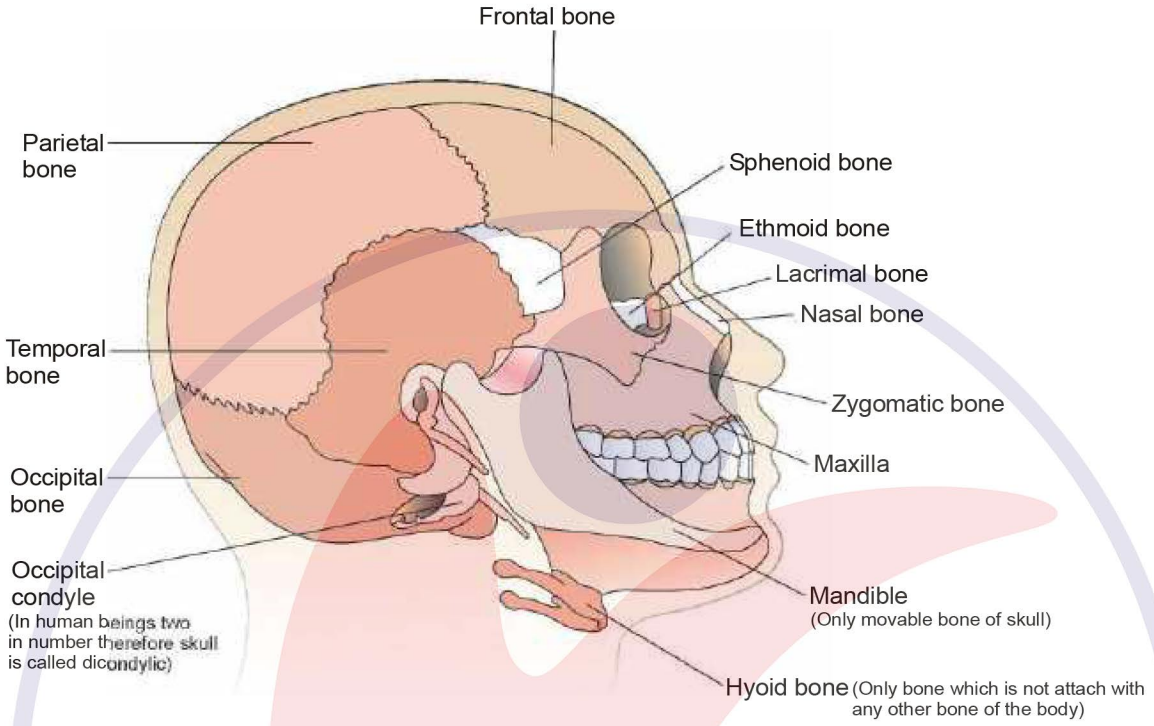
LOCOMOTION AND MOVEMENT (SKELETAL SYSTEM)

Skeletal system consists of a framework of bones and a few cartilages. This system has a significant role in movement shown by the body. Imagine chewing food without jaw bones and walking around without the limb bones. Bone and cartilage are specialised connective tissues. The former has a very hard matrix due to calcium salts in it and the latter has slightly pliable matrix due to chondroitin salts. In human beings, this system is made up of 206 bones and a few cartilages. It is grouped into two principal divisions – the axial and the appendicular skeleton.

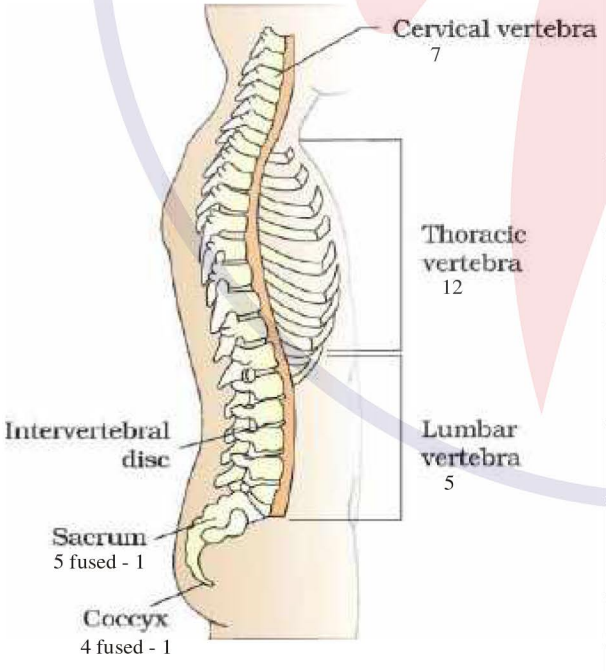
HUMAN SKELETON



HUMAN SKULL



VERTEBRAL COLUMN



Our vertebral column is formed by 26 serially arranged units called vertebrae and is dorsally placed. It extends from the base of the skull and constitutes the main framework of the trunk. Each vertebra has a central hollow portion (neural canal) through which the spinal cord passes.

First vertebra is the atlas and it articulates with the occipital condyles.

Second cervical vertebrae is axis vertebrae

Joint between atlas and axis is pivot joint

The vertebral column is differentiated into cervical 7, thoracic 12, lumbar 5, sacral (1-fused) and coccygeal (1-fused) regions starting from the skull.

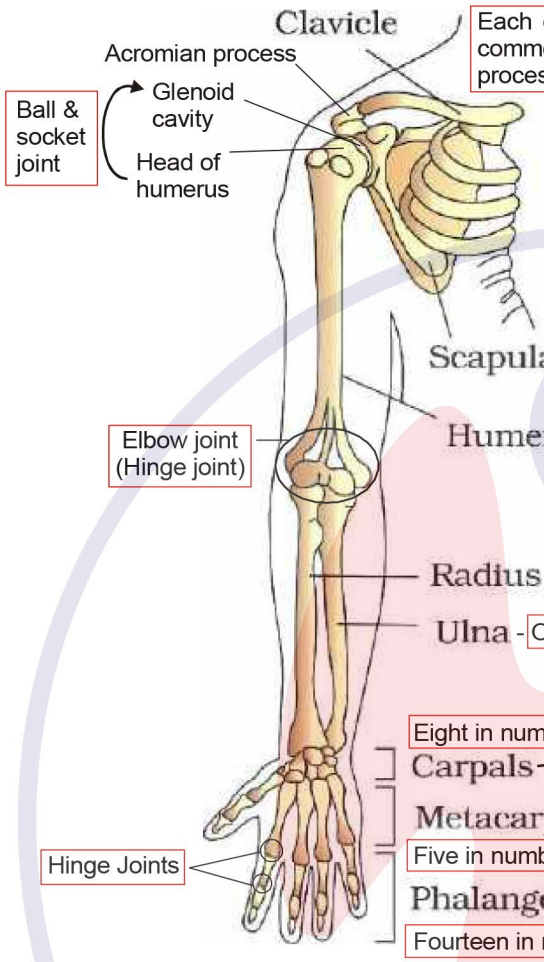
The number of cervical vertebrae are seven in almost all mammals including human beings.

The vertebral column protects the spinal cord, supports the head and serves as the point of attachment for the ribs and musculature of the back.

Human vertebral formula - $C_7Th_{12}L_5S_{(5)}Co_{(4)}$

The joint between the adjacent vertebrae in the vertebral column is cartilagenous joint and it permits limited movements.

RIGHT PECTORAL GIRDLE AND UPPER ARM. (FRONTAL VIEW)

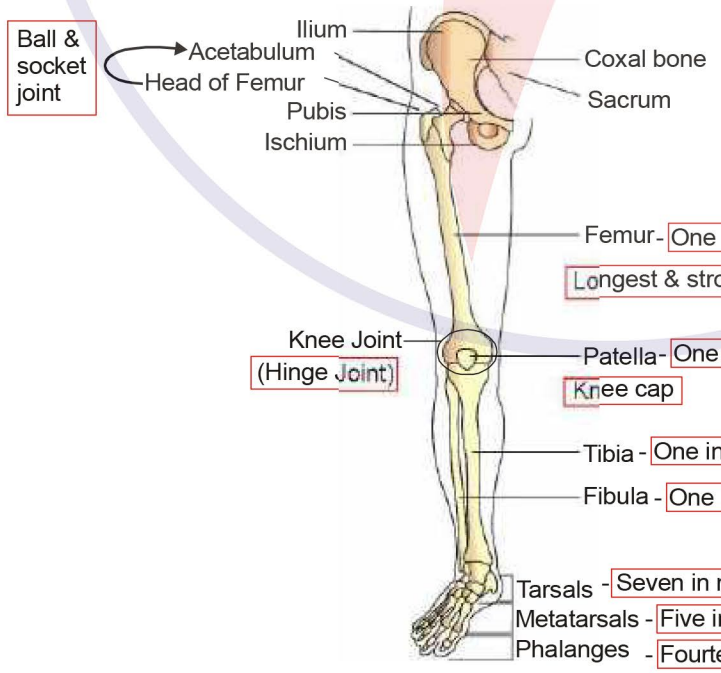


Each clavicle is a long slender bone with two curvatures. This bone is commonly called the collar bone. The clavicle articulate with the acromian process of scapula.

Each half of pectoral girdle consists of a clavicle and a scapula

Scapula is a large triangular flat bone situated in the dorsal part of the thorax between the second and the seventh ribs. The dorsal, flat, triangular body of scapula has a slightly elevated ridge called the spine which projects as a flat, expanded process called the acromion.

RIGHT PELVIC GIRDLE AND LOWER LIMB BONES (FRONTAL VIEW)

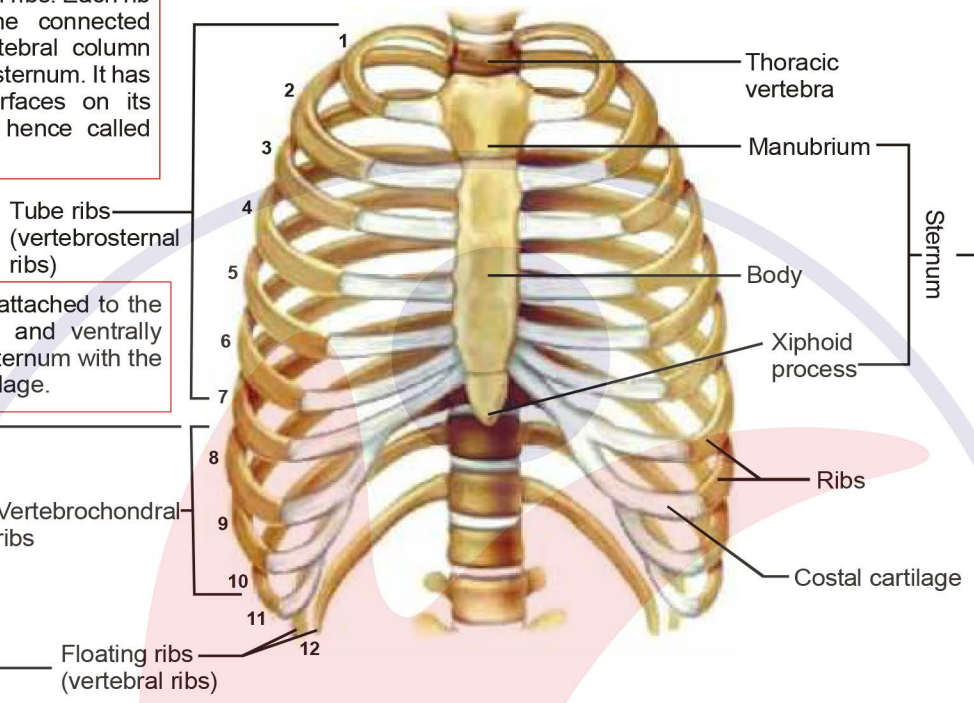


Pelvic girdle consists of two coxal bones. Each coxal bone is formed by the fusion of three bones – ilium, ischium and pubis. At the point of fusion of the above bones is a cavity called acetabulum to which the thigh bone articulates. The two halves of the pelvic girdle meet ventrally to form the pubicsymphysis containing fibrous cartilage.

RIBS AND RIB CAGE

Sternum is a flat bone on the ventral midline of thorax

There are 12 pairs of ribs. Each rib is a thin flat bone connected dorsally to the vertebral column and ventrally to the sternum. It has two articulation surfaces on its dorsal end and is hence called bicephalic.



Dorsally, they are attached to the thoracic vertebrae and ventrally connected to the sternum with the help of hyaline cartilage.

Skeleton

Exoskeleton	Endoskeleton
• Ectodermal in origin	• Mesodermal in origin
• Dead eg. nails, horns, hooves, feathers, scales	• Living eg. bones, cartilages

JOINTS

Joints are essential for all types of movements involving the bony parts of the body.

Locomotory movements are no exception to this. Joints are points of contact between bones, or between bones and cartilages. Force generated by the muscles is used to carry out movement through joints, where the joint acts as a fulcrum. The movability at thes joints vary depending on different factors. Joints have been classified into three major structural forms, namely, fibrous, cartilaginous and synovial.

1. **Fibrous joints (Synarthrosis)** do not allow any movement. This type of joint is shown by the flat skull bones which fuse end-to-end with the help of dense fibrous connective tissues in the form of sutures, to form the cranium.
2. **In cartilaginous joints (Amphiarthrosis)**, the bones involved are joined together with the help of cartilages. The joint between the adjacent vertebrae in the vertebral column is of this pattern and it permits limited movements.
3. **Synovial joints (Diarthrosis)** are characterised by the presence of a fluid filled synovial cavity between the articulating surfaces of the two bones. Such an arragement allows considerable movement. These joints help in locomotion and many other movements. Ball and socket joint (between humerus and pectoral girdle), Hinge joint (knee joint), Pivot joint (between atlas and axis), Gliding joint (between the carpals) and Saddle joint (between carpal and metacarpal of thumb) are some examples.

DISORDERS OF SKELETAL SYSTEM

Arthritis: Inflammation of joints.

Osteoporosis: Age-related disorder characterised by decreased bone mass and increased chances of fractures. Decreased levels of estrogen is a common cause.

Gout: Inflammation of joints due to accumulation of uric acid crystals.