

VISWASS SCHOOL & COLLEGE OF NURSING

GNM 1ST YEAR

ANATOMY AND PHYSIOLOGY

UNIT-13

THE SKELETAL SYSTEM

SHORT QUESTIONS AND ANSWERS

PREPARE BY: MS. AMRITA SINGH,
DEPARTMENT OF NURSING, VISWASS

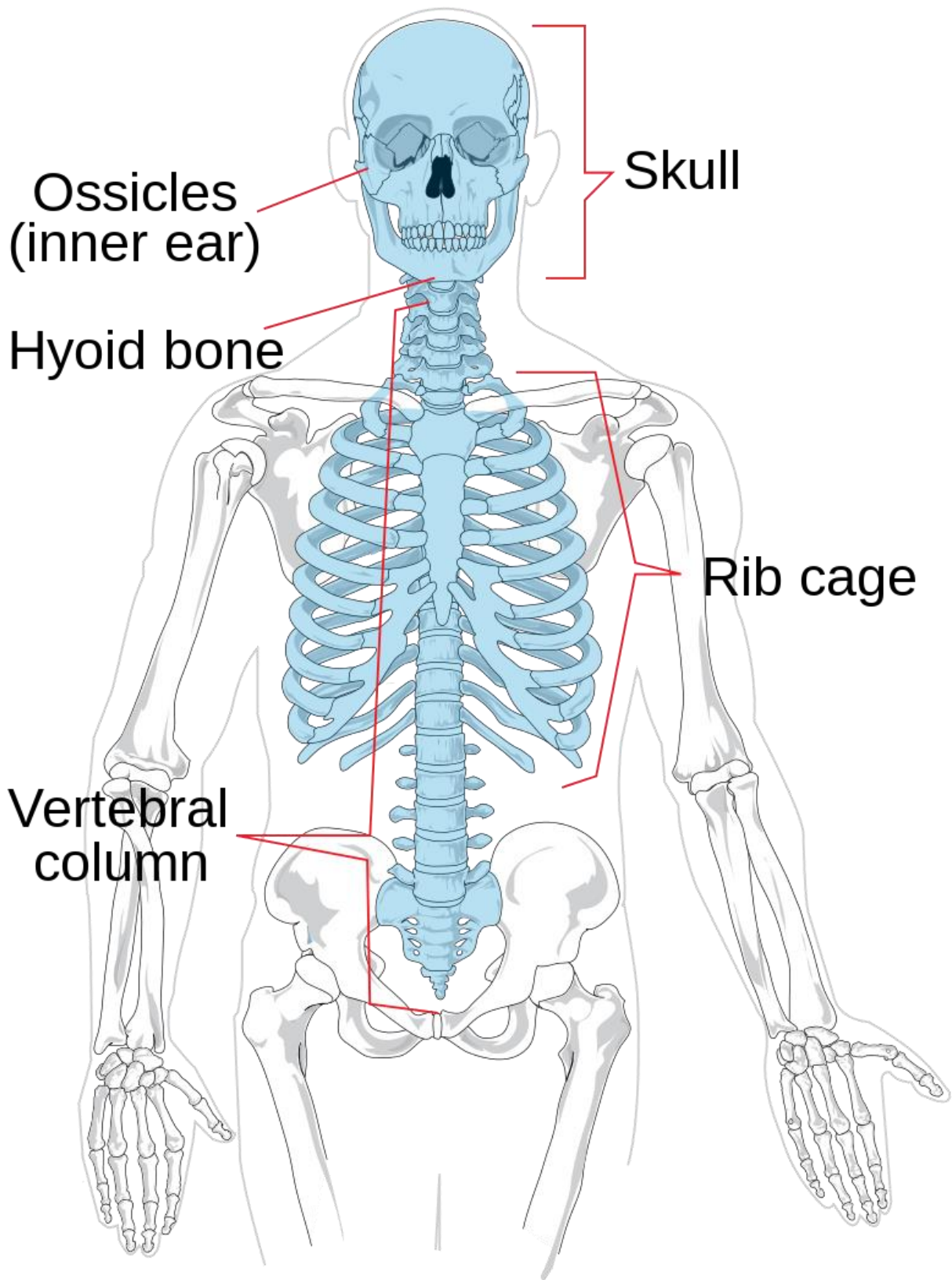
1.Short note on Axial skeleton.(5)

Axial skeleton:

- The **axial skeleton** is the part of the skeleton that consists of the bones of the head and trunk of a vertebrate.
- composed of six parts; the skull (22 bones), the ossicles of the middle ear, the hyoid bone, the rib cage, sternum and the vertebral column.
- The axial skeleton together with the appendicular skeleton form the complete skeleton. Another definition of axial skeleton is the bones including the vertebrae, sacrum, coccyx, ribs, and sternum.

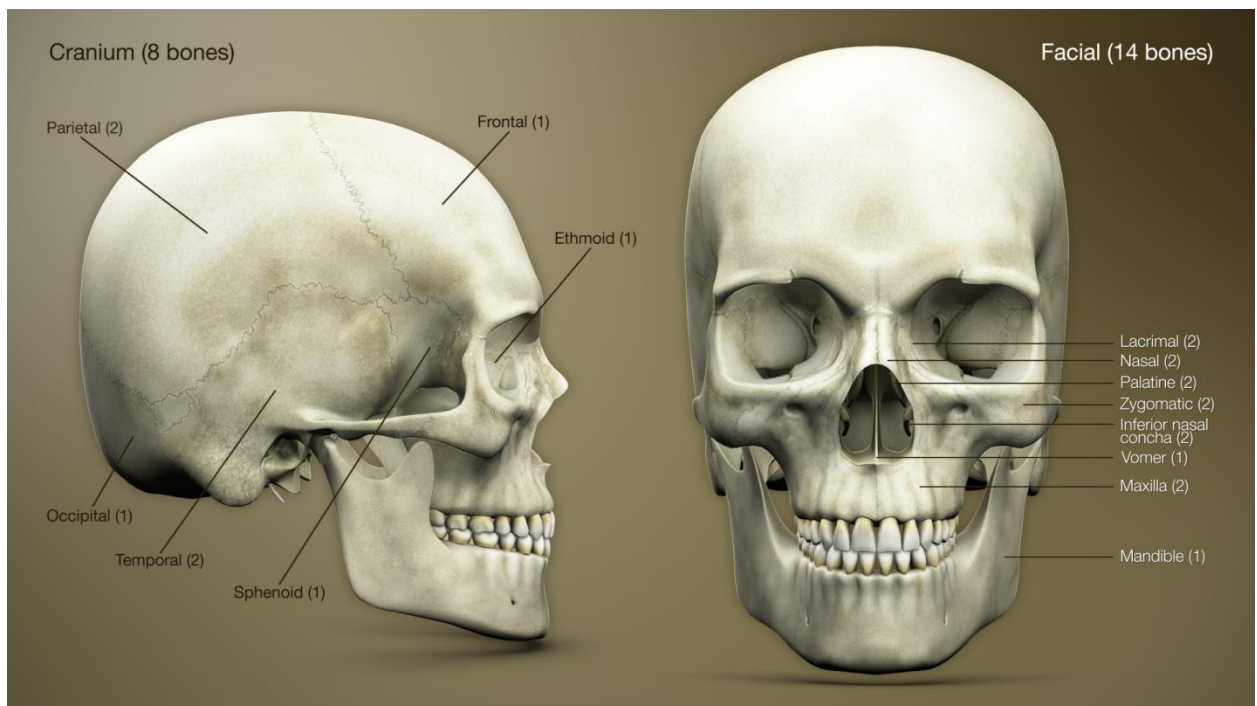
Structure:

- The human axial skeleton consists of 80 different bones. It is the medial core of the body and connects the pelvis to the body, where the appendix skeleton attaches. As the skeleton grows older the bones get weaker with the exception of the skull. The skull remains strong to protect the brain from injury.



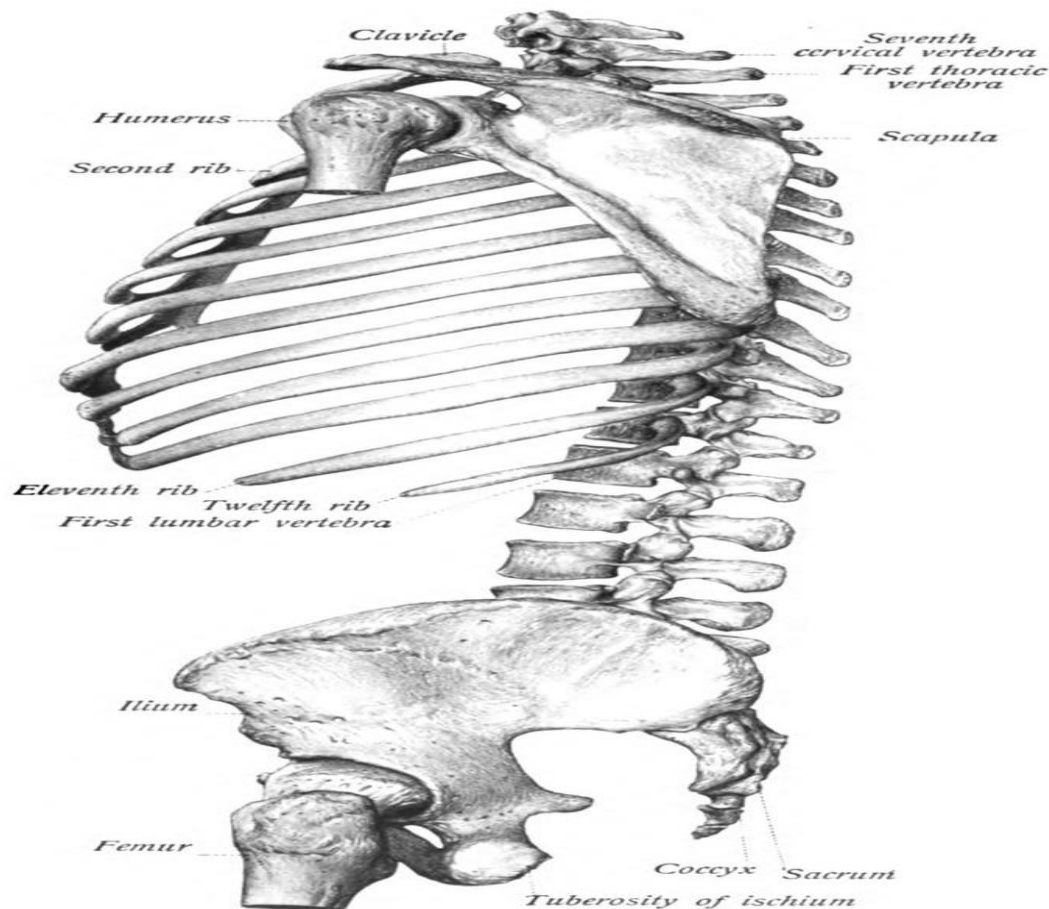
Skull:

- The human skull consists of the cranium and the facial bones.
- The cranium holds and protects the brain in a large space called the cranial vault. The cranium is formed from eight plate-shaped bones which fit together at meeting points (joints) called sutures
- there are 14 facial bones which form the lower front part of the skull. Together the 22 bones that compose the skull form additional, smaller spaces besides the cranial vault, such as the cavities for the eyes, the internal ear, the nose, and the mouth.
- The most important facial bones include the jaw or mandible, the upper jaw or maxilla, the zygomatic or cheek bone, and the nasal bone.
- Humans are born with separate plates which later fuse to allow flexibility as the skull passes through the pelvis and birth canal during birth.
- During development the eight separate plates of the immature bones fuse together into one single structure known as the Skull.
- The only bone that remains separate from the rest of the skull is the mandible.



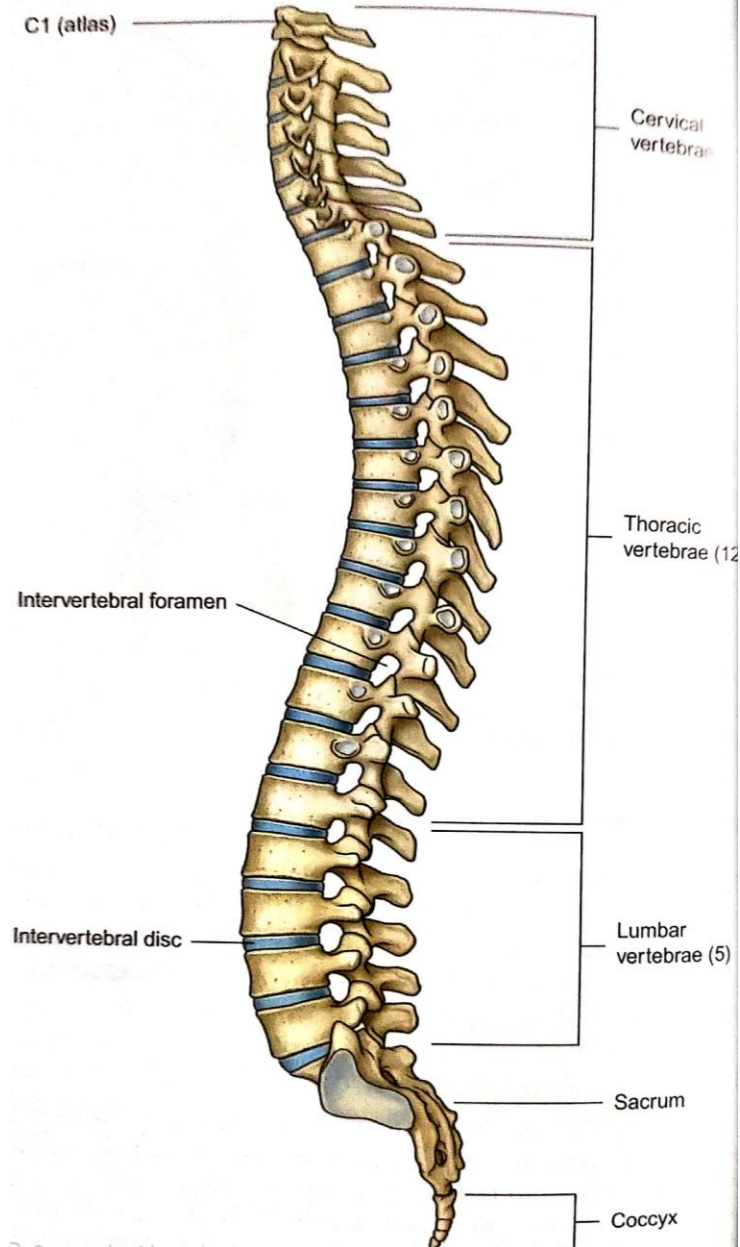
Rib cage:

- The rib cage is composed of 12 pairs of ribs plus the sternum for a total of 25 separate bones. The rib cage functions as protection for the vital organs such as the heart and lungs.
- The ribs are shaped like crescents, with one end flattened and the other end rounded. The rounded ends are attached at joints to the thoracic vertebrae at the back and the flattened ends come together at the sternum, in the front.
- The length of each rib increases from number one to seven and then decreases until rib pair number 12. The first rib is the shortest, broadest, flattest, and most curved.



Vertebral column:

- There are 26 bones in the vertebral column.
- 24 separate vertebrae extend downwards from the occipital bone of the skull;
- Then there is the sacrum, formed from five fused vertebrae, and lastly the coccyx, or tail, which is formed from between three and five small fused vertebrae and lastly the coccyx, or tail, which is formed from between 3-5 small fused vertebrae.
- The vertebral column is divided into different regions.
- The 1st 7 vertebrae, in the neck, form the cervical spine; the next 12 vertebrae are the thoracic spine, and the next 5 the lumbar spine, the lowest vertebrae of which articulates with the sacrum.
- Each vertebrae is identified by the 1st letter of its region in the spine, followed by a number indicating its positions.



2)Short note on appendicular skeleton & its diagram.(5)

Appendicular skeleton & diagram:

- The **appendicular skeleton** is the portion of the skeleton of vertebrates consisting of the bones that support the appendages. The appendicular skeleton includes the skeletal elements within the limbs, as well as supporting shoulder girdle pectoral and pelvic girdle.
- Of the 206 bones in the human skeleton, the appendicular skeleton comprises 126. Functionally it is involved in locomotion (lower limbs) of the axial skeleton and manipulation of objects in the environment (upper limbs).
- The appendicular skeleton forms during development from cartilage, by the process of endochondral ossification.
- The appendicular skeleton is divided into six major regions:
 - Shoulder girdles (4 bones) - Left and right clavicle (2) and scapula (2).
 - Arms and forearms (6 bones) - Left and right humerus (2) (arm), ulna (2) and radius (2) (forearm).
 - Hands (54 bones) - Left and right carpals (16) (wrist), metacarpals (10), proximal phalanges (10), intermediate phalanges (8) and distal phalanges (10).
 - Pelvis (6 bones) - Ilium (2), Ischium (2) and Pubis (2).
 - Thighs and legs (8 bones) - Left and right femur (2) (thigh), patella (2) (knee), tibia (2) and fibula (2) (leg).
 - Feet and ankles (52 bones) - Left and right tarsals (14) (ankle), metatarsals (10), proximal phalanges (10), intermediate phalanges (8) and distal phalanges (10).

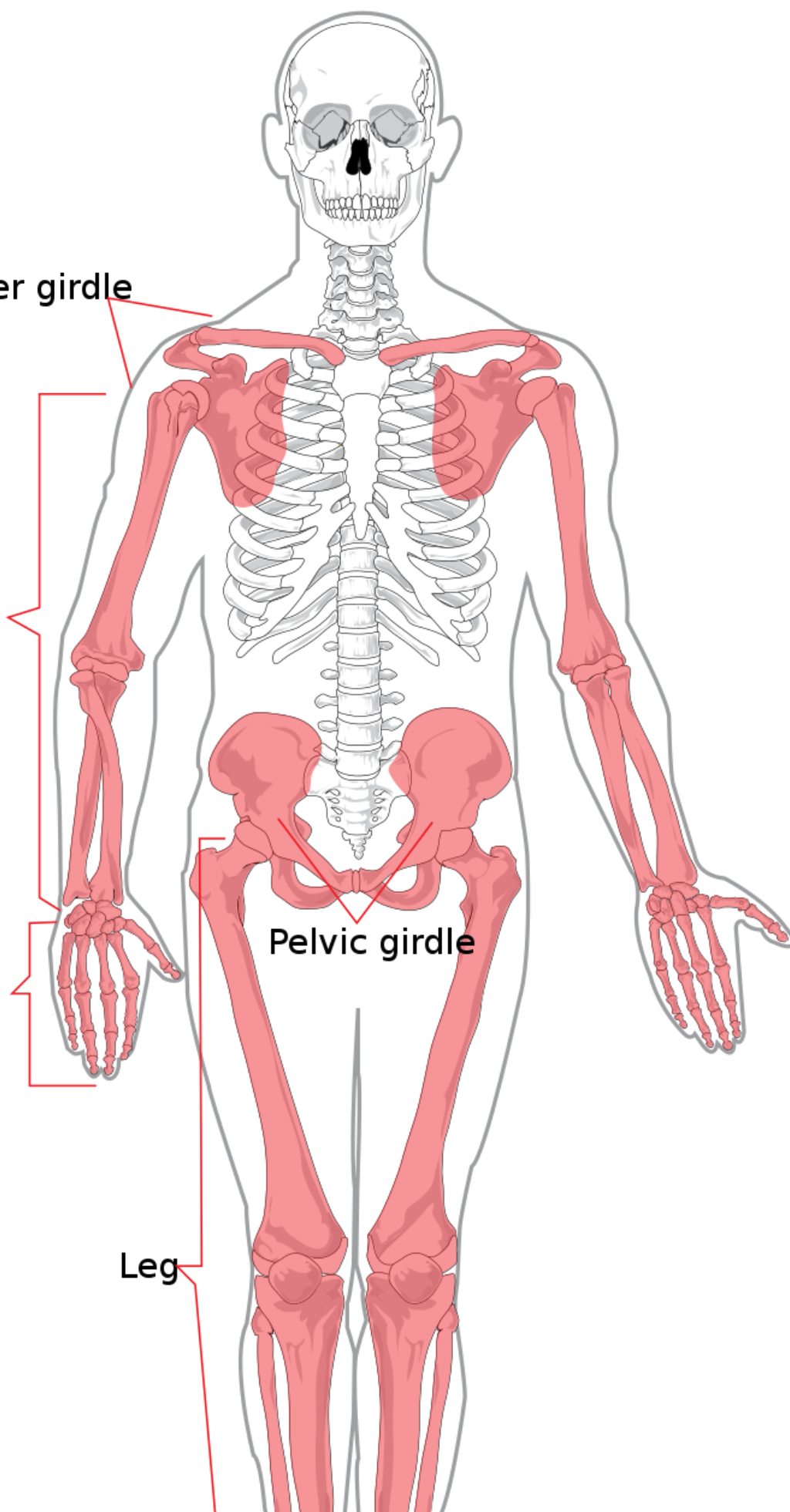
Shoulder girdle

Arm

Hand

Pelvic girdle

Leg

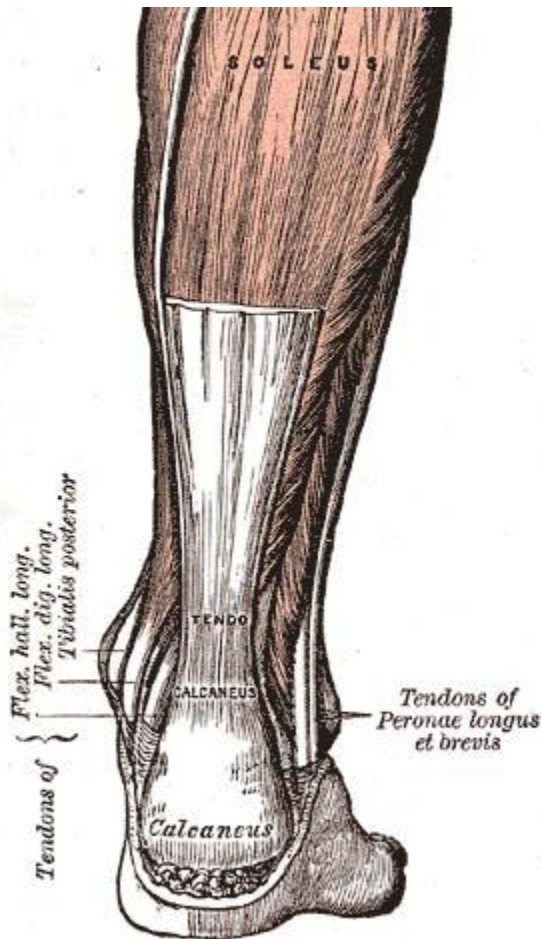


3) Explain about tendons.(5)

Tendon:

A **tendon** or **sinew** is a tough band of fibrous connective tissue that connects muscle to bone and is capable of withstanding tension.

Tendons are similar to ligaments; both are made of collagen. Ligaments connect one bone to another, while tendons connect muscle to bone.



Structure:

- tendons consist of dense regular connective tissue. The main cellular component of tendons are specialized fibroblasts called the tenocytes.
- Tenocytes synthesize the extracellular matrix of tendons, abundant in densely packed collagen fibers.

- The collagen fibers are parallel to each other and organized into fascicles. Individual fascicles are bound by the endotendineum, which is a delicate loose connective tissue containing thin collagen fibrils and elastic fibres.
- Groups of fascicles are bounded by the epitenon, which are the sheaths of dense irregular connective tissue.
- The whole tendon is enclosed by a fascia. The space between the fascia and the tendon tissue is filled with the paratenon, a fatty areolar tissue.
- Normal healthy tendons are anchored to bone by Sharpey's fibres.

Extracellular matrix

The dry mass of normal tendons, which makes up 30-45% of their total mass, is composed of:

- 60-85% collagen
 - 60-80% collagen I
 - 0-10% collagen III
 - 2% collagen IV
 - small amounts of collagens V, VI, and others
- 15-40% non-collagenous extracellular matrix components, including:
 - 3% cartilage oligomeric matrix protein,
 - 1-2% elastin,
 - 1-5% proteoglycans,
 - 0.2% inorganic components such as copper, manganese, and calcium
- While collagen I makes up most of the collagen in tendon, many minor collagens are present that play vital roles in proper tendon development and function.
- These include type II collagen in the cartilaginous zones, type III collagen in the reticulin fibres of the vascular walls, type IX collagen, type IV collagen in the basement membranes of the capillaries, type V collagen in the vascular walls, and type X collagen in the mineralized fibrocartilage near the interface with the bone.

Functions:

- tendons have been considered to be a mechanism by which muscles connect to bone as well as muscles itself, functioning to transmit forces
- This connection allows tendons to passively modulate forces during locomotion, providing additional stability with no active work.
- Energy storing tendons can store and recover energy at high efficiency.
- The mechanical properties of the tendon are dependent on the collagen fiber diameter and orientation. The collagen fibrils are parallel to each other and closely packed, but show a wave-like appearance due to planar undulations, or crimps, on a scale of several micrometers.
- because the tendon is a multi-stranded structure made up of many partially independent fibrils and fascicles, it does not behave as a single rod, and this property also contributes to its flexibility.