

**Puspa Shrestha**

Best Quality Resource Site for Class 11 And 12  
Students (Based on Updated Curriculum 2077)



**PDF Collections**

Notes

Books

Model Questions

This PDF was downloaded  
from **puspas.com.np**

Visit our website for more  
materials.



**puspas.com.np**

Follow us on:



AR Dinesh



puspas.com.np



Puspa Shrestha

## EXPERIMENT NO. 4

NAME OF EXPERIMENT: TO STUDY HUMAN BONES

### COMMENTS ON SKULL

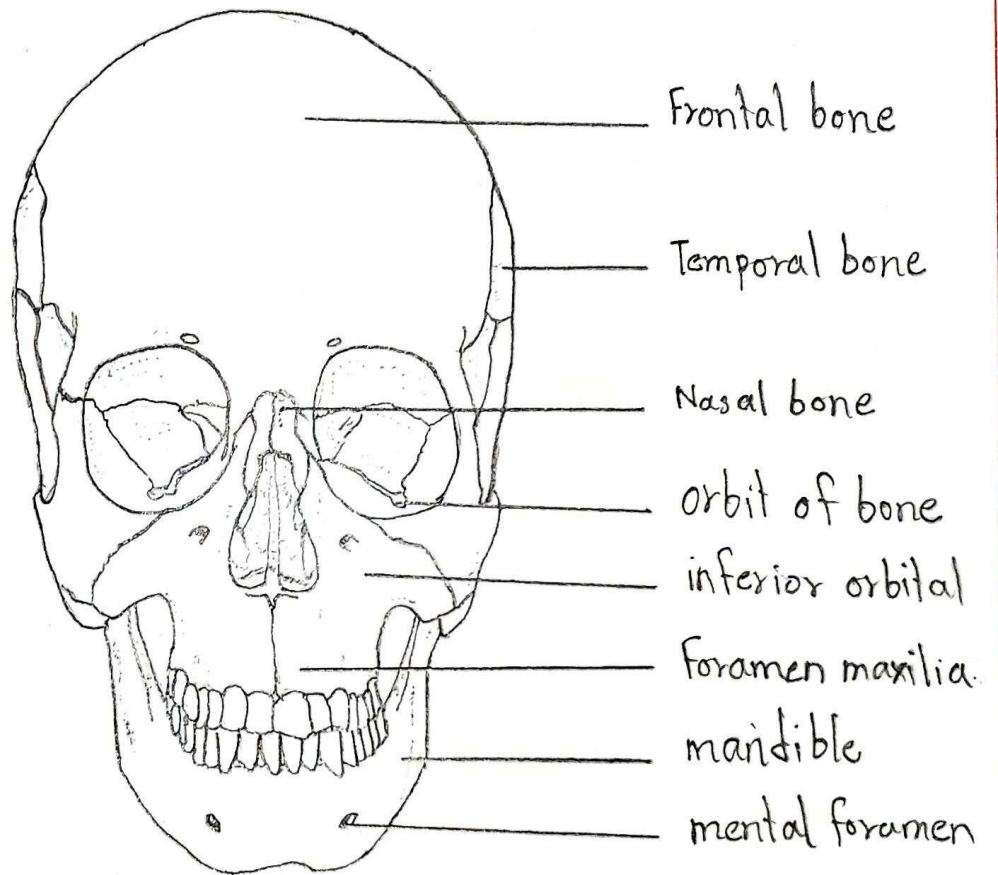
1. It is the bony structure present at the top of the vertebral column.
2. The skull consists of 8 cranial bones and 14 facial bones.
3. The 8 cranial bones include: 1 frontal bone, 2 parietal bones, 2 temporal bones, 1 occipital bone, 1 sphenoid bone and 1 ethmoid bone.
4. The cranial bones form the cranium cavity (brain case) that encloses and protects the brain, eyes, and ears.
5. The bones of the cranium are fit together by wavy, immovable sutures.
6. The ~~facial~~ 14 facial bones include: 2 zygomatic (cheek) bones, 2 maxillae, 2 nasal bones, 2 lacrimal bones, 1 vomer, 2 palatine bones, 2 inferior conchae and 1 mandible.

### COMMENTS ON STERNUM

1. The sternum or breastbone is a partially T-shaped bone that forms the anterior middle portion of the thoracic cage.
2. It is differentiated into three parts: manubrium,

# TO STUDY HUMAN BONES

Roll No. 11  
Date :

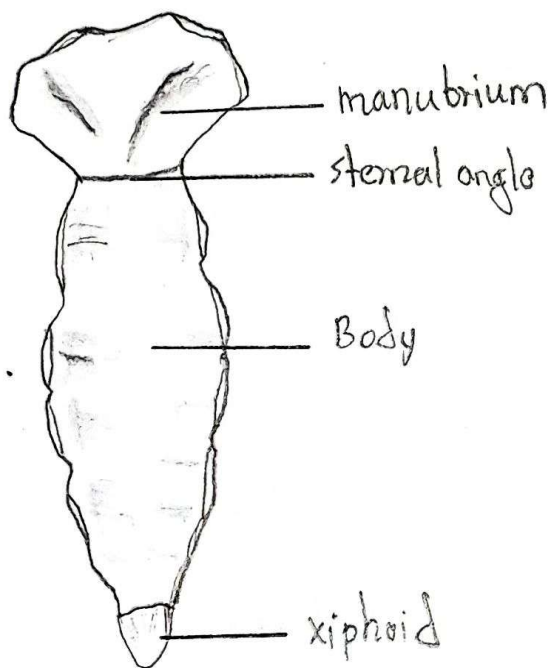


Frontal view of human skull

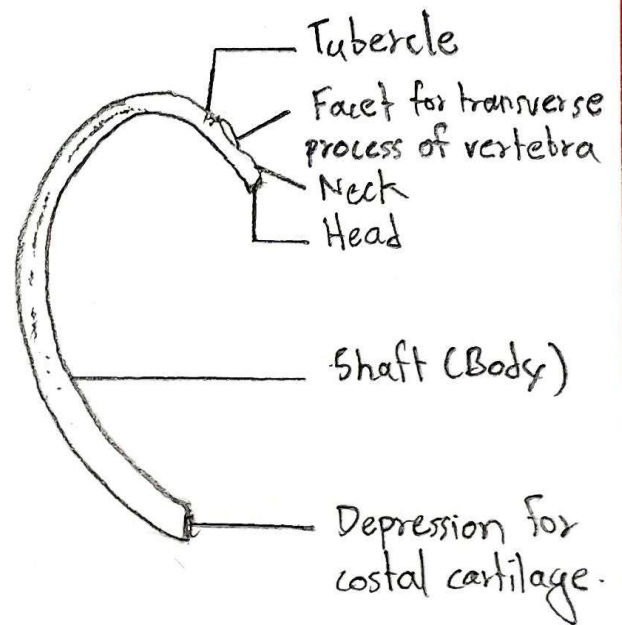
# TO STUDY HUMAN BONES

Roll No. : 11

Date :



Sternum



A typical rib.

- body, and xiphoid process.
3. A pair of clavicle articulates with manubrium through sternoclavicular joints.
  4. The first seven pairs of ribs (true ribs) articulate with the manubrium and body of the sternum through costal cartilages.
  5. The xiphoid process of sternum gives attachment to several important muscles, including the diaphragm.

#### COMMENTS ON RIBS.

1. There are 12 pairs of ribs in the rib cage.
2. Each rib is a long, narrow, curved bone with an anteriorly attached piece of hyaline cartilage, the costal cartilage.
3. All of the ribs articulate posteriorly with the thoracic vertebrae. They can be categorized into three types: true ribs, false ribs and floating ribs.
4. The first seven pairs (1<sup>st</sup> to 7<sup>th</sup>) of ribs are called true ribs. They articulate directly with the sternum through costal cartilages.
5. The next three pairs (8<sup>th</sup>, 9<sup>th</sup> and 10<sup>th</sup>) of ribs are called false ribs. Their cartilages join the 7<sup>th</sup> rib cartilage.
6. The last two pairs (11<sup>th</sup> and 12<sup>th</sup>) of ribs are called floating ribs because they do not articulate with the sternum at all.

### COMMENTS ON ATLAS

1. Atlas is the first cervical vertebra, the bone on which the skull rests.
2. Its anterior surface has a pair of articular facets through which it articulates with the two occipital condyles of the skull (atlas-occipital joints).
3. It has no distinct body or spinous process but has two short transverse processes.

### COMMENTS ON AXIS

1. Axis is the second cervical vertebra and lies below the atlas.
2. It has a small body with a small upward projection called the odontoid process or dens.
3. The odontoid process articulates with the atlas through atlanto-axial joints (a type of pivot joint).
4. The head rotates left and right on this joint.

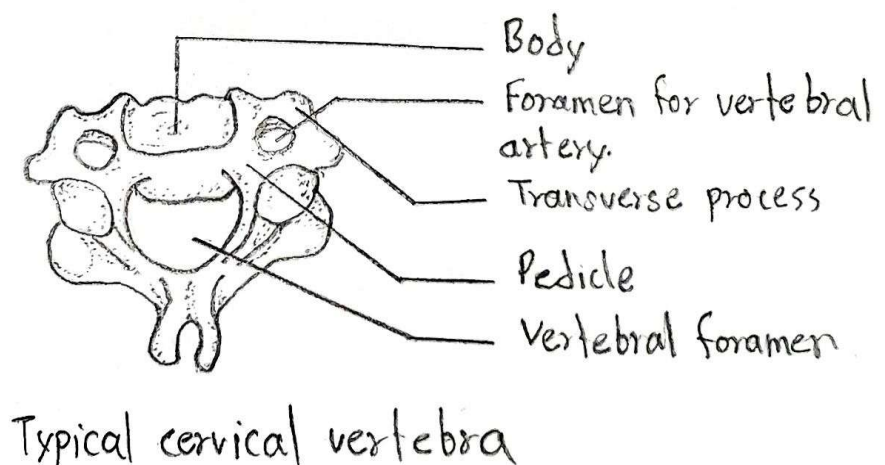
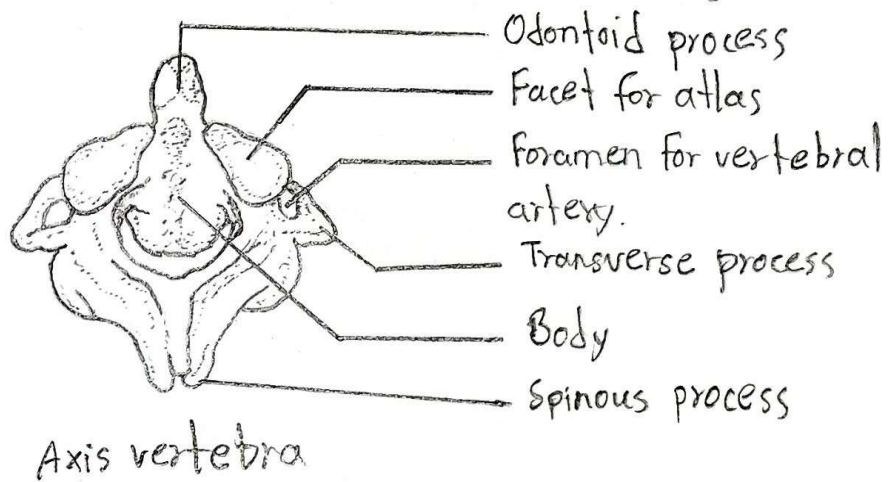
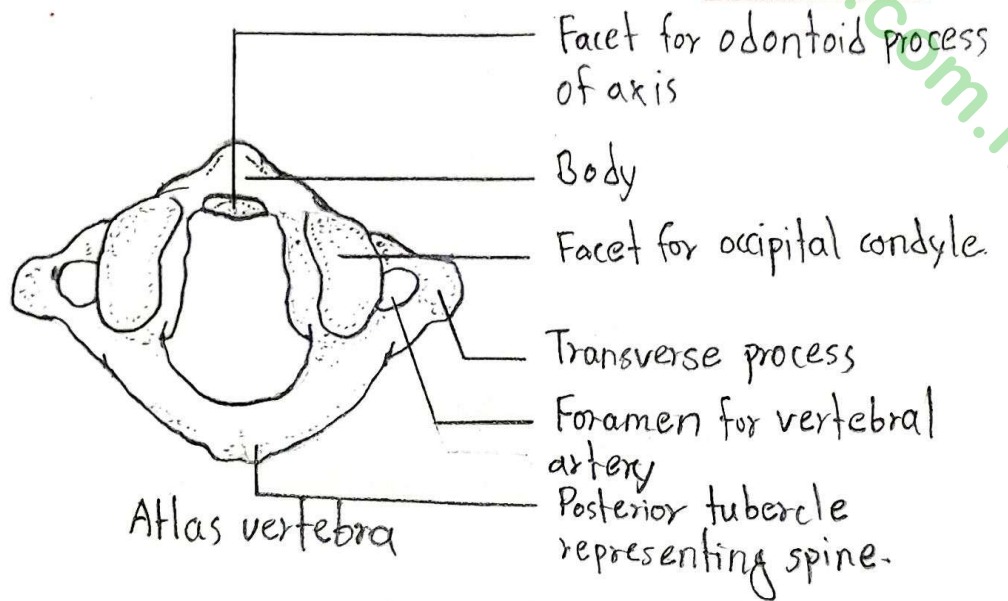
### COMMENTS ON TYPICAL CERVICAL VERTEBRAE

1. The 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> vertebrae of the neck are the typical cervical vertebrae.
2. In typical cervical vertebrae, the spinous process is short and bifid (except C7). The transverse process is reduced and the vertebral foramen is triangular & relatively large.

# TO STUDY HUMAN BONES

Roll No. 11

Date :



3. The body of the vertebra articulates with the body of the superior vertebra through uncovertebral joints.
4. There are two superior and two inferior articular processes between the pedicle and lamina.
5. The two superior articular processes articulate with the two inferior articular processes of the vertebra above.

#### COMMENTS ON THORACIC VERTEBRAE

1. The thoracic vertebrae are located inferior to the cervical vertebrae and superior to the lumbar vertebrae.
2. They are twelve in number and are larger than the cervical vertebrae because this section of the vertebral column has to support more body weight.
3. Distinguishing features of the thoracic vertebrae includes the presence of the facets on the sides of the bodies for articulation with the heads of the ribs, and facets on the transverse processes for articulation with the tubercles of the ribs (except the 11<sup>th</sup> and 12<sup>th</sup> vertebrae).
4. There are two superior and two inferior articular processes. The two superior articular processes articulates with the two inferior articular processes of the vertebra above.
5. The bodies of the thoracic vertebrae increase in

size from the first to the twelfth vertebrae.

6. They have circular vertebral foramen.
7. Their spinous processes are long, more pointed and angled sharply downward.

### COMMENTS ON LUMBAR VERTEBRAE

1. Lumbar vertebrae are five in number and occur in the abdominal region.
2. They are the largest vertebrae as they support the weight of the entire upper body.
3. Vertebral body is kidney-shaped and the vertebral foramen is triangular shaped.
4. Their spinous processes are short, flat and hatchet shaped.
5. They lack foramina on transverse processes and facets on the sides of the body.
6. There are two superior and two inferior articular processes of the vertebra above.
7. The fifth lumbar (L5) vertebra articulates with the first sacral (S1) vertebra.

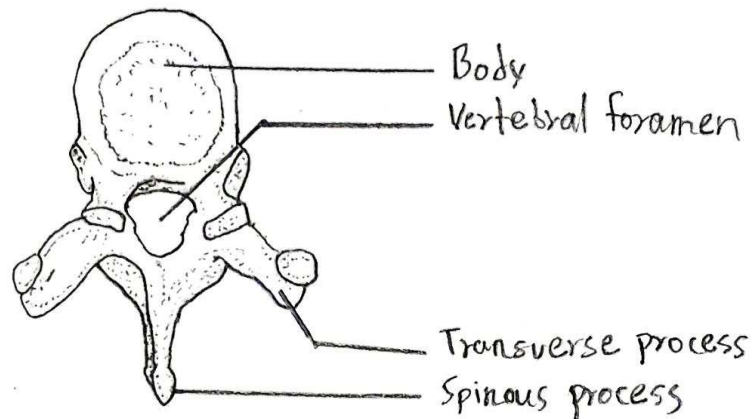
### COMMENTS ON SACRAL VERTEBRAE (SACRUM)

1. Sacrum is a wedge-shaped vertebra located at the upper back part of the pelvic cavity.
2. The sacrum is formed by the fusion of five sacral vertebrae (S1-S5) at the age between 18-30 years.

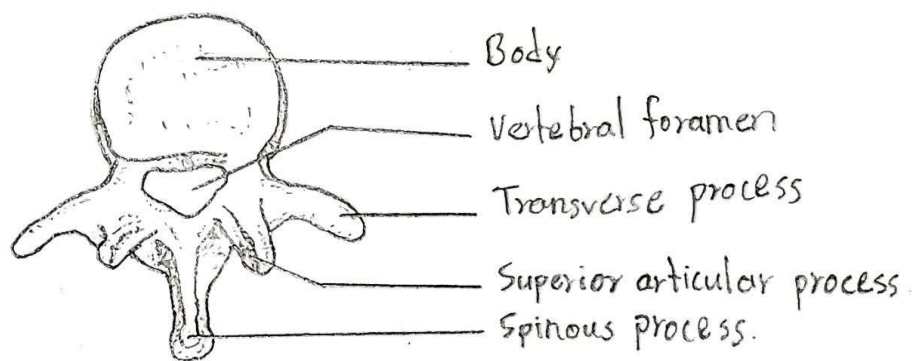
# TO STUDY HUMAN BONES

Roll No. 11

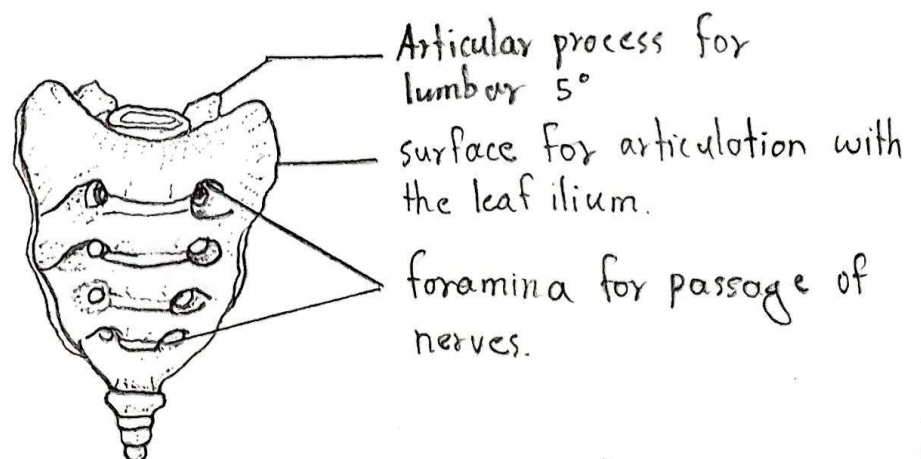
Date :



Thoracic vertebra



Lumbar vertebra



Sacrum and coccyx

3. It has four pairs of sacral foramina.
4. The upper part of the sacrum (base) articulates with the last lumbar vertebra (lumbosacral joint), and its lower part (apex) with the coccyx (sacrococcygeal joint).
5. On each side, it articulates with the ilium (sacroiliac joints).
6. In women sacrum is shorter, wider and more curved.

#### COMMENTS ON CAUDAL VERTEBRAE (COCCYX OR TAILBONE)

1. The coccyx is a triangular vertebra below the sacrum.
2. The coccyx is formed by the fusion of 4 coccygeal vertebrae by age 30.
3. It represents a vestigial tail, hence the common term tailbone.
4. All the caudal vertebrae lack pedicles, laminae and spinous processes.

#### COMMENTS ON PECTORAL GIRDLE

1. The shoulder girdle consists of two scapulae (shoulder blades) and two clavicles (collar bones).
2. Scapula is a large, triangular and flat bone attached to the posterior chest wall by muscles.
3. The posterior surface of the scapula is crossed obliquely by a prominent ridge, the spine, which divides the bone into two concave areas, the supraspinous and infraspinous fossae.

4. The clavicle is a long bone with two curvatures.
5. It articulates with the manubrium of the sternum at one end and with the acromion process of the scapula at other end.
6. The clavicle provides the only bony link between the upper limb and the axial skeleton.

#### COMMENTS ON PELVIC GIRDLE

1. The pelvic girdle, also known as the hip bone, is a ring-like bony structure, located in the lower part of the trunk. It connects the axial skeleton to the lower limbs.
2. Hip bone consists of two halves each is called coxal or innominate bone.
3. Each coxa (half) is formed by three bones, the ilium, ischium and pubis, that fuse together during the late teenage years.
4. These three hip bones, the ilium, ischium and pubis converge to form a deep, cup-shaped cavity on the lateral surface called the acetabulum.
5. The head of the femur articulates with the acetabulum to form the hip joint.

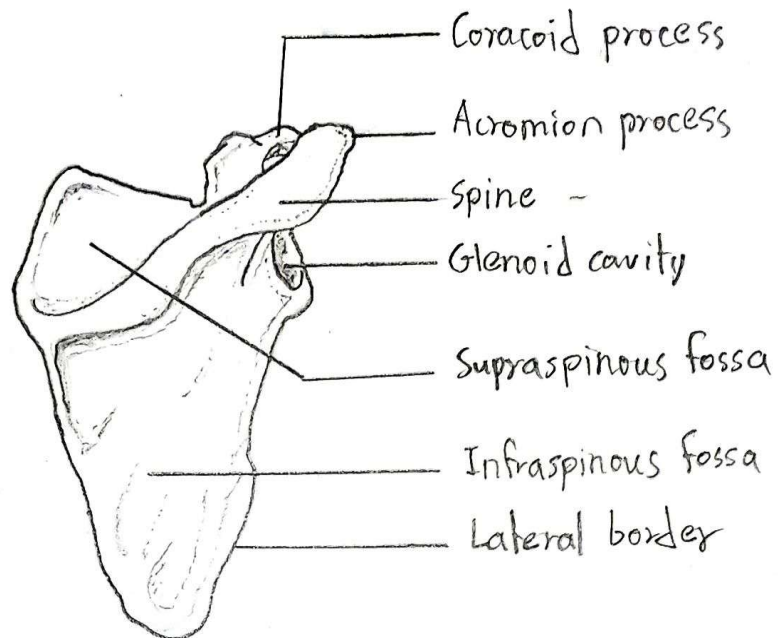
#### COMMENTS ON HUMERUS

1. The humerus is a long bone in the upper arm that extends from the shoulder to the elbow.
2. The head of humerus is a hemispherical shape that

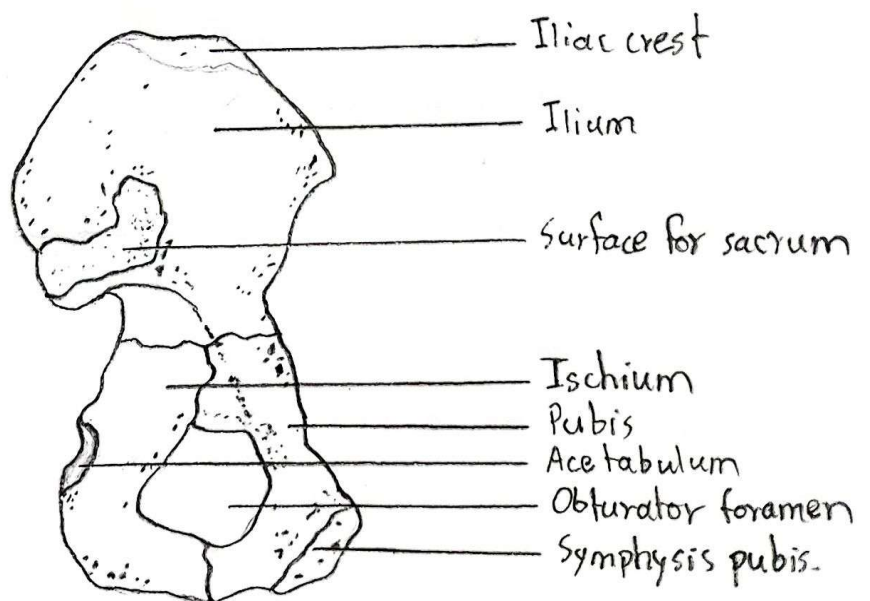
# TO STUDY HUMAN BONES

Roll No. 11

Date :



Pectoral girdle



Pelvic girdle or hip girdle.

articulates with the glenoid fossa of scapula.

3. A bicipital groove is a deep groove that separates the greater tubercle from the lesser tubercle. Bicipital groove and tubercles give attachment to muscles.
4. The proximal half of the shaft is cylindrical, whereas the distal half is triangular.
5. On the lateral side of the shaft, is a roughened surface known as the deltoid tuberosity where the deltoid muscle attaches.

#### COMMENTS ON RADIUS AND ULNA

The radius and the ulna are two separate bones of the forearm that extend from the elbow to the wrist. The radius is on the thumb side and the ulna is on the little finger side. Radius and ulna articulate with proximal and distal radioulnar joints.

1. Proximally, the head of radius articulates with the capitulum of humerus as part of the elbow joint.
2. Distally, radius articulates with carpal bones to form wrist joint.
3. A hook-shaped process, located on the proximal ulnar end is the olecranon process. It fits into the olecranon fossa of the humerus.

4. Shaft of the ulna is triangular in shape and tapers distally.

#### COMMENTS ON BONES OF THE HAND

Each human hand has 27 bones which can be divided into three groups: carpals or wrist bone (8), the metacarpals or palm bone (5) and the phalanges or finger bones (14).

##### a. Carpals (bones of wrist)

1. There are eight carpal bones arranged in two rows of four.
2. In the distal row, all of the carpal bones articulate with the metacarpals.
3. These bones are closely fitted together and held in position by ligaments.

##### b. Metacarpals (bones of palm)

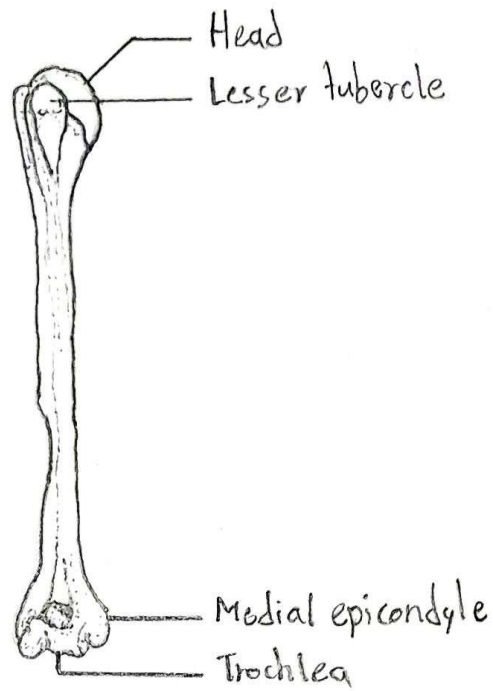
1. The metacarpals are a group of 5 long bones of the palm, between the phalanges and the carpals.
2. They are labelled with numbers 1-5 going from to ulnar direction.

##### c. Phalanges (bones of fingers)

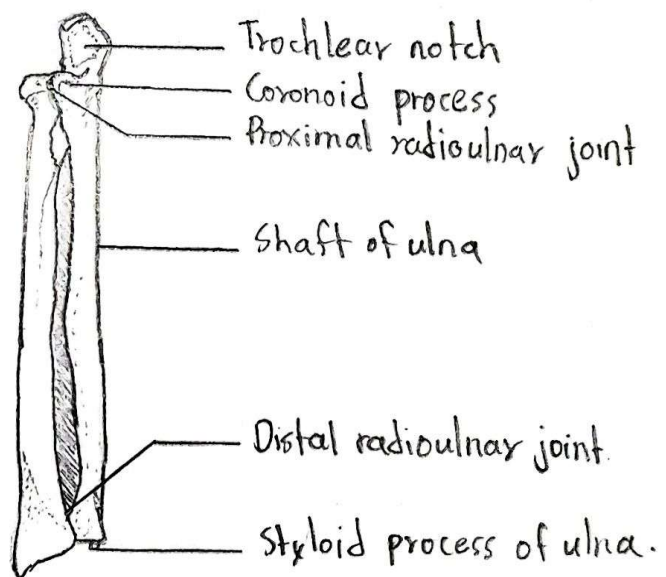
1. Phalanges are the small bones of the fingers.
2. Even though the phalanges are small in size, they are classified as long bones because of their

# TO STUDY HUMAN BONES

Roll No. 11  
Date :



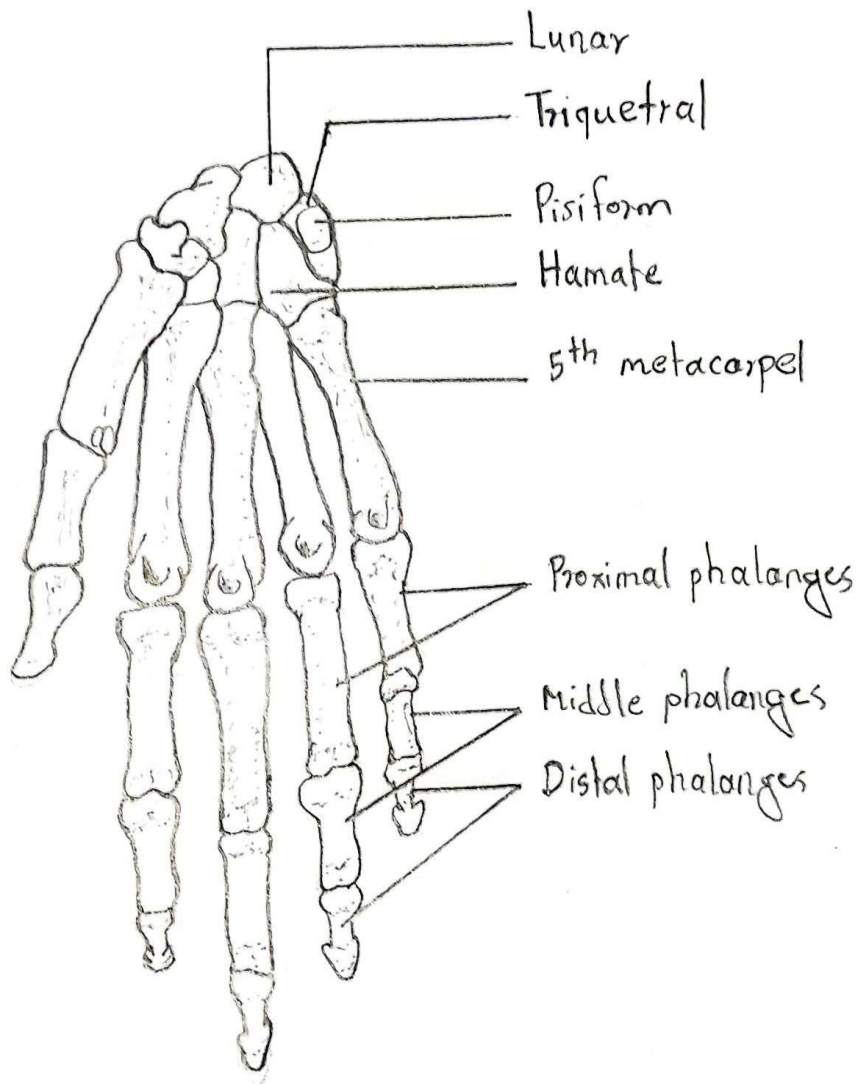
Bones of humerus



Bones of radio ulna

# TO STUDY HUMAN BONES

Roll No.   
 Date .



The Bones of Wrist, Hand and Fingers.

structural characteristics.

3. They articulate with the metacarpal bones and with each other.

### COMMENTS ON FEMUR (THIGH BONE)

1. Femur is the strongest and longest bone of the body located in the thigh region.
2. The head of the femur is almost spherical that projects anteriorly from the neck.
3. The head articulates with the acetabulum of the pelvic girdle to form the hip joint.
4. Two rough projections below the neck are the greater trochanter and the lesser trochanter.

### COMMENTS ON TIBIA AND FIBULA

The tibia and fibula are two separate long bones in the lower leg. The tibia is larger than the fibula. These bones articulate with each other by proximal and distal tibiofibular joints.

#### a) Tibia

1. The proximal end of the tibia has two articular surfaces: medial condyle and lateral condyle.
2. The tibial condyles articulate with the femoral condyles within the knee joint.
3. A bony extension of the tibia on the distal end is called the medial malleolus.

## 6) Fibula

1. The proximal end of the fibula is characterized by an irregularly shaped head and a short neck.
2. The shaft of the fibula is long and triangular. It is the site for muscle attachment.
3. The interosseous membrane between tibia and fibula attaches those two bones.

## COMMENTS ON BONES OF THE FOOT

The human foot has 26 bones which are divided into three groups: Tarsal bone (7), Metatarsal bones (5) and phalanges (14).

### a) Tarsal (Ankle bones)

1. There are seven tarsal bones arranged in three groups that form the posterior part of the foot.
2. The proximal tarsal bones are the talus and calcaneus.
3. The intermediate tarsal bone is the navicular.
4. The calcaneus is the largest tarsal bone that forms the heel of the foot.

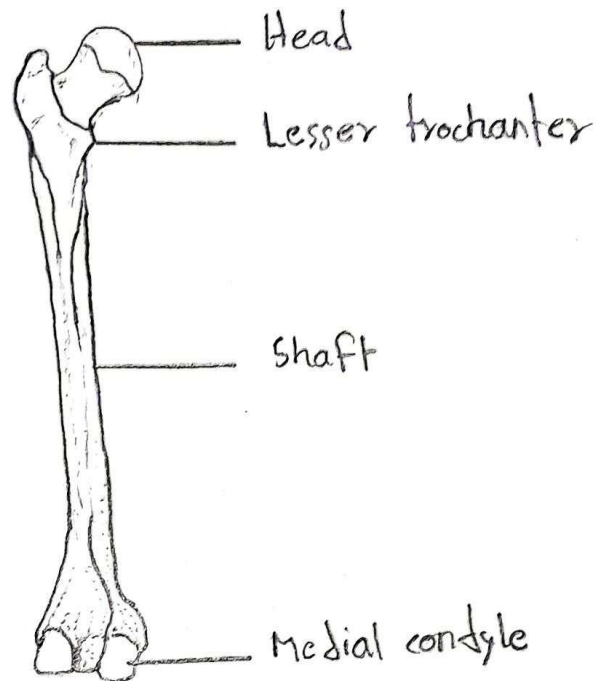
### b) Metatarsal

1. The metatarsal of the foot consists of five long bones. They are named 1-5 from big toe to little toe side.
2. Along with the tarsals, the metatarsals form the arches of the foot.
3. These bones are closely fitted together and held in

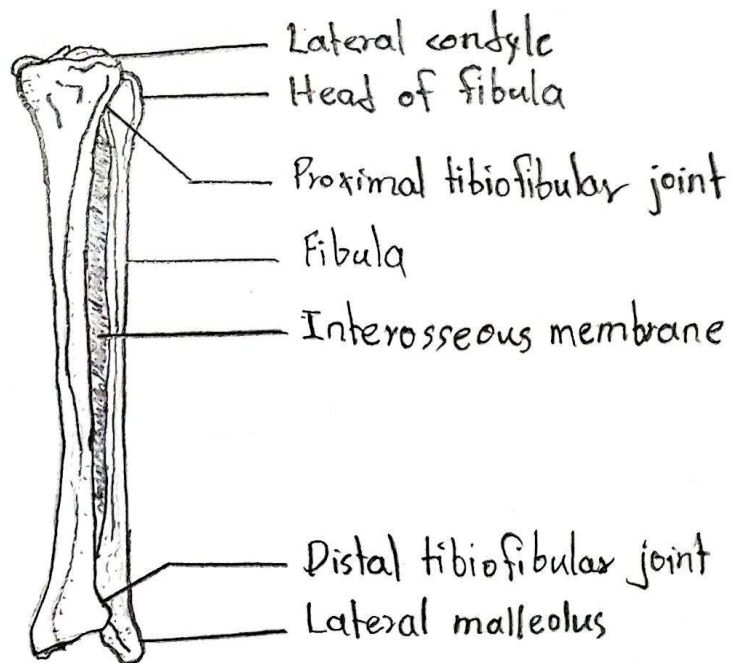
# TO STUDY HUMAN BONES

Roll No. 11

Date :



Bones of femur

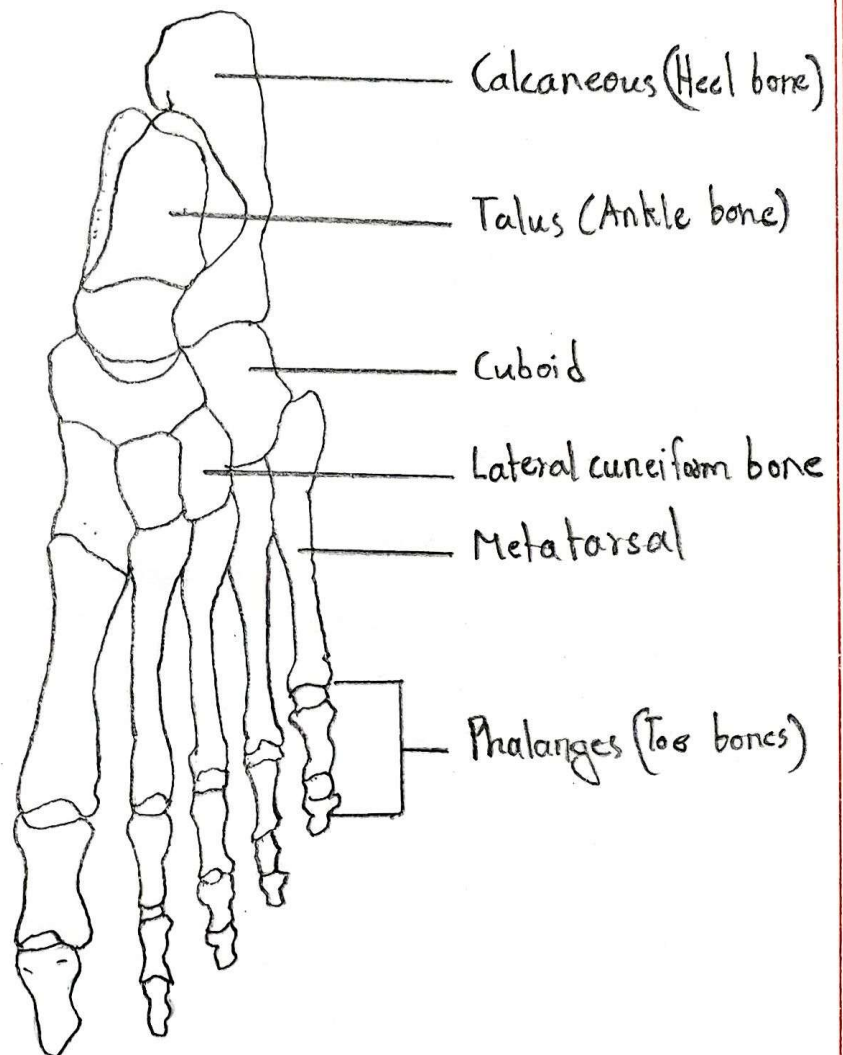


Bones of tibio fibula

# TO STUDY HUMAN BONES

Roll No. 11

Date



Bones of foot

position by ligaments.

c) Phalanges (Toe bones)

1. The phalanges are the small but long bones of the toes.
2. They articulate with the metatarsal bones and with each other.