

Skeletal system

Parts :-

(i) Bones

(ii) Joints

(iii) Cartilage

(iv) Ligaments

(v) Tendon

Skeletal (206)

Axial (80)

Skull (29)

vertebral column (26)

Rib cage (25)

Brain bone (14)

Facial bone (14)

Appendicular (126)

upper limb (64)

lower limb (62)

Hyoid bone (1)

Brain body : (14)

S = 2nd lamina (ii)

- (i) Frontal = 1 [→ Frontal process → zygomatic bone]
- (ii) Parietal = 2
- (iii) Occipital = 1
- (iv) Temporal = 2 [→ zygomatic process → zygomatic bone]
- (v) Sphenoid = 1 [connection of (i), (iv)]
- (vi) Ethmoid = 1
- (vii) Ear bone = $3 \times 2 = 6$

Facial bone : (14)

F = 2nd (v)

- (i) Mandible = 1
- (ii) Maxillary bone = 2 [→ zygomatic process → zygomatic bone]
- (iii) Zygomatic bone = 2
- (iv) Nasal bone = 2
- (v) Inferior nasal concha = 2
- (vi) Vomer = 1
- (vii) Palatine bone = 2

(viii) Lacminal bone = 2

(A.E) 2 phalanges each

Breadstribes \times 220000 (Lumbar)

L = lateral (ii)

C = lat. sinus (ii)

C = lat. sinus (iii)

Vertebral Column : (26)

(i) Cervical = 7

L = longit. (vi)

(ii) Thoracic = 12

L = biconcav (iv)

(iii) Lumbar = 5

L = biconvex (iv)

(iv) Sacrum = 1

S = Sx2 - broad + 3 (iii)

(v) Coccyx = 1

(A.E) S = 3x2, 1 is short (ii)

Rib Cage :

→ manubrium
→ angle
→ body
→ xiphoid process

L = stelliform (ii)

(i) Sternum = 2

S = 2x2 protuber (ii)

(ii) 12 pairs of ribs = $12 \times 2 = 24$

L = broad base (iv)

7 true (pair)

3 false (ii)

2 at back narrow (iv)

S = broad & thick (iii)

Appendicular:

(excl.)

skull + vertebrae

and pelvis or sacrum

rib cage

and small gill (i)

Upper limb: (excl) (32x2)

(i) clavicle = 1

$\frac{1}{2} = 16 \text{ mm}^2$ (ii)

(ii) Scapula = 1

$\frac{1}{2} = 113 \text{ mm}^2$ (iii)

(iii) Humerus = 1

$\frac{1}{2} = 161 \text{ mm}^2$ (iv)

(iv) Rad. Radius = 1

$\frac{1}{2} = 116 \text{ mm}^2$ (v)

(v) Ulna = 1

$\frac{1}{2} = 129 \text{ mm}^2$ (vi)

(vi) Carpal = 8

$2 \times 8 = 16 \text{ mm}^2$ (vii)

(vii) Metacarpal = 5

$5 \times 8 \times 1 = 40 \text{ mm}^2$ (viii)

(viii) Phalanges = $2 \times 2 = 2$

$\left. \begin{array}{l} 2 \times 8 \\ 4 \times 3 \end{array} \right\} 14$

Lower limb (3×2)

(i) Hip bone = 1 → ilium
→ pubis
→ ischium

(ii) Femur = 2

(iii) Patella = 1

(iv) Tibia = 1 } 2
(v) Fibula = 1 }

(vi) Tarsal = 7

(vii) Metatarsal = 5

(viii) Phalanges = $1 \times 2 = 2$ } 14
 $4 \times 3 = 12$

■ Function of Bone & Skeleton: [Made of bone]

Skeleton

1. Bone is a framework for support, connected by ligaments, moved by muscles.
2. Protects internal organs from mechanical injury.
3. Contains and protects red bone marrow.
4. Stores excess calcium, important to regulate blood calcium levels.

■ Types of Bone

1. Compact bone:

(i) Looks solid but precisely structured.

(ii) Made of osteons or haversian system.

(iii) Blood vessels and osteocyte are in contact in haversian canals.

2. Spongy bone:

(i) Look like a sponge with its visible cavities.

(ii) Osteocytes, matrix, blood vessels are present but are not arranged in haversian system.

(iii) Cavities contain red bone marrow, which produce red blood cell and five kinds of white blood cell.

Bone tissue element:

- (i) Matrix of bone is made of ~~bony~~ calcium salts and collagen.
- (ii) Calcium salts are calcium carbonate (CaCO_3) and calcium phosphate ($\text{Ca}_3(\text{PO}_4)_2$) which give bone the strength.

Classification of bone:

1. Long Bone:

- (i) Longer than wide
- (ii) Contain yellow bone marrow
- (iii) Mostly compact bone
- (iv) Example: Femur, Humerous.

2. Short Bone:

- (i) Cube-shaped
- (ii) Mostly spongy bone
- (iii) Example: carpal, tarsals

3. Flat Bone:

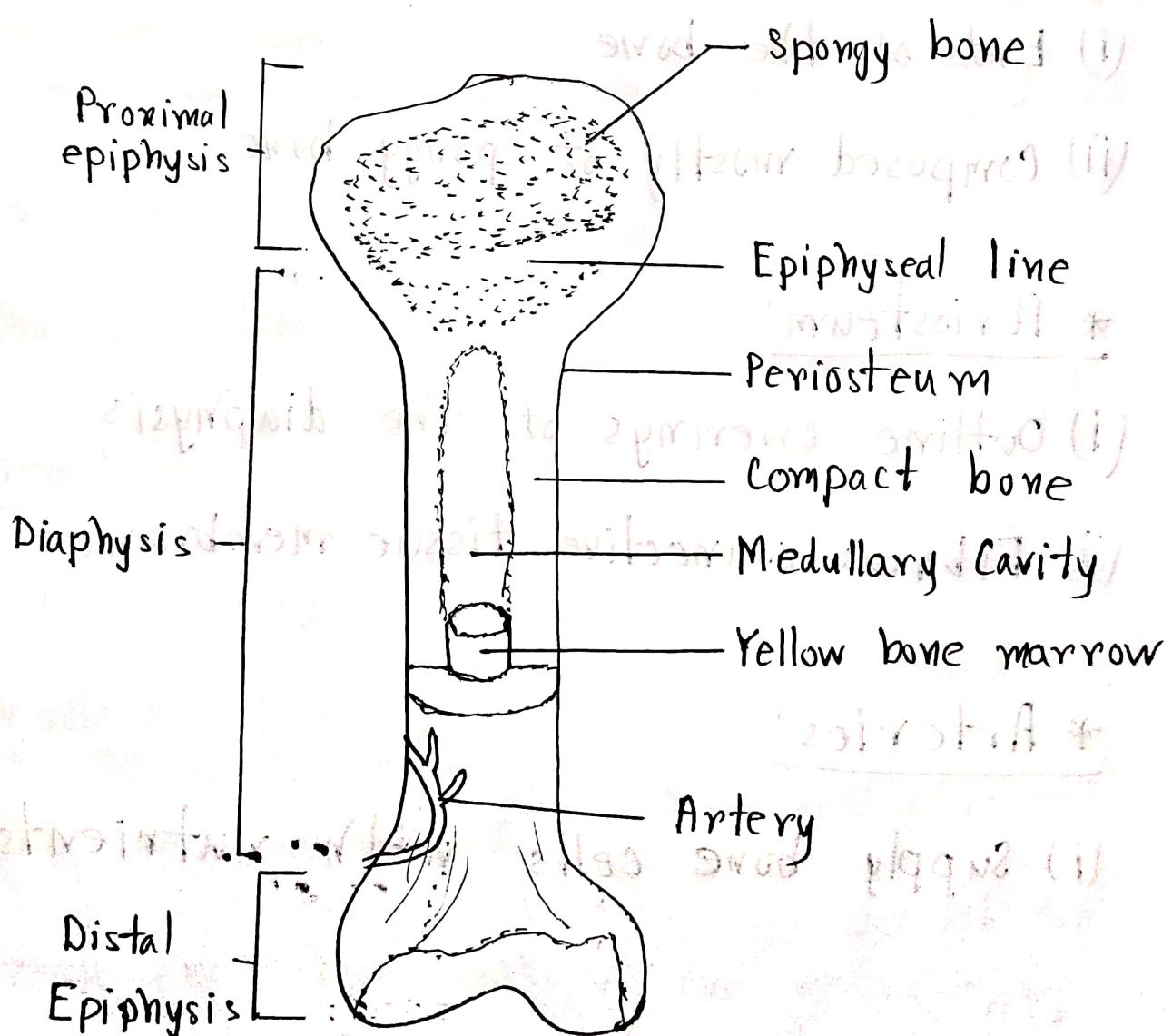
- (i) Thin- and flattened
- (ii) Usually curved
- (iii) Thin layers of compact bone around a layer of spongy bone.
- (iv) Example: cranial bone, ribs, sternum.

4. Irregular bone:

(i) Irregular shape

(ii) Example: Vertebrae, facial bone

Gross anatomy of Long Bone:



(#)

* Diaphysis:

- (i) shaft
- (ii) Composed of compact bone

* Epiphysis:

- (i) Ends of the bone
- (ii) Composed mostly of spongy bone

* Periosteum:

- (i) Outline coverings of the diaphysis

- (ii) Fibrous connective tissue membrane.

* Arteries:

- (i) Supply bone cells with nutrients.

* Medullary Cavity

- (i) Cavity of the shaft
- (ii) Contains yellow marrow in adults
- (iii) Contains red marrow in infants

■ Types of bone cells:

1. Osteocytes:

- (i) Mature bone cells

2. Osteoblasts:

- (i) Bone-forming cells

3. Osteoclast:

- (i) Bone destroying cells

- (ii) Break down bone matrix for remodelling and release of calcium

* Bone remodelling is process by both osteoblasts and osteoclasts.

□ Long bone formation & growth: [See 128 slide of book]

□ Paranasal Sinuses:

Function:

(i) Lighten the skull

(ii) Give resonance and amplification to voice.

Types:

(i) Frontal sinus

(ii) Ethmoid "

(iii) Sphenoid "

(iv) Maxillary "

■ Joints:

General knowledge (1)

A joint is where two bone meet or articulate.

Function:

- (i) Holds bone together
- (ii) Allows for mobility

■ Classification of Joints

Functional:

(i) Synarthrosis:

(a) * Suture type, immovable

* Fibrous connective tissue between bone surfaces

* Exam: Between cranial bones, also facial bones.

(ii) Amphiarthrosis:

- (a) * Symphysis type, slightly movable
* Disc of fibrous cartilage between bones.
* Exam: between vertebrae, pubic bones

(iii) Diathrosis:

(a) * Ball and socket; movement in all planes. Exam: Femur

(b) * Hinge; movement in one plane.

Exam: Humerus & alna.

(c) * Candyloid; movement in one plane with some lateral movement

Exam: Temporal bone.

(d) * Pivot: rotation

Exam: Radius & ulna

(e) * Gliding: side-to-side movement

Exam: Between carpal s.

(f) * Saddle: Movement in several planes.

Exam: Carpometacarpal of thumb.

Structural:

(i) Fibrous Joints:

* Bones united by it

* Largely movable

(ii) Cartilaginous Joints:

* Bones connected by it

* slightly movable.

* Exam: Pubic symphysis, intervertebral joints

(iii) Synovial Joints ~~tutor~~ + (b)

* Articulating bones are separated

from each other by ~~the articular capsule~~ (b)

* Synovial fluid is found in the joint cavity.