

## BONES OF THE HUMAN BODY

### CRANIUM

#### Cranial Bones

Bones	Description	Articulation	Comments and Notes
conchae, inferior nasal (turbinate)	Thin, spongy, bony plate with curved margins; separates middle and inferior meatus, shaped like a conch shell	Ethmoid, lacrimal, maxilla, palate	
ethmoid	Has 4 parts: horizontal cribriform plate, a vertical perpendicular plate, and two lateral masses; exceedingly light and spongy; cuboid	Sphenoid, frontal, vomer, inferior nasal conchae, lacrimal, nasal, palatine, maxillae cavity from the brain	Most deeply situated bone in cranium, it separates the nasal
frontal	Has 2 portions: the squama that forms the forehead, and an orbital portion that forms the roof of the orbital and nasal cavities	Sphenoid, ethmoid, the 2 parietals, the 2 nasals, the 2 maxillae, the 2 lacrimals, and the 2 zygomatics	
occipital	Posterior wall and base of cranium; trapezoidal; pierced by a large oval aperture called the foramen magnum through which the cranial cavity communicates with the vertebral canal	parietal, sphenoid, temporal, atlas	
parietal	Form most of the superior part of the cranium; coronal, squamous, sagittal, lambdoid sutures develop where parietal bones articulate	Frontal, occipital, sphenoid, temporal	
sphenoid	Situated at base of cranium; consists of body, greater and lesser wings, and pterygoid processes; wedge-shaped	All cranial bones	Has 5 important openings: optic canal, superior orbital fissure, foramen rotundum, foramen ovale, foramen spinosum
temporal	Consist of squama; tympanic region; mastoid, petrous, styloid processes; form inferolateral region of skull and parts of cranial floor	Occipital, sphenoid, mandible, parietal, zygomatic	Infections can spread to brain through mastoid air cells

#### Facial Bones

Bones	Description	Articulation	Comments and Notes
lacrimal	Smallest and most fragile bone of face; shaped like a fingernail	Frontal superiorly, ethmoid posteriorly, maxilla anteriorly, inferior nasal concha	Contains lacrimal sac that allows tears to drain
mandible	Consists of horizontal body, and two upright rami; U-shaped bone that forms lower jaw; largest and strongest bone of face	Temporal	Body of mandible anchors the lower teeth
maxilla	Consists of a body and zygomatic, frontal, alveolar, and palatine processes; paired bone forming upper jaw	All facial bones except mandible	Supports superior teeth
nasal	Small paired oblong bones that form the bridge of the nose	Frontal superiorly, ethmoid posteriorly, opposite nasal, maxilla laterally	
palatine	Paired L-shaped bones; form parts of hard palate, lateral walls of nasal cavity, and orbit floor	Sphenoid, ethmoid, maxilla, inferior nasal concha, vomer, and opposite palatine	
vomer	Situated in the nasal cavity; forms inferior part of nasal septum; trapezoidal	Sphenoid, ethmoid, maxillae, palatine	
zygomatic	Commonly called cheekbone; forms prominence of cheek and part of lateral orbital floor, irregularly shaped	Sphenoid, frontal, maxillae, temporal	

#### Middle Ear

Bones	Description	Articulation	Comments and Notes
incus	Middle of the three ossicles in the middle ear; consists of a body, long crus, and short crus; shaped like an anvil	Malleus, stapes	Present only in mammals
malleus	Most lateral ossicle; club-shaped; transmits sounds from tympanic membrane to incus	Incus medially	Present only in mammals
stapes	Most medial ossicle in middle ear; smallest bone in body; stirrup-shaped; transmits sounds from incus to oval window	Incus	Fusion of footplate of stapes to oval window causes otosclerosis

**Neck**

Bones	Description	Articulation	Comments and Notes
atlas	First cervical vertebra C1; supports the cranium	Occipital bone superiorly, axis inferiorly	
axis	Second cervical vertebra C2, contains dens (odontoid process), which serves as pivot for rotation of the atlas and cranium	Occipital bone and atlas superiorly, third cervical vertebra inferiorly	In traumatic injury, cranium can be driven inferiorly, driving brainstem into dens; in motor vehicle accident involving "whiplash," dens can be driven posteriorly into cervical spinal cord
hyoid	Consists of a body, two greater cornua, and two lesser cornua; acts as a movable base for the tongue and for neck muscle attachments; suspended by stylohyoid ligaments	None	Only bone in skeleton that does not articulate with other bones

**Shoulder Girdle**

Bones	Description	Articulation	Comments and Notes
clavicle	Commonly called collar bone; attached to axial skeleton; together with scapula, allows for free range of motion of arm	Sternum medially and acromion, part of the scapula, laterally	Often fractured when person falls onto shoulder or outstretched arm
scapula	Forms posterior part of shoulder girdle; flat and triangular in shape; connects humerus to clavicle	Clavicle and humerus	

**Thorax**

Bones	Description	Articulation	Comments and Notes
sternum	Commonly called breast bone; long flat bone lies in the anterior midline of thorax; consists of manubrium, body, and xiphoid process	Clavicles laterally, first through seventh rib	Trauma to xiphoid process can cause massive hemorrhage involving heart or liver
ribs	12 pairs flat bow-shaped bones attached posteriorly to thoracic vertebrae and curves anteriorly; superior 7 ribs attach directly to sternum forming the true ribs; inferior 5 ribs form false ribs; ribs 11 and 12 are called floating ribs; length increases from parts 1–7 then decreases from pairs 8–12	Thoracic vertebrae posteriorly, upper 7 pairs with sternum anteriorly	Most common cause of rib fractures is blunt trauma to chest, which can cause lung parenchyma injury, cardiac contusion, or pneumothorax
vertebra	Vertebral column consists of 33 separate bones; cervical (7), thoracic (12), lumbar (5), sacrum (5 fused), coccyx (4 fused)		Scoliosis involves abnormal lateral curvature of the spine; kyphosis is exaggerated thoracic curvature; lordosis exaggerated lumbar curvature

## UPPER EXTREMITIES

### Arm and Forearm

Bones	Description	Articulation	Comments and Notes
humerus	Largest and longest bone of superior limb	Scapula at shoulder; radius and ulna at elbow	Surgical neck most frequently fractured portion
radius	Lateral to ulna; prism shaped; thin at proximal end, wider at distal end	Humerus and ulna proximally, carpal bones and ulna distally,	Contributes greatly to wrist joint function
ulna	Medial to and slightly longer than radius; prism shaped; proximally has olecranon process, radial notch, and ulna tuberosity; distally styloid process	Humerus and radius proximally, radius distally	Contributes greatly to elbow joint function

### Carpal Bones

Bones	Description	Articulation	Comments and Notes
carpal	Consists of 8 bones in 2 rows; distal row composed of trapezium, trapezoid, capitate, hamate; proximal row composed of scaphoid, lunate, triquetrum, pisiform		About 60% of wrist fractures involve scaphoid
capitate	Largest carpal bone, distal row of carpal bones, shaped like a cranium (head)	Navicular and lunate proximally; second, third, and fourth metacarpals distally; trapezium on radial side; hamate on ulnar side	
hamate	Most medial in distal row of carpal bones; itself shaped like hook; a hooklike process serves as attachments for flexor tendons of the palm	Lunate proximally, the fourth and fifth metacarpals distally, the triquetrum medially, the capitate laterally	
lunate	Proximal row of carpal bones, shaped like a crescent moon	Radius proximally, capitate and hamate distally, navicular laterally, and triangular medially	
pisiform (lentiform)	Proximal row of palmar carpal bones; resembles a green pea in size and shape	Triquetrum	
scaphoid	Most lateral in proximal row of carpal bones; shaped like a rowboat; hollowed out area within the anatomic snuffbox	Radius proximally, trapezium, trapezoid, capitate, lunate	Relatively easy to fracture; heals slowly due to poor circulation
trapezium (greater multangular)	Most lateral in distal row of carpal bones	First metacarpal distally, trapezoid and second metacarpal medially, scaphoid proximally	
trapezoid (lesser multangular)	Distal row of carpal bones; quadrangular	Navicular proximally, second metacarpal distally, trapezium laterally, and capitate medially	
triquetrum	Most medial of proximal carpal bones; shaped like a wedge or pyramid	Hamate, lunate, pisiform	Does not articulate with ulna

### Hands

Bones	Description	Articulation	Comments and Notes
metacarpal	The 5 long bones of the hand; slightly concave on palmar side; cylindrical	With proximal phalanges; first: trapezium; second: trapezium, trapezoid, capitate, and third metacarpal; third: capitate and second and fourth metacarpals; fourth: capitate, hamate, and third and fifth metacarpals; fifth: hamate and fourth metacarpal	
sesamoid	Short bones formed within tendons; so named because of resemblance to sesame seeds		
phalanges	Proximal, intermediate, and distal digits; 14 miniature long bones of hand phalanx	Proximal and distal phalanges	Thumb and great toe lack middle

## LOWER EXTREMITIES

### Pelvis

Bones	Description	Articulation	Comments and Notes
hip (coxal)	Commonly called hip bone; also termed ossa coxae or innominate; made up of three separate bones, the upper part the ilium; the middle the pubis; the bottom the ischium	Femur, sacrum posteriorly	
ilium	Broad flaring bone that forms the superior region of the hip bone; consists of an inferior body and a superior winglike ala forming the iliac crest	Sacrum, pubic bone	Distinct at birth, but later fuses with ischium and pubis
ischium	Lower and posterior part of hip bone; consists of body forming acetabulum, and ramus	Ilium, pubic bone, femur	Distinct at birth, but later fuses with ilium and pubis
pubis	Anteroinferior portion of hip bone; V-shaped; consists of superior and inferior rami arising from a flat body	Ischium, ilium, femur	Distinct at birth, but later fuses with ilium and ischium; acuteness of pubic arch helps distinguish gender
sacrum	Large triangular bone at the base of the vertebral column forming the posterior wall of pelvis; concave curvature anteriorly	Lumbar vertebrae superiorly, coccyx inferiorly	

### Leg

Bones	Description	Articulation	Comments and Notes
femur	Consists of a head and a neck proximally, a diaphysis and 2 condyles distally; longest, largest, and strongest bone in the body patella inferiorly	Acetabulum, articular cup on the pelvis superiorly, tibia and	Neck is its weakest part and is often fractured, leading to a "broken hip"
fibula	Lateral to tibia; most slender of long bones	Tibia proximally, tibia and patella distally	Does not bear weight; serves to attach muscles
tibia	Commonly called shin bone; medial to fibula, transmits weight of body from femur to foot	Femur and fibula proximally, talus and fibula distally	

### Foot

Bones	Description	Articulation	Comments and Notes
calcaneus	Largest tarsal bone; forms heel of foot; tendon to calf muscles attaches posteriorly	Cuboid anteriorly, talus superiorly	Bone bears most body weight
cuboid	Lateral tarsal bone; cuboid	Calcaneus, lateral cuneiform, fourth and fifth metatarsal, navicular	
cuneiform	Consists of 3 cuneiform bones in the foot: medial, intermediate, and lateral; wedge-shaped	Navicular, first, second, and third metatarsals, medial to the cuboid	
metatarsal	Comprises 5 long bones of the foot; prismoid-shaped; tapers gradually from tarsal to phalangeal extremity; slightly convex dorsal surface; concave plantar surface	Tarsal bones and proximal phalanges; first, first cuneiform; second, all three cuneiforms; third, third cuneiform; fourth, third cuneiform and cuboid; fifth, cuboid	First metatarsal supports the weight of body
navicular	Flattened medial tarsal bone, also called scaphoid in carpal bones	Talus, three cuneiform bones	
phalanges	Consists of proximal, intermediate, and distal digits; 14 miniature long bones of foot	Proximal and distal phalanges	Thumb and great toe lack a middle phalanx
sesamoid	Short bones formed within tendons, sesame-shaped		
talus	Ankle of the foot	Tibia and fibula superiorly, calcaneus inferiorly, navicular anteriorly	
tarsals	Consists of 7 foot bones: talus, calcaneus, cuboid, navicular, medial cuneiform, intermediate cuneiform, lateral cuneiform		