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ANATOMY & PHYSIOLOGY

for Paramedics and Nurses



Ajay Kumar Singh

Foreword
KM Singh

3rd Edition

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CHAPTER 4

Skeletal System

Abstract
In this chapter, we study about framework of body. It is made up by bone, which is 206 in number. In this chapter bones are described according to their situation and their function. We also describe joints which is made by bones, they help in locomotion.

Keywords
Prominent, suture, fontanelle, foramen, notch, foramina, convex, concave, transverse groove, tuberosity, fossa, border, acetabulum, flexion, extension, adduction, abduction, pronation, supination.

The framework of bone and cartilage that protects organs and allows movement is called the Skeletal System. Thus skeletal system forms framework of body. In this system, all the types of bones are found.

Structure of bone: Described in Chapter Tissue.

Types of bone: Described in Chapter Tissue.

Division of skeletal system: In adult humans 206 bone are found. It is divided into axial and appendicular skeleton. In the body an imaginary line is present, i.e. called Midline, which extends through head and down to space between feet. The axial division consists of bone around the axis, skull bone, ear ossicles, hyoid bone, ribs, back bone and breast bone.

Appendicular division contain bone of upper and lower extremities.

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Divisions of Skeletal System

Axial skeleton	**Bone**
Skull	22
Cranial bone	8
Facial bone	14
Hyoid	1
Auditory ossicles	6
Vertebral column	26
Thorax	25
Sternum	1
Ribs	24
Appendicular Skeleton	
Pectoral (shoulder) girdle	64
Clavicle	2
Scapula	2
Upper extremity:	
Humerus	2
Radius	2
Ulna	2
Carpals	16
Metacarpals	10
Phalanges	28
Pelvic Girdle	62
Hib bone	2
Lower Extremities	
Femur	2
Tibia	2
Fibula	2
Patella	2
Tarsals	14
Meta Tarsals	10
Phalanges	28
Total bones = Axial skeleton + Appendicular skeleton	80 + 126 = 206

Skull

It rests on superior end of vertebral column. Skull contains two types of bones: cranial bone and facial bone. Total skull bone is 22 in number. Skull bones name and number are given below.

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Cranial Bone (8)

Frontal	1
Parietal	2
Temporal	2
Sphenoid	1
Ethmoid	1
Occipital	1

Facial Bone (14)

Nasal bone	2
Maxillae	2
Zygomatic	2
Lacrimal	2
Palatine	2
Inferior nasal concha	2
Mandible	1
Vomer	1

In skull bone an immovable joint is present, i.e. called *suture*. Four prominent sutures are present:

1. *Coronal suture*: Present between frontal and two parietal bone.
2. *Sagittal suture*: Found between two parietal bone.
3. *Lambdoid suture*: Present between parietal and occipital bone.
4. *Squamous suture*: Present between parietal and temporal bone.

At the time of birth, membrane filled space are found in skull, i.e. called *fontanelle*. It helps in rapid growth or growth of brain during infancy. They are closed by bone and some landmark remain. Six among them are very prominent. They are given below:

Anterior (frontal) fontanelle: Lies between angles of two parietal bone and frontal bone.

Posterior (occipitalle) fontanell: Situated between two parietal and occipital bone.

Anterolateral (sphenoid) fontanelle: It is two in number situated on both side of skull. Lies at junction of frontal, parietal, temporal and sphenoid bone.

Posterolateral fontanelle: It is also two, situated at junction of parietal, occipital and temporal bone on both side of skull.

Cranial Bone

Frontal bone: It is found anterior and forms forehead and roofs of orbits. Soon after birth, left and right sides of frontal bone are united by frontal suture. It is one in number.

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Parietal bone: It is two in number, forms greater portion of sides and roof of cranial cavity.

Temporal bone: It is two in number, forms lateral sides of cranial bone.

Occipital bone: It forms the posterior part of skull. In occipital, a large hole is present, i.e. called *Foramen Magnum*. Through thin opening medulla oblongata continues with spinal cord and some artery and nerves passes.

Sphenoid bone: It lies at middle part of base of skull.

Ethmoid bone: Located in anterior part of cranial floor between orbits.

Facial Bone

It is 14 in number, in which six are paired and two are unpaired.

Nasal bone: It is paired bone, meet at middle and superior part of face and form bridge of nose.

Maxillae: It is paired and unite to form upper jaw bone and articulate with all face bone except the mandible.

Zygomatic bone: It is commonly called cheek *Bone*. It is two in number and forms lateral wall and floor of each orbit. Articulated with frontal, maxilla, sphenoid and temporal bone.

Lacrimal bone: It is paired bone. Smallest bone of face. Lies posterior and lateral to nasal bone and forms medial wall of each orbit. Each contain lacrimal foramen.

Palatine bones: They are 'L' shaped, two in number. They form posterior portion of hard palate, part of floor and lateral wall of nasal cavity.

Inferior nasal conchae: Two in number and forms a part of lateral wall of nasal cavity.

Vomer: It is single and roughly triangular bone, forms inferior and posterior part of nasal septum.

Mandible: It forms lower jaw. It is single, largest and strongest bone of face. It is only movable skull bone.

Mandible consists of curved, horizontal portion, i.e. called body and two ramus are present, where each ramus meet, they form *angle*

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of *mandible*. Each ramus has posterior condylar and anteriorly coronoid process. A depression is found between the process, i.e. called *Mandibular notch*. A foramen is present, i.e. called *mental foramen.*

Orbits

Each orbit or eye socket is pyramid shape space, which contain eyeball and their structure. Orbit is formed by seven bone—frontal, sphenoid, palatine, lacrimal bone, ethmoid, maxilla and nasal bone.

Hyoid bone

It is single, 'U' shaped bone. It does not articulate with any other bone. It is located in neck, between mandible and larynx and suspended by help of process of temporal bone. It supports the tongue.

Vertebral column: It is composed of bones, i.e. called *Vertebrae*. It's length is near about 71 cm in average adult male and 61 cm in female. Vertebral column is strong, flexible rod that bends anteriorly posterior and laterally and rotates. In vertebral column, spinal cord are present. Between vertebrae a opening is found called *Inter vertebral foramina* through this opening nerves connect spinal cord to various parts of body.

In adult 26 vertebrae are found. There are 7 cervical in neck, 12 thoracic in posterior to thorax, 5 lumbar support lower, 5 sacral vertebrae, which fuse and form one sacrum and 4 coccygeal vertebrae fused into one, form coccyx. Before fusion, 33 vertebrae are found. In vertebral column cervical, thoracic and lumbar vertebrae are movable, sacrum and coccyx are immovable.

In vertebral column 4 normal curves are seen, cervical and lumbar curves are anterior convex (bulging out) while thoracic and sacral curves are anterior concave (cupping in).

Cervical vertebrae are 7 in number. It is smaller than thoracic vertebrae. The first cervical vertebra are atlas, which support the head and second are axis. They have 3 foramina one vertebral foramina (It is larger than all other vertebra) and two transverse foramina. Atlas have no body and process, while C_2-C_7 have body and process.

Thoracic vertebrae are 12 in number. They are larger (T_1-T_{12}) and stronger than cervical vertebrae. It has large process and body.

Lumbar vertebrae (L_1-L_5) are 5 in number. It is largest and strongest vertebrae in column.

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Sacrum: It is triangular in shape and formed by 5 sacral vertebrae. *(In 16 to 18 yrs)* It lies between two hipbone in posterior portion. It has two surfaces—anterior (concave) and posterior (convex). On anterior surface—4 transverse lines (ridges) are present. On posterior surface—crest and foramina are present.

Coccyx: It is also triangular in shape and formed by 4 coccygeal vertebrae.

Thorax

It is also called 'Chest'. It is bony cage formed by sternum, costal cartilage, ribs and bodies of thoracic vertebrae. It is cone shaped and the upper portion is narrow and lower portion is broader. It forms cavity, i.e. known as thoracic cavity, in which some organs are present such as heart and lungs.

Sternum or Breast Bone

It is a flat, narrow bone. Near about 15 cm in length and lies on median line of anterior thoracic wall and consists of 3 parts—superiorly manubrium, middle largest portion body and inferior smallest portion called xiphoid process. On superior surface of manubrium a depression is found, i.e. is known as suprasternal (jugular) notch, on both sides of suprasternal notch, clavicular notch are present, which articulates with medial end of clavicle. Body articulates with 2 to 10 ribs.

Ribs

In our body 12 pairs of ribs are present and form sides of thoracic cavity. Ribs are three types as given below—

1. *True ribs*: First seven pairs of ribs are directly attached to sternum by strip of costal cartilage (Hyaline).
2. *False ribs*: Eight, nineth, tenth and cartilage rib's are attached to each other, then attached to seventh pair of ribs.
3. *Floating ribs*: There are 11th and 12th pair of ribs. They do not attach to sternum, but they are only attached to thoracic vertebrae posteriorly.

Pectoral (shoulder) girdle: Pectoral girdle attachs the bones of upper extremities to axial skeleton. Each of two pectoral girdles consists of two bones, a clavicle and a scapula. Clavicle anterior articulates with sternum and scapula posterior articulates with humerus and clavicle. Pectoral girdle is not attached to the vertebral column.

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Clavicle: It is also known as *Collar bone.* It is a long, slender 's' shaped bone with two curves. One medial 1/3 convex anterior and lateral 1/3 concave anterior. It has two ends, medial end which is rounded and also called as *Sternal end* and joined with sternum and forms *Sternoclavicular Joint* and lateral end is broad, flat (acromial extremity) articulated with acromian process of scapula and forms acromio clavicular joint. Clavicle has two surfaces—superior and inferior and one shaft.

Scapula: It is large, triangular flat bone, lies in posterior part of thorax (between 2-7 ribs). Scapula has 3 borders—thin edge near vertebral column is medial border, thick, closer to arm lateral border and superior edge is superior border.

In scapula 2 angles are present, they are superior angle and inferior angle and 2 surface anterior and posterior. A sharp ridge spine runs diagonally on posterior surface of scapula. End of spine projects as a flattened expanded process known as acromian process. Inferior to acromian a depression known as glenoid cavity is found lateral end of superior border, a projection is found i.e., called coracoid process. Above and below the spine two fossa supraspinous and infraspinous fossa are present.

Upper extremity: It consist of 60 bones in which each consist humerus, radius, ulna, carpals, meta carpals and phalanges.

Humerus or arm bone: It is longest and largest bone of upper extremity. It has two ends—upper and lower and one shaft.

In upper end: On upper side medially, rounded structure are found, i.e. head, which articulates with glenoid cavity of scapula. It has two neck—anatomical neck, which is present below the head and surgical neck, where fracture of humerus is present. It has two tubercle, in which on lateral side, there is greater tubercle and anteromedial side lesser tubercle. On anterior side between these tubercle a groove is found, i.e. called *Bicipital groove*.

Shaft are cylindrical at proximal end, in middle triangular and below flattened, border and 3 surfaces are present. On lateral border in middle a 'U' shaped, rough area is present, i.e. called *deltoid tuberosity*. (This is point of attachment of deltoid muscle).

In lower end—two epicondyle, medial and lateral are present. It has two fossa and two rounded knob like structure. On medial side–coronoid fossa and trochlea and on lateral side radial fossa

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and capitulum are present. On posterior side, olecranon fossa (Attachment of olecranon of ulna) is present.

It present on medial side in forearm. It is longer than radius. On upper end of ulna they have two process—Olecranon (prominance forms of elbow) posterior and coronoid process anteriorly. Just below coronoid a tuberosity is found, i.e. called *ulnar tuberosity*. Between coronoid and olecranon process, a notch is present, i.e. called trochlear notch. Below trochlear notch, radial notch is present. In shaft they have surface and border (not signified).

In lower end, a rounded head is present and on posteior side styloid process are present.

Radius

It is located laterally in forearm. It has upper end, shaft and lower end. In upper end, a disc shaped structure is found, which articulates with capitulum (humerus) and radial notch (ulna), i.e. called *head*. Below head a constricted area is found, i.e. called *neck shaft*, which has some surface and border. On medial side a rough, raised area is present, i.e. called *radial tuberosity*. In lower end laterally styloid process and medially a notch (ulnar notch) are present.

Carpals, meta carpals and phalanges: In wrist (carpus) consists of 8 small bones, i.e. called carpals. They are joined by ligament and arranged in two transverse rows, 4 bones in each row. They are:

In proximal row, lateral: to medial scaphoid, lunate triquetrum and pisiform.

In distal row lateral to medial trapezium, trapezoid, capitate and hamate.

In *Proximal row*	S	L	T	P
In *Distal row*	T_2	T_3	C	H

Five metacarpals are present, they consitute palm of hand. Each metacarpal has proximal base, shaft and distal head.

Phalanges or bones of fingers are 14 in each hand. A single bone is called *phalanx*. Each *phalanx* has proximal base, shaft and distal hand. In thumb, two phalanges and in other (4) fingers 3 phalanges are present. It is arranged in 3 rows. Proximal row articulates with metacarpal, middle row articulates with proximal row (absent in thumb) and distal row articulates with middle row.

Pelvic Girdle or Hip Girdle

It consists of two hip bones. They provide stable support of lower extremity on which body weight is carried. Hip bones unite anteriorly

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by pubic symphysis. Each hip bones consists of three components which are given below.

One superior *ilium*, anteroinferior *pubis* and posteroinferior *ischium*. They fuse into one, form a fossa, i.e. called *acetabulum*.

Ilium is largest part of hip bone. It has 3 borders—anterior, posterior and superior. Its superior border is called *iliac crest*. It has 4 spines i.e. called *iliac spine*. In which on anterior border two iliac spine-anterior-superior iliac spine and anterior-inferior iliac spine are present. On posterior border—posterior superior iliac spine and posterior inferior iliac spine are present. Below them a notch is present, i.e. called greater sciatic notch. It has 3 surfaces—anterior surface, iliac surface and sacropelvic surface.

Ischium has a prominent ischial spine, below spine lesser sciatic notch and a tuberosity (ischial tuberosity) and a ramus are found. It joins with pubis and surrounds the obturator foramen (largest foramen).

Pubis have a body and two ramus–superior and inferior. In anterior—border of body known as *pubic crest* and its lateral side a projection are found, i.e. called *pubic tubercle*.

Hip bones are joint with sacrum and coccyx and form basin like structures, i.e. called *pelvis*. Superior and inferior portion of pelvis are separated from each other by a plane or imaginary line that connect sacral promontory on posterior side, pubic symphysis anterior side and sacral point on lateral side. This oblique plane is called *pelvic brim*.

Those portion present above pelvic brim, i.e. called *false pelvis* and those below is called *true pelvis*.

Lower extremity: Lower extremity are composed of 60 bones. Each extremity includes femur, patella, tibia, fibula, tarsals, metatarsals and phalanges.

Femur or thigh bone: It is longest, heaviest and stronger bone in body. It has upper end, shaft and lower end.

In upper end, a rounded, medial head is present, below head a constricted, neck is present. It has two trochanter, in which on anterior side–greater trochanter and on medial side–lesser trochanter are present. Between these trochanters, on anterior side narrow intertrochanteric line and posterior side a intertrochanteric crest are present.

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In shaft, there are 3 borders and 3 surfaces in middle and 4 surfaces on upper and lower side. Border are medial, lateral and posterior border and surface are medial, lateral and posterior surface (In upper femoral and below popliteal surface). On posterior surface a rough vertical ridge is found, i.e. called *Linea Aspera* on this several thigh muscle attached.

In lower end, two condyle-medial and lateral condyle. Superior to condyle two epicondyle-medial and lateral epicondyle are present. On posterior surface a depression is found between condyle, i.e., called inter condylar fossa and on anterior side patellar surface are present.

Patella

The patella or knee cap is a small triangular bone located anterior to the knee joint. It is a sesamoid bone that develops in the tendon of the quadriceps femoris muscle. The broad superior end of the patella is called the base. The pointed inferior end is the apex.

The posterior surface of the patella contains the articular facets, one for the medial condyle and the other for the lateral condyle of the femur. The function of the patella is to maintain the position of the tendon when the knee is bent.

Tibia and Fibula

The tibia is the larger medial bone of the leg. It bears the weight of the leg. The tibia articulates at its proximal end with the femur and fibula, and its distal end with the fibula of the leg and tarsal bone of the ankle.

The promixal end of the tibia is expanded into a lateral and medial condyle. These articulate with the condyle of the femur. The interior surface of the lateral condyle articulates with the head of the fibula. The tibial tuberosity on the anterior surface is a point of attachment for the patellar ligament.

The medial surface of the distal end of the tibia articulates with the tarsal bone of the ankle and forms the prominence that can be felt on the medial surface of ankle.

The fibula is parallel and lateral to the tibia. It is smaller than the tibia. The head of the fibula articulates with the interior surface of lateral condyle of the tibia below the level of the knee joint. The distal end has a projection called the *lateral malleolus* that articulates with the tarsal bone of the ankle. This forms the prominence on the lateral

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surface of the ankle. The fibula also articulates with the tibia at the fibular notch.

Tarsal

The tarsus is collective term for the 7 tarsal bones of the ankle. They include the tallus calcaneous located in the posterior part of the foot.

The anterior tarsal bone are the cuboid, navicular (boat shape) and three cuneiform bone called the first medial, second-intermediate and third lateral cuneiform.

The talus is the uppermost tarsal bone and is the only bone of the foot that articules with the fibula and tibia and it has no muscle attachment.

It is surrounded on one side by the medial maleolus of the tibia and on the other side by the lateral malleolus of the fibula. During walking, the talus initially bears the entire weight of the body about half the weight is then transmitted to the calcaneous and the remaining weight is transmitted to the other tarsal bone.

The calcaneous or heel bone is the largest and strongest tarsal bone.

Bones

1. Talus
2. Calcaneous
3. Cuboid
4. Navicular
5. Cuneiform (Medial)
6. Cuneiform (Intermediate)
7. Cuneiform (Lateral)

Metatarsus

The metatarsus consist of 5 metatarsus bone numbered 1 to 5th from the medial to lateral side.

Like the metacarps of the palm of the hand, each metatarsus consist of a proximal base, an intermediate cell and distal head.

The metatarsus articulate proximally with the 1st, 2nd and 3rd cuneiform bones and the cuboid.

The first metatarsal is thicker than the other because it bears more weight.

Phalanges

Phalanges of the foot resemble those of the hand both in number and arrangement. Each phalanges consist of a proximal base, intermediate shaft and distal head.

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The great toe (hallux) has two large heavy phalanges called proximal and distal phalanges.

The Joints

The articulation of any two or more bones is called *joint*. It is studied under orthology. There are many types of joints found but we study mainly 3 types of joints.

1. Cartilaginous or slightly mobile joints.
2. Synovial joints or freely mobile joints.
3. Fibrous or fixed joints.

Cartilaginous Joint

It is also called *amphiarthrosis*. It is slightly mobile joint and the joint surfaces are separated by some intervening substance and only slight movement is possible.

For example: Intervertebral disc and manubrium.

Fibrous Joint

These are also called *synarthrosis*. They are immovable or fixed joint and no movement is possible between the bones.
For example: Sutures and peg and socket joint, teeth.

Synovial Joint

These are also called *diarthrosis*. The ends of bone enters into the formation of the joint which are covered by hyaline cartilage ligaments. They are required to bind the bones together. There are 6 types of synovial joints.

a. Ball and socket joint
b. Hinge joint
c. Pivot joint
d. Saddle joint
e. Condyloid joint
f. Gliding or plane joint

Ball and Socket Joint

In this type of joint, one rounded extremity fits into a cavity of another bone.

For example: Hip joint and shoulder joint.

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Hinge Joint

In this type of joint, one rounded surface is received into another. Movement only possible in one plane.
For example: Elbow joint.

Pivot Joint

In this type of joint rotation only possible as in the movement of the head where the ring like atlas rotate around the process of the axis.
For example: In between head of radius and radial notch of ulna.

Condyloid Joint

This joint is just like the hinge joint but it can be adapted for two plane movements, lateral as well as backward and forward.
For example: Wrist joint.

Saddle Joint

It is also known as joint of reciprocal reception.
For example: The joint between the trapezium and the first metacarpal bone of thumb permits great freedom of movement and enables the thumb to be opposed to the finger.

Gliding or Plane Joint

In this type of joint, two flat surfaces of the bone glide on each other.
For example: The joint of carpus and tarsus.

Joints of Upper Limb

The joint which are found in the upper part of body are called *joints of upper limb*.

a. *Sternoclavicular joint*: It is the gliding joint. It is formed by the sternum and clavicle.
b. *Acromioclavicular joint*: This joint is formed by the articulation of the outer end of the clavicle, i.e. lateral end with the acromian process of scapula.
c. *Shoulder joint*: It is the synovial joint, i.e. ball and socket joint. It is formed by the articulating of the head of the humerus with the glenoid cavity of the scapula.
d. *Elbow joint*: It is also synovial joint, i.e. hinge. It is formed between trochlear surface of the lower end of the humerus and trochlear notch of ulna. These form the joint called *humeroulnar joint*.

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e. *Radioulnar joint*: It is a joint of radius and ulna. The movement of the radius on the ulna is free. There is interosseous membrane found in the middle of radioulnar joint. This membrane separates the muscles on the front from those on the back of the forearm.
f. *Wrist joint*: It is also called *radiocarpal joint*. It is condyloid between the lower end of the radius and the articular disc below the head of ulna.
g. *Carpal joint*: The articulation between carpal bones are flat and smooth. These flat surfaces move easily on each other forming gliding joint.
h. *Carpometacarpal joint*: This is also a gliding joint. It is formed between the distal end of carpal bone and superior end of 5 meta-carpal bone.
i. *Metacarpophalangeal joint*: It is the condyloid joint. It is the joint between 5 metacarpals and 14 phalanges.
j. *Interphalangeal joints*: It is hinge type of joint, this is formed by the head of proximal phalanges articulating on the surface of the distal phalanges.

Joints of Lower Limbs

1. *Hip joint*: It is the synovial joint, ball and socket variety/type. It is formed by the head of femur and the acetabulum of the innominate/hip bone.
2. *Knee joint*: It is the modified form of *hinge joint*. It is formed by the condyles of the femur articulating with the superior surface of the condyle of the tibia. Patella glides over the surface.
3. *Tibiofibular joint*: This joint is formed by the meeting of upper and lower extremities of two bones of legs.
4. *Ankle joint*: It is the hinge type joint formed between the lower extremities of the tibia and its medial malleolus and the lateral malleolus of the fibula.
5. *Tarsal joint*: The joint between the *tarsal bones are gliding* joints or tarsal joints. The bones are united by dorsal, plantar and interosseous ligaments.
6. *Tarsometatarsus*: It is formed by the meeting of tarsal and meta tarsal bones.
7. *Metatarsophalangeal and interphalangeal joints*: Found in between metatarsal bone and phalanges and in between phalanges.

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Movement

The movement takes place at the skeletal joint. There are mainly three types of movements:

1. *Gliding movement*: It is type of movement in which surface move on each other.
   For example, carpal and tarsal bone.
2. *Angular movement*: It is type of the movement in which two action takes place at a time.
   For example, 1. Flexion (outside): radius and carpal.
   2. Extension (inside): radius and carpal.
3. *Rotational movement*: In this movement, one bone moves around (or) within another bone.
   For example, Radius and ulnar.
4. *Circumduction*: It is the combination of rotation and angular movement. It occurs in a circle.
   For example, ARM.

The other types of movement are as follows:

a. *Adduction*: Innerside turn.
b. *Abduction*: Outerside turn.
c. *Pronation*: Lies palm downwards.
d. *Supination*: Lie the palm taking upward.

MCQs

1. Total bones of body are:
   a. 206 b. 205
   c. 203 d. 207
2. Sagittal suture found in:
   a. Between parietal and occipital bone
   b. Between frontal and two parietal bone
   c. Between two parietal bone
   d. Between parietal and temporal bone
3. Anterior fontanelle lies between angles of:
   a. Two parietal bone and frontal bone
   b. Two parietal and occipital bone
   c. Two temporal and occipital bone
   d. Frontal bone and two temporal bone
4. In face 'L' shaped bone is:
   a. Vomer b. Palatine
   c. Mandible d. Maxilla

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5. Mental foramen found in which bone:
   a. Vomer bone
   b. Palatine bone
   c. Mandible bone
   d. Zygomatic bone
6. Orbit is formed by:
   a. Five bone
   b. Seven bone
   c. Six bone
   d. Four bone
7. Xiphoid process found in:
   a. Sternum
   b. Scapula
   c. Ribs
   d. Clavicle
8. Floating ribs are:
   a. 1-7th pair of ribs
   b. 11th and 12th pair of ribs
   c. 8th, 9th and 10th ribs
   d. All ribs
9. Clavicle is also called as:
   a. Collar bone
   b. Neck bone
   c. Arm bone
   d. Shoulder bone
10. Deltoid tuberosity found in:
    a. Scapulla
    b. Clavicle
    c. Humerus
    d. Ulna
11. Medial side bone of the forearm is:
    a. Ulna
    b. Radius
    c. Humerus
    d. Clavicle

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Answers

1. a	2. c	3. a	4. b	5. c
6. b	7. a	8. b	9. a	10. c
11. a				

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