

# JOINTS

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The site or place where 2 or more bones of the skeleton are attached to each other is called a joint or place of articulation. A joint can be defined as follows: A joint or place of articulation is formed where 2 or more bones come in close contact in the body and are attached to each other by ligaments or cartilage.

## Types of Joints

Joints can be classified according to the degree and type of movement they allow. The following types of joints can be recognized:

### 1. Fibrous (or Immovable) Joints.

These joints are firmly held together by a thin layer of strong connective tissue. There is no movement between the bones such as the sutures of the skull and the teeth in their sockets.

### 2. Cartilagenous Joints.

Cartilagenous joints are joints where the articular surfaces of the bones forming the joints are attached to each other by means of white fibrocartilaginous discs and ligaments which allow only a limited degree of movement. Examples are the cartilaginous between the vertebrae, the cartilage in the symphysis which binds the pubic bones together at the front of the pelvic girdle and the cartilage in the joint between the sacrum and the hip bone.

### 3. Synovial Joints.

These are freely movable joints. Most of the joints in the body are of the synovial type. The following are the main characteristics of a synovial joint:

- The ends of the bones are covered with a layer of smooth hyaline cartilage, called articular cartilage in the joint regions. This reduces friction at the point.
- The joint is completely enclosed by a bag-like capsular ligament which holds the joint together and helps to contain the synovial fluid.
- The capsular ligament is lined with a synovial membrane. This membrane secretes synovial fluid into the synovial cavity and acts as a seal, waterproofing the joint. The synovial fluid lubricates the joint.
- In addition to the capsule, the bones are also attached and held together by strong, tough ligaments made of dense connective tissue. These ligaments prevent dislocation during normal movement.
- The articulating surfaces of adjacent bones are reciprocally shaped.

Synovial joints can be subdivided into the following groups according to the type of movement they carry out:

- **Ball-and-Socket Joints.**

These joints are formed where the rounded head of one bone fits into the hollow, cup-shaped socket of another bone such as the shoulder joint and the hip joint. Such joints allow freedom of movement in all directions.

- **Hinge Joints.**

These joints occur where the convex surface of one bone fits into the concave surface of another bone, so making movement possible in one plane only. Examples of these joints are the knee and the elbow joints. Hinge joints have ligaments mainly at the sides of the joints.

- **Gliding Joints.**

This type of joint allows for gliding movements between flat surfaces as the surfaces slide over one another. Only a limited amount of movement is allowed such as the joints between the carpal bones, the joints between the tarsal bones and those between the articular processes (zygapophyses) of successive vertebrae.

- **Pivot Joints.**

These joints occur where:

- a bony ring rotates round the pivot (axis) of another bone such as the ring-like atlas rotating around the odontoid process of the axis, allowing the head to turn from side to side.
- the end of one bone rotates round the axis of another bone such as the end of the radius rotating around the ulna as the palm of the hand is turned inwards or outwards.

- **Compound Joints.**

These joints are made up of several joints between a number of different bones. The bones articulate with one another in different ways, allowing for a variety of movements such as the movement of the skull on the vertebral column.

### **Types of joints movements:**

- **Flexion:** Bending parts at a joint so that the angle between them decreases and the parts come closer together (bending the lower limb at the knee).
- **Extension:** Straightening parts at a joint so that the angle between them increases and the parts move farther apart (straightening the lower limb at the knee).
- **Hyperextension:** Excess extension of the parts at a joint, beyond the anatomical position (bending the head back beyond the upright position).
- **Dorsiflexion:** Bending the foot at the ankle toward the shin (bending the foot upward).
- **Plantar flexion:** Bending the foot at the ankle toward the sole (bending the foot downward).
- **Abduction:** Moving a part away from the midline (lifting the upper limb horizontally to form a right angle with the side of the body).
- **Adduction:** Moving a part toward the midline (returning the upper limb from the horizontal position to the side of the body).
- **Rotation:** Moving a part around an axis (twisting the head from side to side). Medial rotation involves movement toward the midline, whereas lateral rotation involves movement in the opposite direction.
- **Circumduction:** Moving a part so that its end follows a circular path (moving the finger in a circular motion without moving the hand).
- **Supination:** Turning the hand so the palm is upward or facing anteriorly (in anatomical position).

- **Pronation:** Turning the hand so the palm is downward or facing posteriorly (in anatomical position).

## **Movements of Joints**

### **Flexion and extension**

Flexion and extension describe movements that affect the angle between two parts of the body.

**Flexion** describes a bending movement that decreases the angle between a segment and its proximal segment. For example, bending the elbow, or clenching a hand into a fist, are examples of flexion.

**Extension** is the opposite of flexion, describing a straightening movement that increases the angle between body parts. For example, when standing up, the knees are extended. Extension of the hip or shoulder moves the arm or leg backward.

### **Abduction and adduction**

Abduction and adduction refer to motions that move a structure away from or towards the centre of the body.

**Abduction** refers to a motion that pulls a structure or part away from the midline of the body. For example, raising the arms up, such as when tightrope-walking, is an example of abduction at the shoulder. When the legs are splayed at the hip, such as when doing a star jump or doing a split, the legs are abducted at the hip.

**Adduction** refers to a motion that pulls a structure or part toward the midline of the body, or towards the midline of a limb. Dropping the arms to the sides, or bringing the knees together, are examples of adduction.

### **Elevation and depression**

The terms elevation and depression refer to movement above and below the horizontal. **Elevation** refers to movement in a superior direction. For example, shrugging is an example of elevation of the scapula.

**Depression** refers to movement in an inferior direction, the opposite of elevation.

### **Rotation**

Rotation of body parts is referred to as internal or external, referring to rotation towards or away from the center of the body.

**Internal rotation** (or medial rotation) refers to rotation towards the axis of the body.

**External rotation** (or lateral rotation) refers to rotation away from the center of the body.