

JOINTS

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General

We have already learnt that the human skeleton consists of more than 200 bones. The individual bones are attached in such a way that a large variety of co-ordinated movements are made possible in different parts of the body. These movements are made possible by **skeletal muscles**, the fact that the bones act as **levers**, **cartilage** which reduces friction and **ligaments** which prevent dislocation and the presence of **movable joints**. 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:

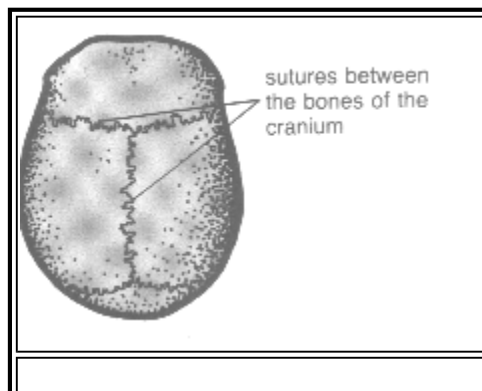
A joint or place of articulation is formed where 2 or more bones come in close contact in the body and are attached to each other by ligaments or cartilage.

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:

Fibrous (or Immovable) Joints.

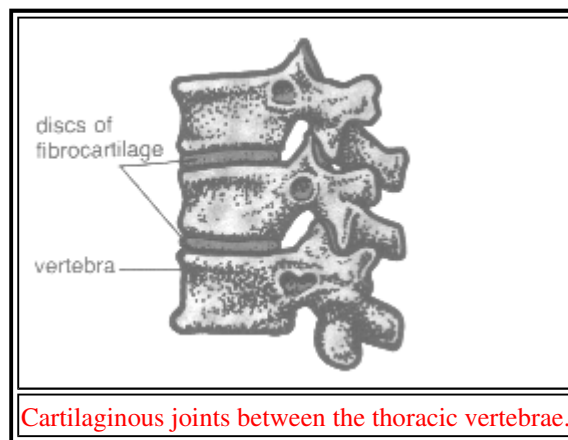
These joints are firmly held together by a **thin layer of strong connective tissue**. There is **no movement** between the bones such as the **sutures of the skull** and the **teeth in their sockets**.



Fibrous joints (sutures in the skull).

Cartilagenous Joints.

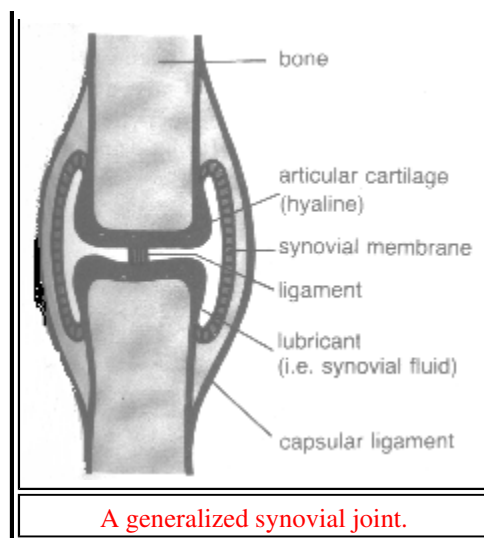
Cartilagenous joints are joints where the articular surfaces of the bones forming the joints are attached to each other by means of **white fibrocartilaginous discs** and **ligaments** which allow only a **limited degree of movement**. Examples are the **cartilagenous between the vertebrae**, the **cartilage 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**.



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:

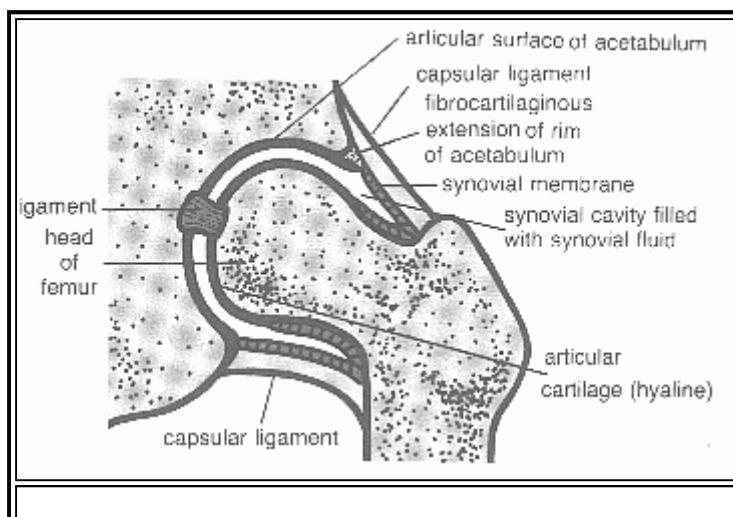
- The ends of the bones are covered with a **layer of smooth hyaline cartilage**, called **articular cartilage** in the joint regions. This **reduces friction** at the point.
- The joint is completely enclosed by a **bag-like capsular ligament** which **holds the joint together** and helps to contain 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.**

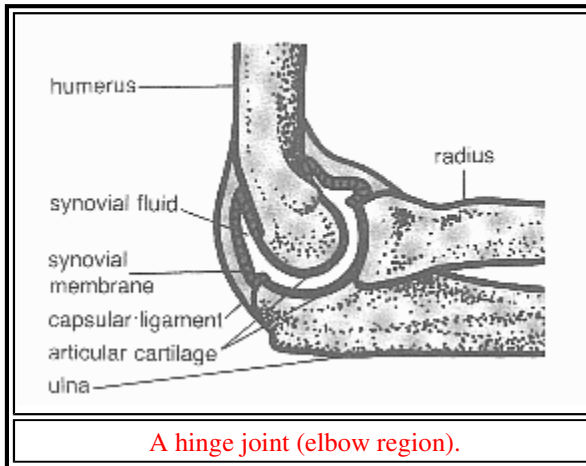
These joints are formed where the **rounded head** of one bone fits into the **hollow, cup-shaped socket** of another bone such as the **shoulder joint** and the **hip joint**. Such joints allow **freedom of movement in all directions**.



The Hip Joint - ball-and-socket joint.

- **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**.

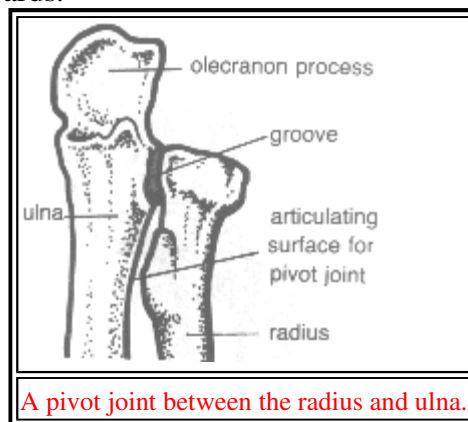


Gliding joints in the wrist region.

• 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 set of joints which operate the **movement of the skull** on the vertebral column. The **condyles** at the base of the skull fit into the facets of the **atlas**, allowing for the **nodding movement** of the head. While one moves one's head, the atlas is able to **rotate** round the **odontoid process of the axis**, allowing the head to turn from side to side. There are also other articulating surfaces, where the atlas and axis meet. All these joints together make a compound joint with its many **possible movements** in the neck region.



