FOREARM, WRIST, HAND & DIGITS:

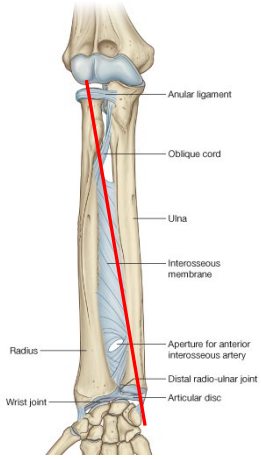
- With the arms and hands in the anatomical position:
  - Radius is on the lateral side – the thumb side
  - Ulna is on the medial side

- Proximal → distal:
  - Radius thickens
  - Ulna narrows

- **Styloid processes**: boney prominces in the wrist which mark the ends of the ulnar and radius.
- **Radial syloid** (on thumb side) is <u>lower</u> than the **ulnar styloid**.

- Distal ulna is the **ulna head**
- **Ulna head** articulates with the **ulna notch** on the <u>radius</u> at the **<u>distal radioulnar notch</u>**.
  - **Synovial**
  - Lax capsule
  - Ends of the 2 bones are united by the **triangular cartilage**
- **Triangular cartilage:**
  - Broad at base of radius
  - Narrows to a point on the ulnar styloid.

- The proximal articular surface of the wrist joint is composed of the:
  - End of the radius
  - Triangular cartilage



Supination and pronation:

- Radius and ulnar can twist and overlap one another in their long axis
- **Pronation**: twisting bones, palm up → palm down
- **Supination**: untwisting bones, palm down → palm up.

- **Pronated**: bones crossed (thumbs medial)
  - Radial tuberosity not visible on radiograph
- **Supinated**: bones uncrossed (anatomical position – thumbs lateral)
  - Radial tuberoisty is easy to identify on radiograph.

- <u>Ulna remains stationary in these movements.</u>

- **Distal radius** moves in **cone motion** over stationary ulna:
  - <u>Proximal radioulnar joint</u>: **radius head rotates** – with anular ligament ensuring the bones stay together.
  - <u>Distal radioulnar joint</u>: **distal radius swings over stationary lower ulna**.
- Apex of cone is at the radius head, base is drawn out by radius styloid swinging over ulna styloid process.

- <u>Axis</u> is therefore from **middle of radius head** to **ulnar styloid process**.

INTEROSSEOUS MEMBRANE:

- Fibrous membrane between the shafts of ulna and radius, binding them together.
- Interosseous membrane passes **obliquely downwards** from **radius → ulna**
- Interosseous membrane lax during pronation and supination – doesn't restrict movement.
- Main function is as a platform from which forearm muscles can originate.

BONES OF THE WRIST & HAND:

- Wrist bones = **carpal bones**
- 2 rows of carpal bones.
- **Proximal row:**
    - **Scaphoid** (thumb side)
    - **Lunate**
    - **Triquetrum**
- Linked by ligaments to form a smooth arch.

WRIST JOINT:

- Articulation between proximal row of carpals and lower end of radius
- **Synovial**
- **Condyloid** joint – all movement possible except rotation in long axis
- Circumduction is combination of flexion, extension, abduction and adduction – all of which are possible.

Proximal articular surface:

- Concave lower end of radius
- Triangular articular cartilage extending medially to styloid process of ulna.

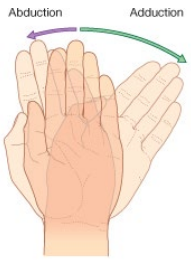
- Δ ulnar bone takes no part in formation of wrist joint.
- NOTE the lower end of the radius is set obliquely, sloping palm downwards.

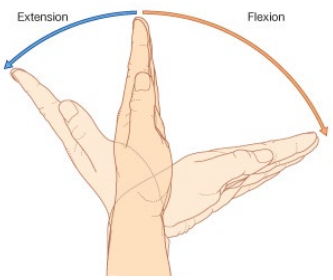
Distal articular surface:

- Scaphoid
- Lunate
- Triquetrum

- Triquetrum only contacts triangular cartilage when wrist is adducted.

- The wrist joint is surrounded by a **fibrous capsule**
- Thickened on either side by **radial and ulnar collaeral ligaments**.
- **Synovial membrane** lines the inside of the capsule.





*MOVEMENTS OF THE WRIST (*in anatomical position*):*

- Condyloid synovial joint.
- Adduction: triquetrium comes into contacts triangular articular cartilage.
- Abduction: not as free as adduction, as scaphoid comes into contact with radial styloid.

Distal row of carpal bones:

- **4** small bones:
    - Trapezium (next to thumb) – cube
    - Trapezoid – cube
    - Capitate – larger, enxtending into concavity of proximal row
    - Hamate – boney hook on palmar surface

- Proximal and distal row of carpal bones articulate with one another as a complex synovial joint – the **midcarpal joint:**
    - Fibrous capsule surrounding joint
    - Ligaments join each bone to its neighbours.
    - Movement between the individual carpal bones and between the 2 rows of carpal bones is a gliding motion.

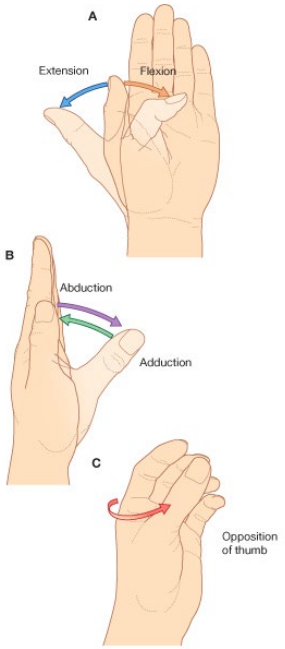
Metacarpals:

- 5 bones
- Make up framework of palm of hand
- Articulate with the distal row of carpals at synovial **carpometacarpal joints**

Thumb metacarpal:

- Articulates with trapezium
- Has own capsule and synovial membrane
- Allows thumb such mobility.
- Thumb metacarpal sits in a different orientation to the other metacarpals – it doesn't face directly forwards.
- Means the plane of movement of the thumb is different.

- Learn the pictures opposite for thumb motion.
- Circumduction = combination of flexion, extension, adduction & abduction.
- **Opposition of thumb** is a rotation of thumb which allows it to touch tip of a finger.



- **The other carpometacarpal joints are much less mobile**: finger carpometacarpal joints share the same cavity with the midcarpal joint.

- The little finger metacarpal can be flexed and opposed to increase cupping of palm.

Articulations:

Metacarpal	**Carpal bone (distal row)**
Thumb (I)	Trapezium
Index finger (II)	Trapezoid
Middle finger (III)	Capitate
Ring & little finger (IV & V)	Hamate

- The bases of the finger metacarpals are united by strong ligaments.

PHALANGES:
- Each finger has 3 phalanges
  - Proximal phalanx
  - Middle phalanx
  - Distal phalanx
- Thumb has 2 phalanges
  - Proximal phalanx
  - Distal phalanx

- **Metacarpophalangeal joints (MCP):** synovial joint between proximal phalanx and metacarpal

- **Interphalangeal joints:** between phalanges in a finger / thumb
  - **Proximal interphalangeal joint (PIP)**: between proximal and middle phalanges
  - **Distal interphalangeal joint (DIP)**: between middle and distal phalanges.

- The capsules of these joints are strengthened by:
  - **Collateral ligaments** on either side
  - **Palmar ligament** on palm side
- Small **sesamoid bones** can develop in the palmar ligaments, esp. MCP joint of thumb.

MOVEMENTS OF MCP JOINTS:
- **Condyloid:**
  - Flexion
  - Extension
  - Adduction
  - Abduction
  - Circumduction
  - (NOT rotation)
- With finger MCP joints:
  - Adduction = movement towards midline of hand
  - Abduction = movement away from the midline of the hand

MOVEMENTS OF IP JOINTS:
- **Hinge**
- Only flexion and extension