Joints

Level 2 Anatomy and physiology
for exercise and fitness instructors

Learning outcomes

By the end of this session you will be able to:

- Describe the classification of joints
- Describe the structure of synovial joints
- Describe the types of synovial joints and their range of motion
- Describe joint movement potential and joint actions

Joint classifications

A joint is where a bone meets another bone

There are 3 classifications of joints:

- Immovable (fused or fibrous) e.g. the skull
- Slightly moveable (cartilaginous) e.g. the thoracic vertebrae
- Freely movable (synovial) e.g. the shoulder

Synovial joint structure

A synovial joint is surrounded by a sleeve-like capsule (joint capsule) that encloses the joint cavity and is attached to the outside of the bone (periosteum)

The inner layer of the joint capsule is formed by a synovial membrane, which secretes synovial fluid. This fluid helps to lubricate the joint and provides nourishment for the articular cartilage on the ends of the bones

Synovial joint structure

Joint capsule

- Sleeve-like capsule that encloses the joint cavity

Synovial membrane

- Secretes synovial fluid into the joint

Synovial fluid

- Lubricates the joint

Synovial joint structure

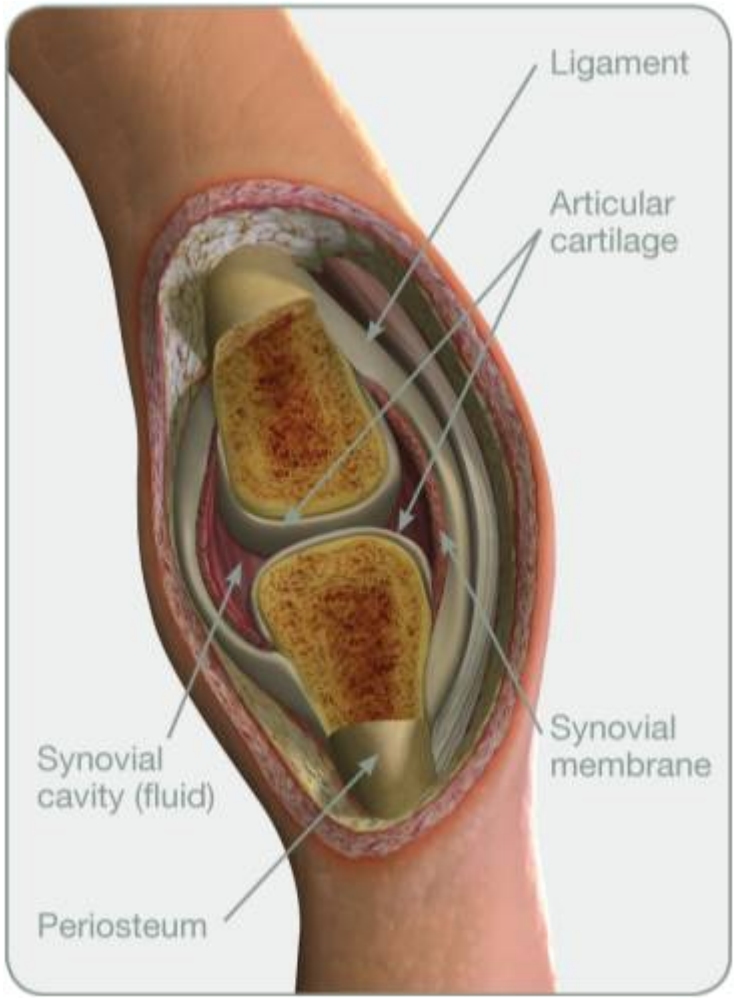
Articular/hyaline cartilage

- Lines the ends of bone for smooth movement
- Reduces friction between bones
- Shock absorption for the joint
- Tough, smooth tissue

Ligament - links bone to bone and adds stability

Tendon - attaches muscle to bone

Synovial joint structure



Types of synovial joint

- Gliding joint
- Hinge joint
- Pivot joint
- Ball and socket joint
- Saddle joint
- Condyloid joint

Types of synovial joint

Gliding joint – where movement is over relatively flat surfaces e.g. the carpals, tarsals and the AC joint in the shoulder

Hinge joint – where movement is possible in one plane only e.g. the elbow or knee

Pivot joint – where movement is purely rotational e.g. the articulation of the radius and the ulna allow the body to pronate and supinate the forearm as the bones rotate around each other

Types of synovial joint

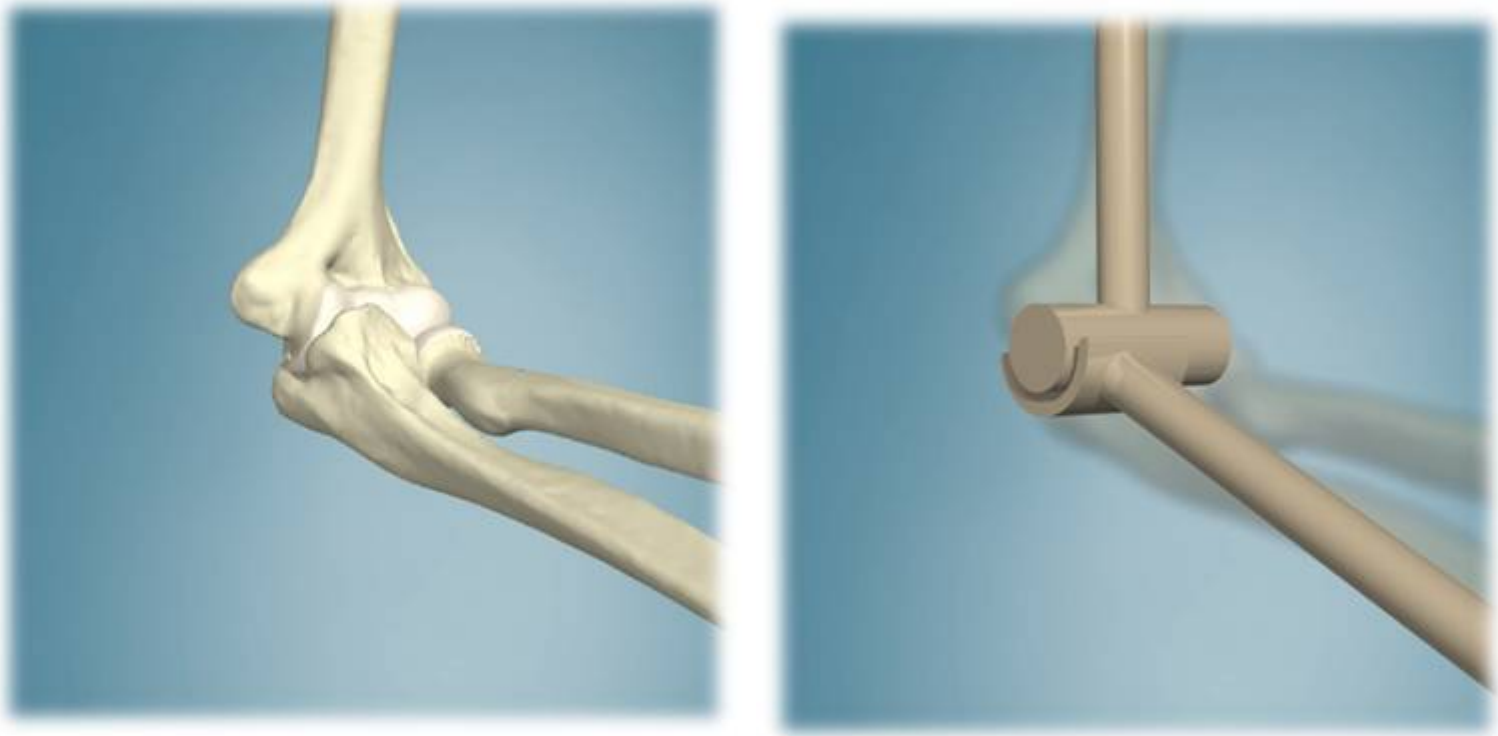
Condyloid joint – where movement occurs in two planes e.g. in the wrist between the ulna, radius and carpals

Saddle joint – similar to a condyloid joint but the surfaces are concave and convex e.g. at the base of the thumb

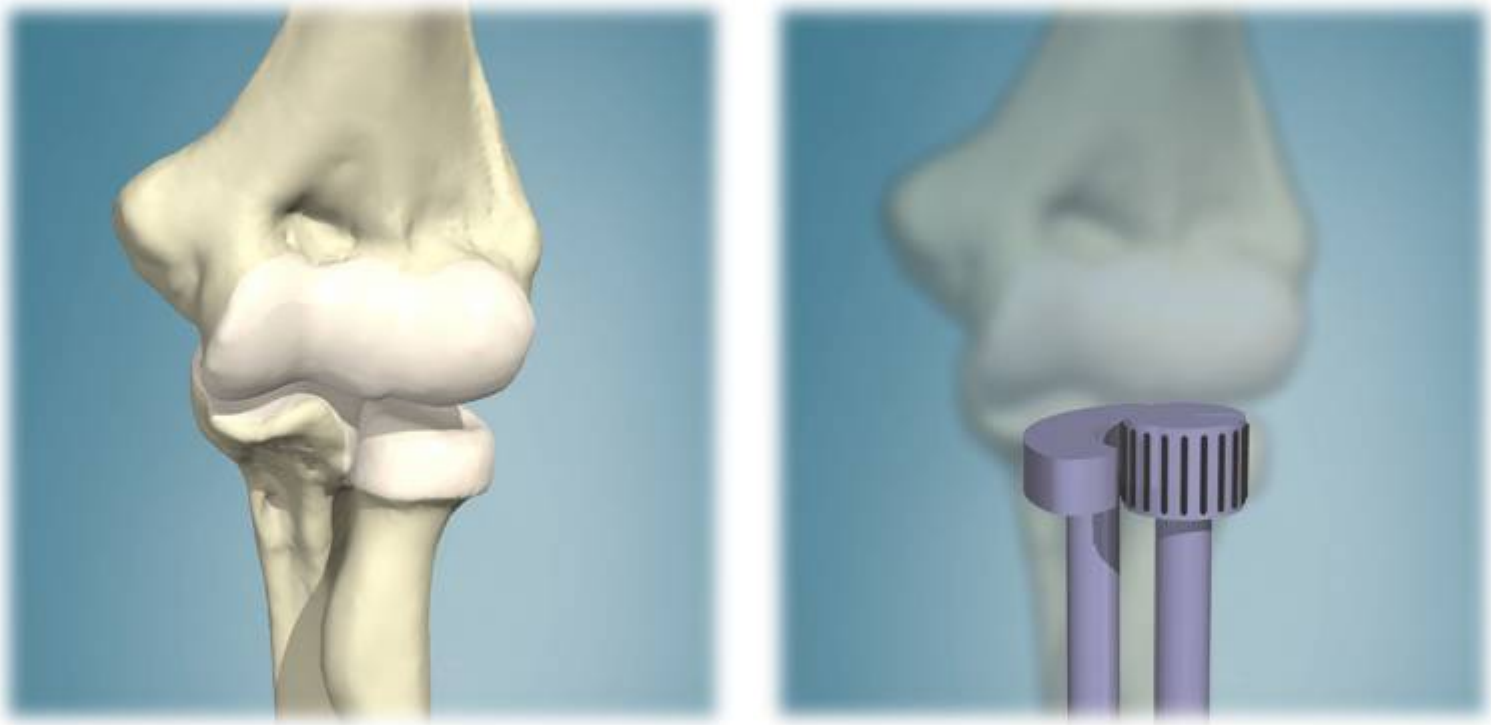
Ball and socket joint – where movement occurs in three planes e.g. in the shoulder and hip joints

Gliding joint

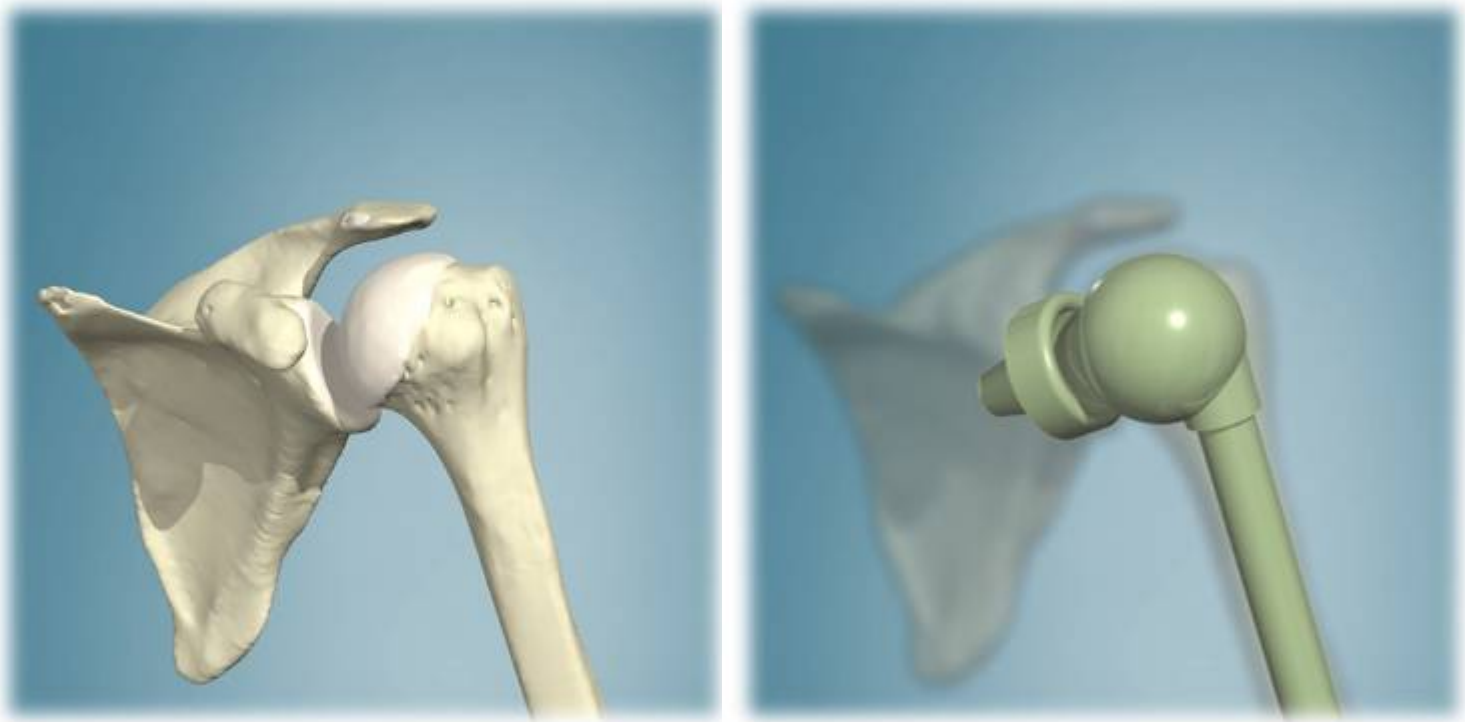
Hinge joint



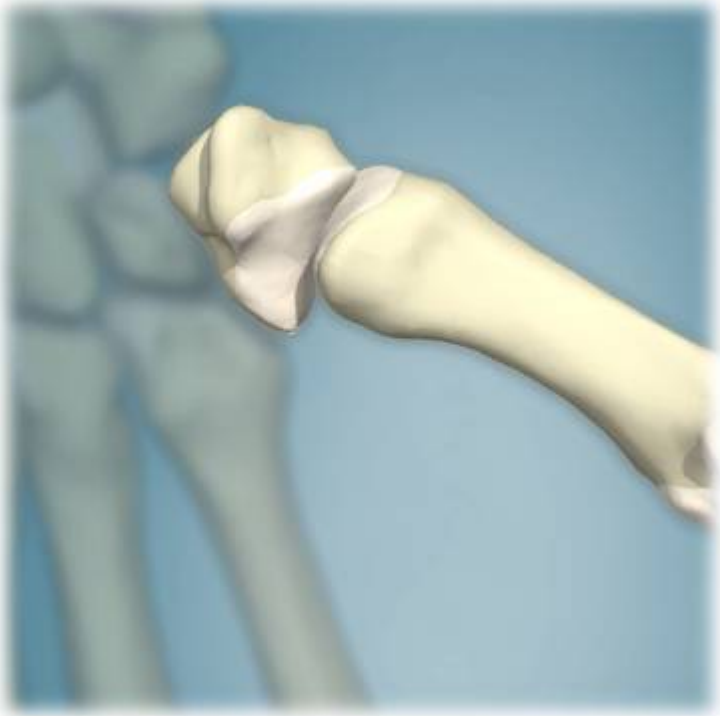
Pivot joint

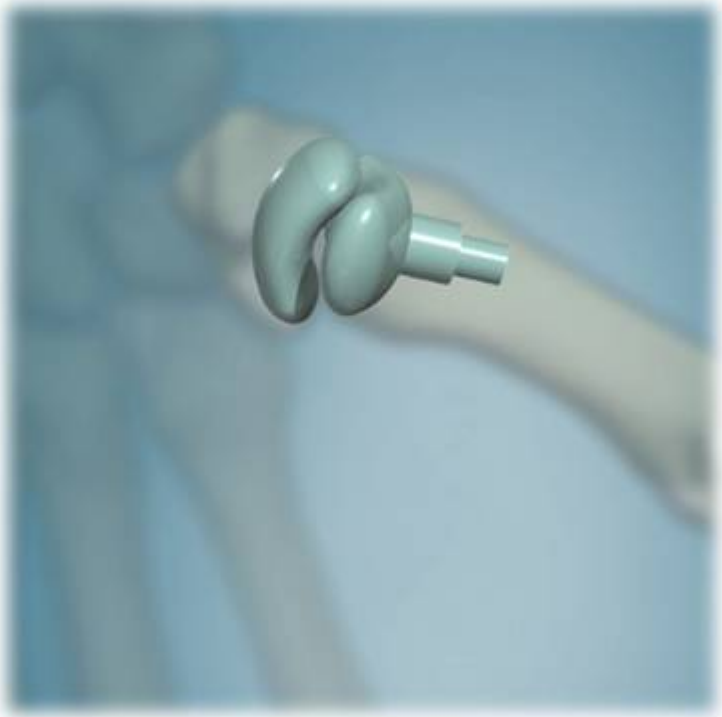


Ball and socket joint

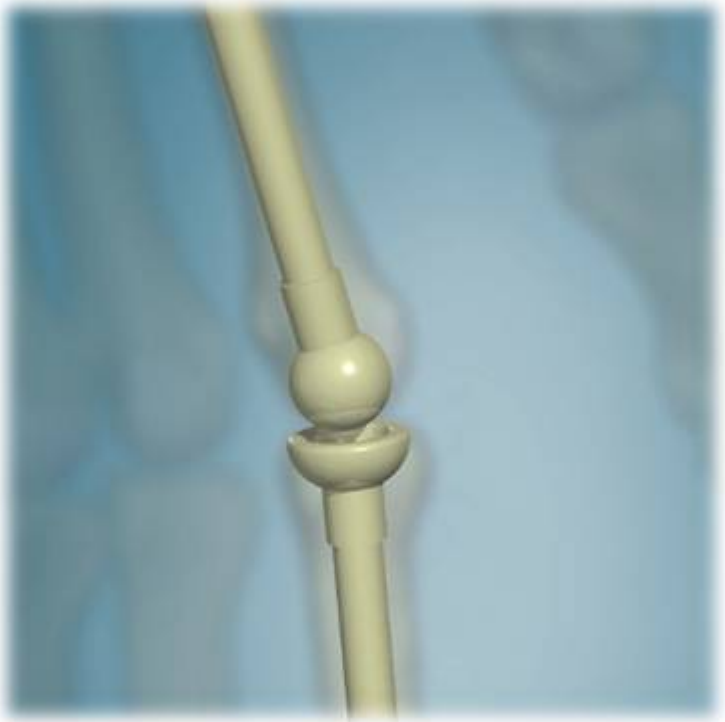


Saddle joint





Condyloid joint



Anatomical position

When analysing joint actions the starting point is the anatomical position

Flexion and extension

Flexion

To reduce the angle at the joint or to bend a limb

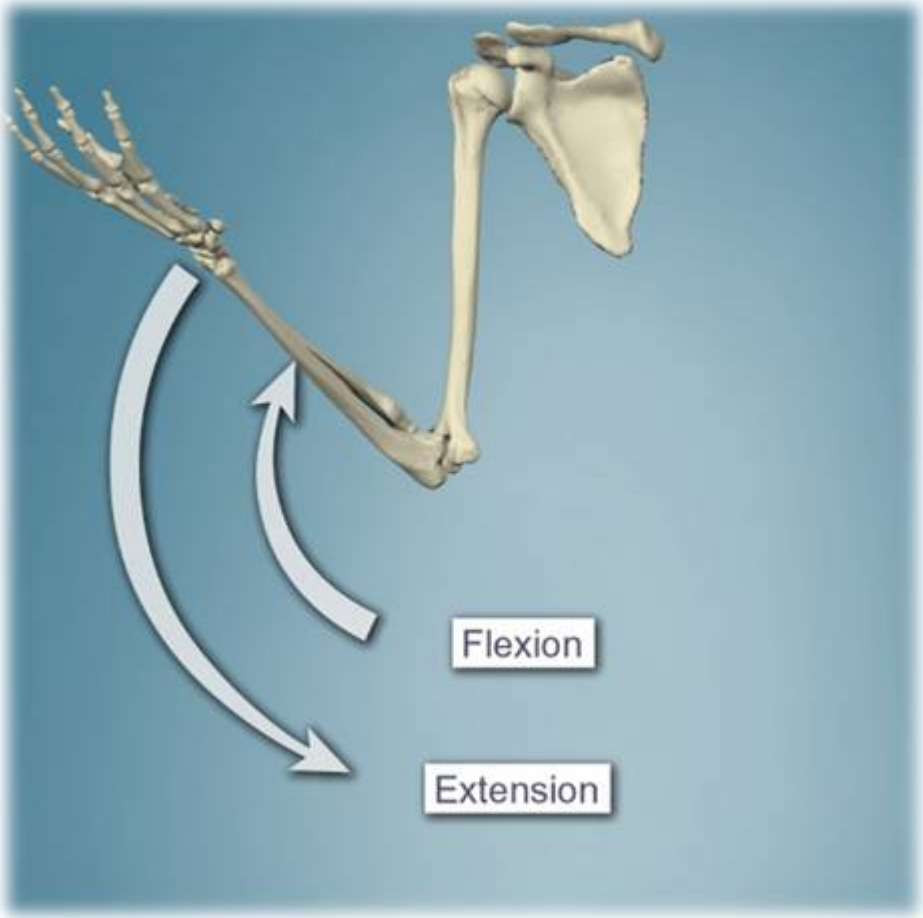
e.g. bending the arm at the elbow

Extension

To return from flexion, increase the angle at the joint or to straighten the limb

e.g. extending the arm or straightening the leg

Flexion and extension



Abduction and adduction

Abduction

To take away from the midline of the body

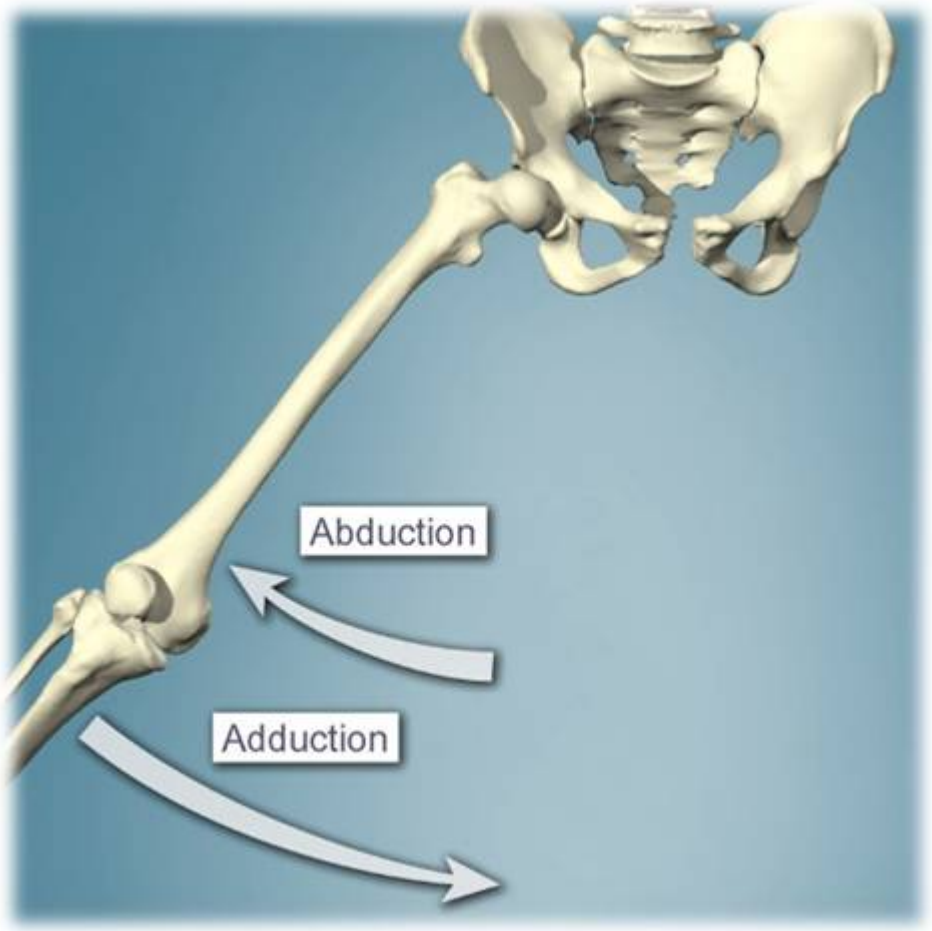
e.g. raising the arm or leg out to the side

Adduction

To bring towards or across the midline of the body

e.g. drawing the leg across the body

Abduction and adduction

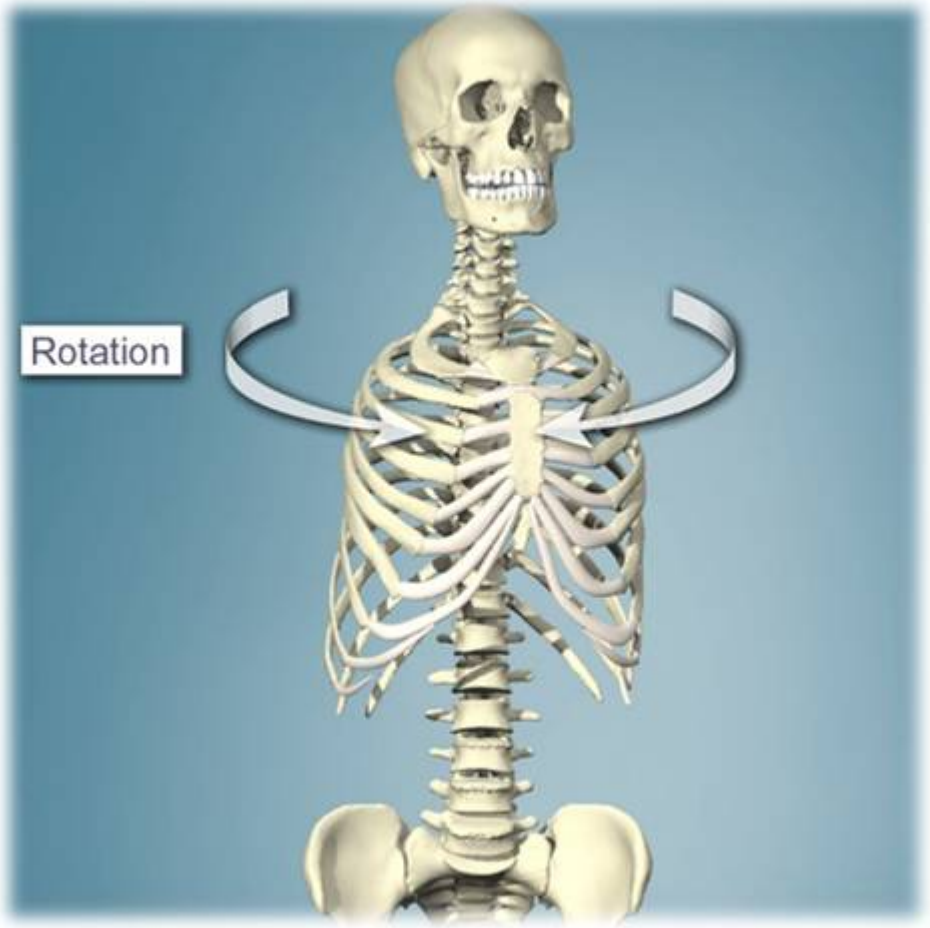


Rotation

A rotary movement inward or outward

e.g. turning the hip in and out, or rotation of the thoracic vertebrae

Rotation

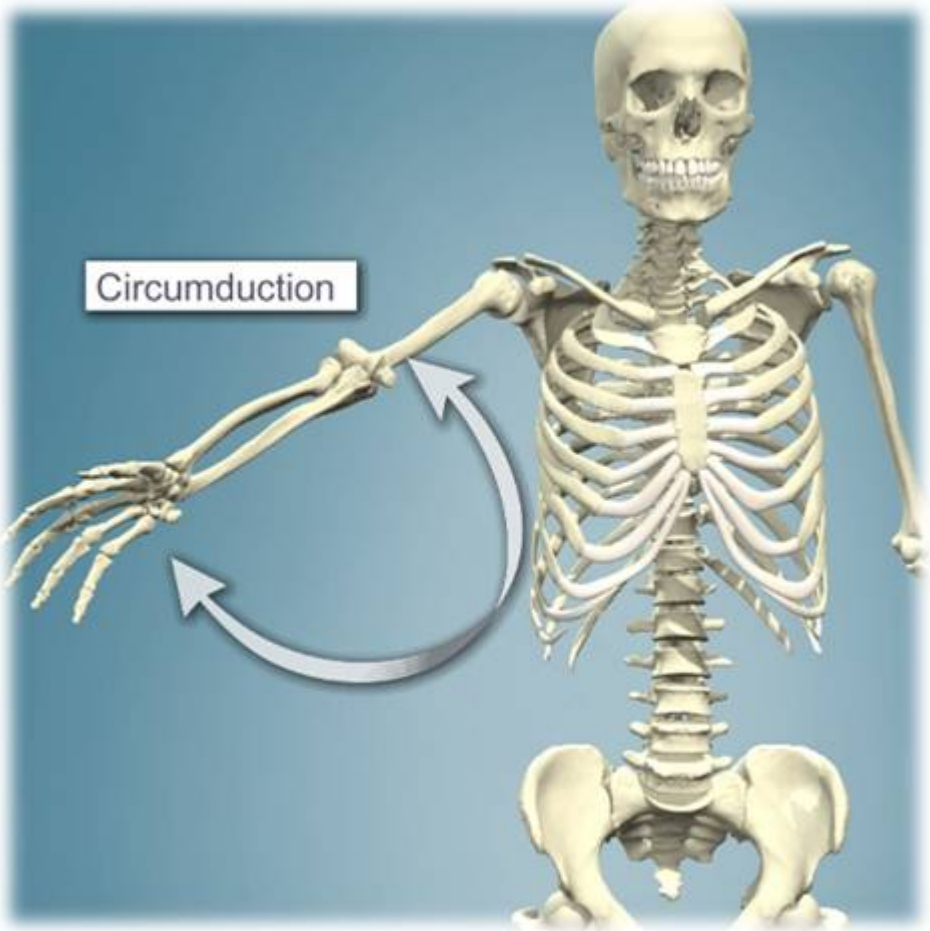


Circumduction

Circle movement of the body

e.g. with the arm

Circumduction



Horizontal flexion

A forward movement in a horizontal plane

e.g. drawing the arm across the body (pec dec exercise)

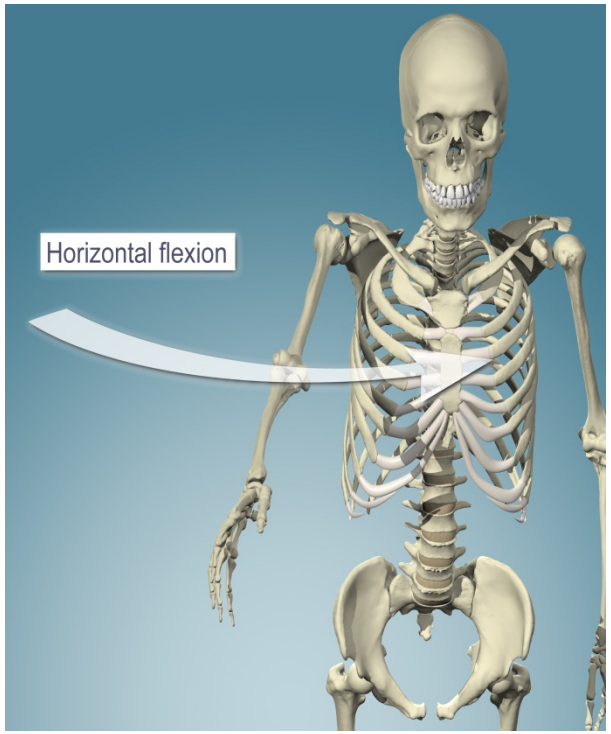
Horizontal extension

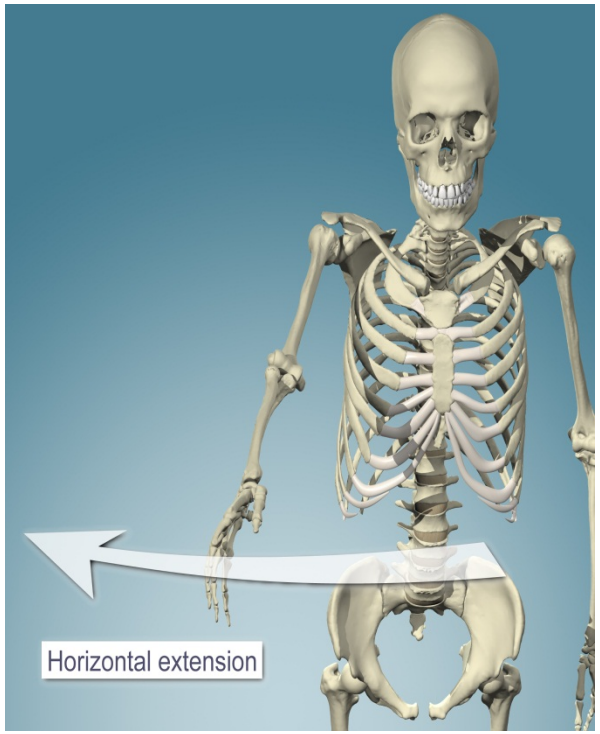
A backward movement in a horizontal plane

e.g. swinging the arm away from the body

NB: Also known as horizontal shoulder adduction (flexion) and abduction (extension)

Horizontal flexion and extension





Elevation and depression

Elevation

To lift or raise a joint

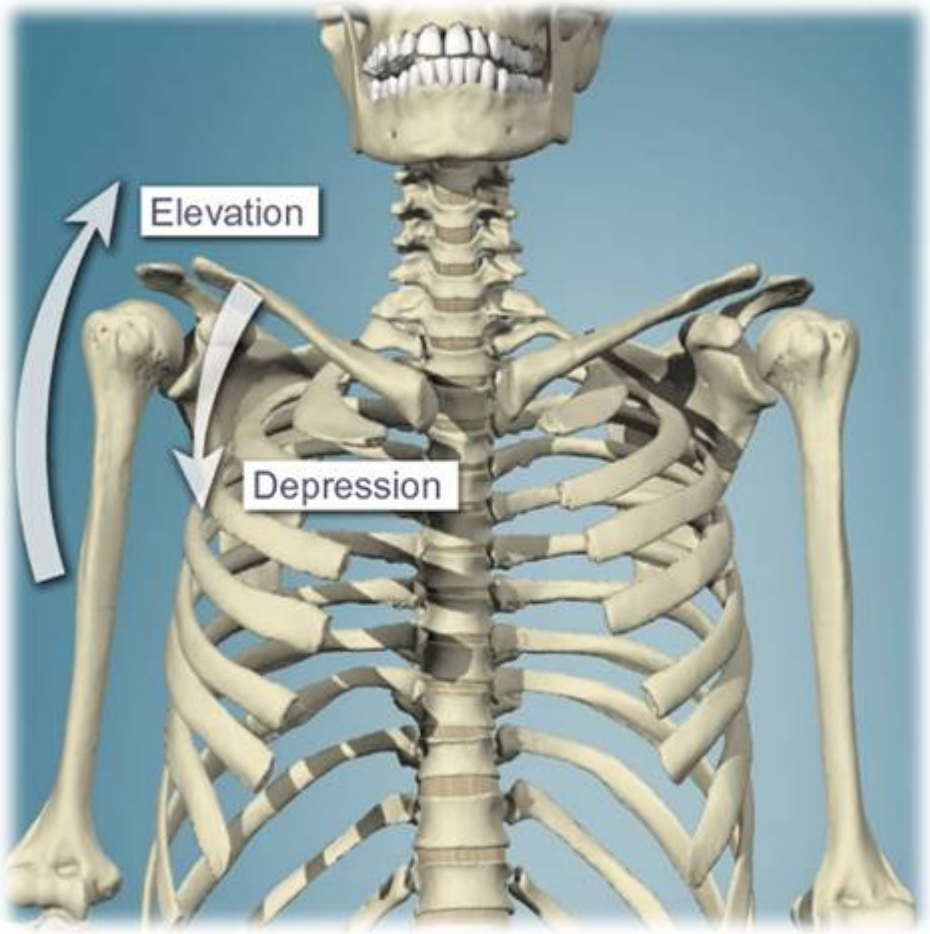
e.g. lifting the shoulders

Depression

To drop or lower a joint

e.g. dropping down the shoulders

Elevation and depression



Lateral flexion and extension

Lateral flexion

To bend sideways with the trunk or neck

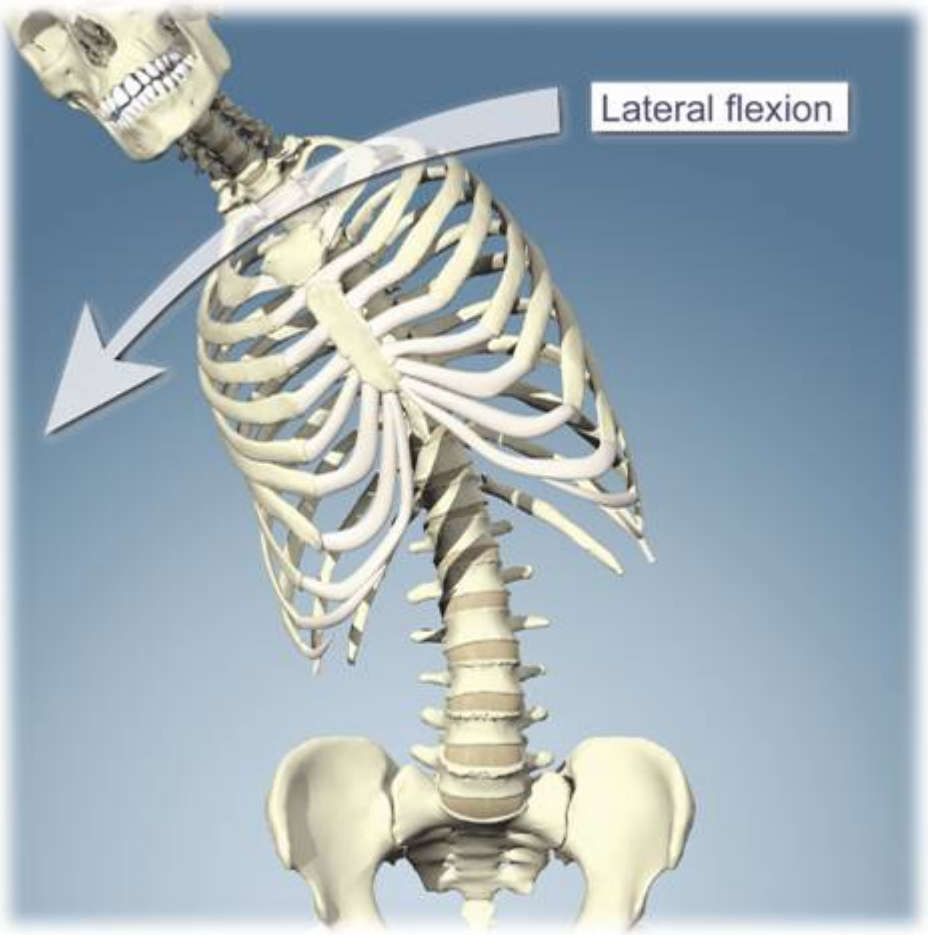
e.g. standing side bends or tilting the head

Lateral extension

To straighten from a sideways bending movement

e.g. returning to an upright anatomical position after performing a side bend

Lateral flexion and extension



Pronation and supination

Pronation

e.g. to turn the palm down

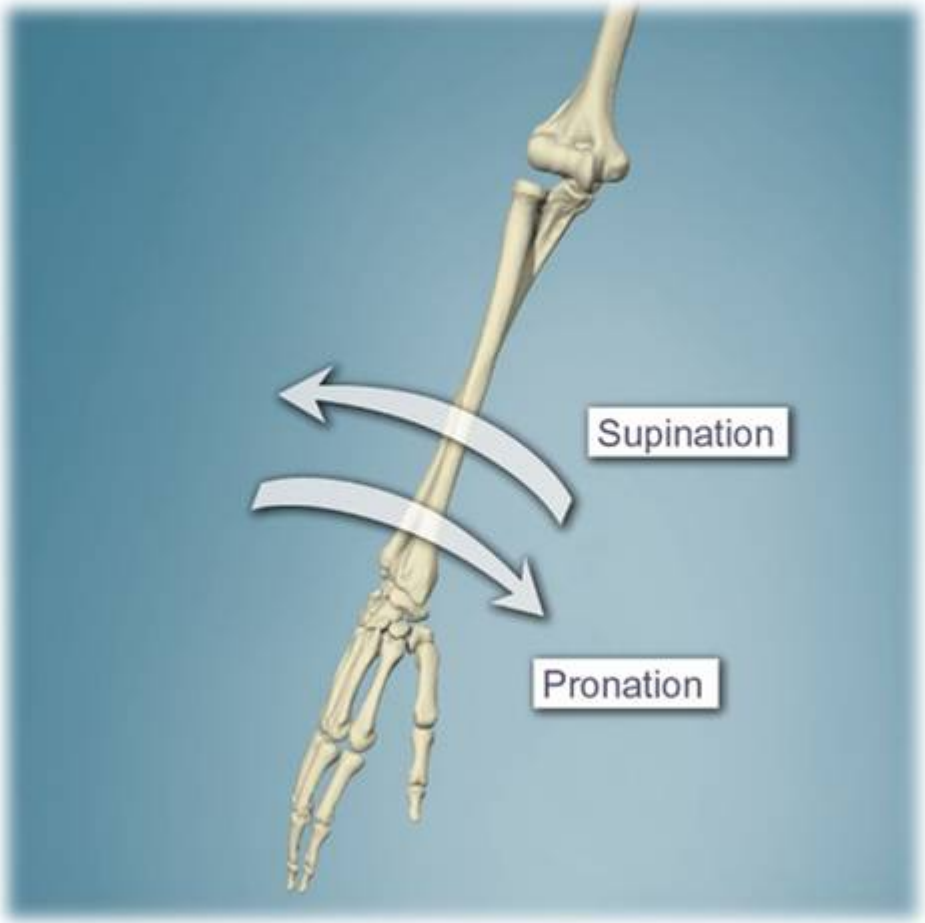
Supination

e.g. to turn the palm up

Prone – face down

Supine - face up

Pronation and supination

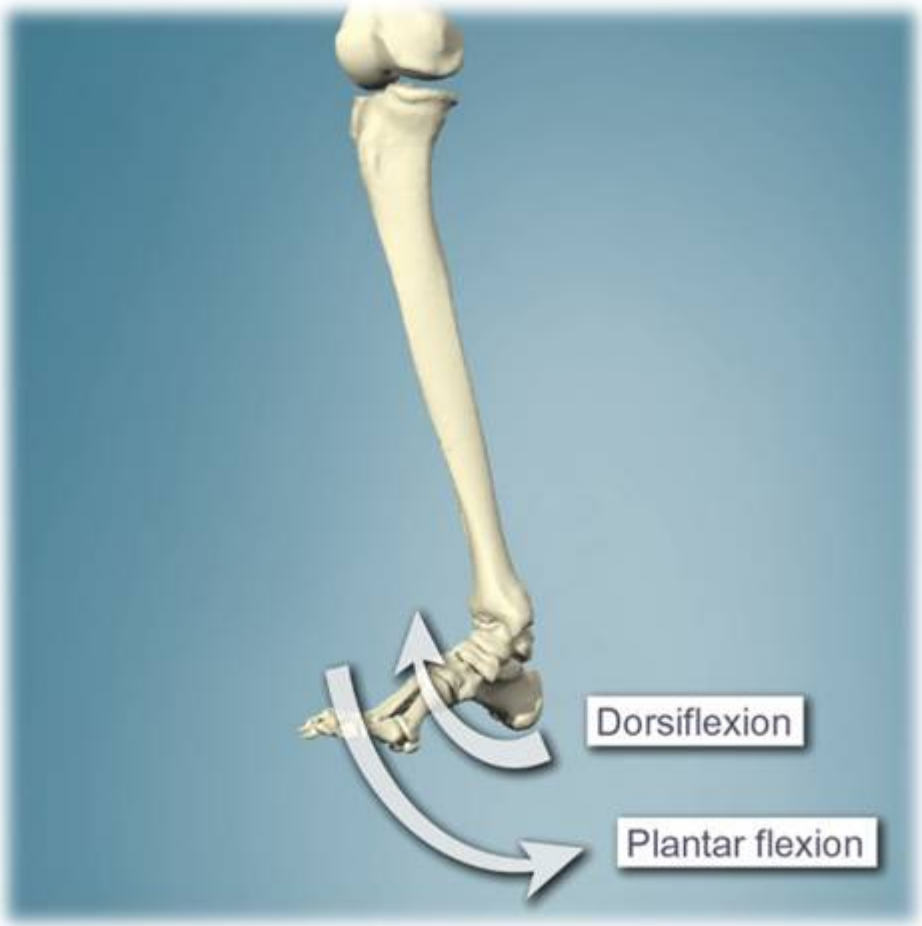


Plantar flexion and dorsi flexion

Plantar flexion
Pointing the toes away from the body
e.g. upward movement of a standing calf raise

Dorsi flexion
To pull the toes towards the body
e.g. digging the heel in the ground

Plantar flexion and dorsi flexion



Inversion and eversion

These movements occur in the foot (specifically the subtalar joint)

Inversion is where the sole turns to face inwards

Eversion is where the sole turns to face outwards.

Inversion and eversion