

The Skeletal System

AusDBF - eLearning Modules

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The Skeletal System

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– The Skeletal System.

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videos
and an online survey questionnaire.

It is important that you read all the text and
instructions before you proceed to the next
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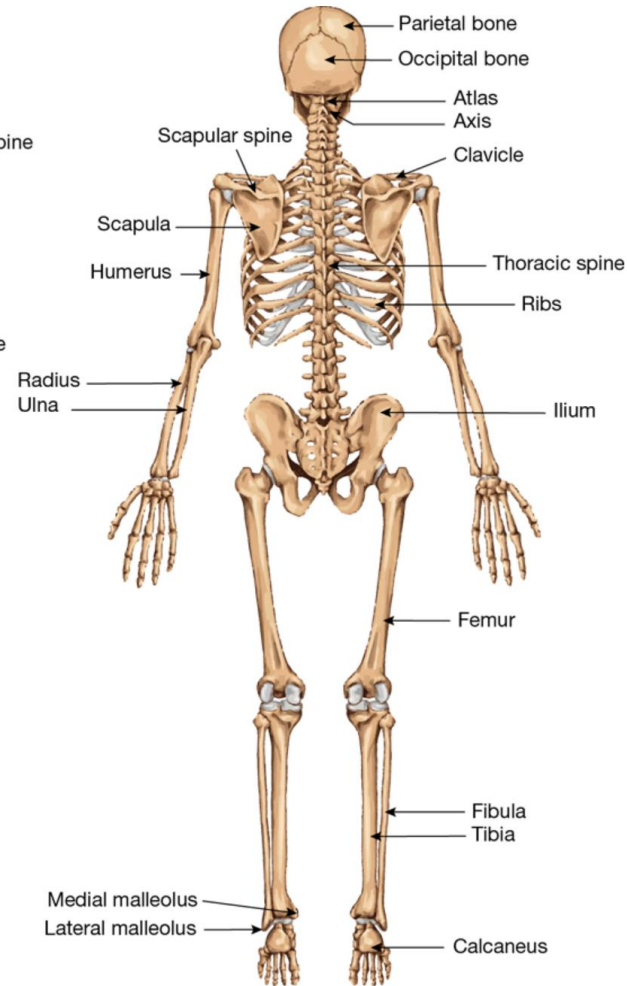
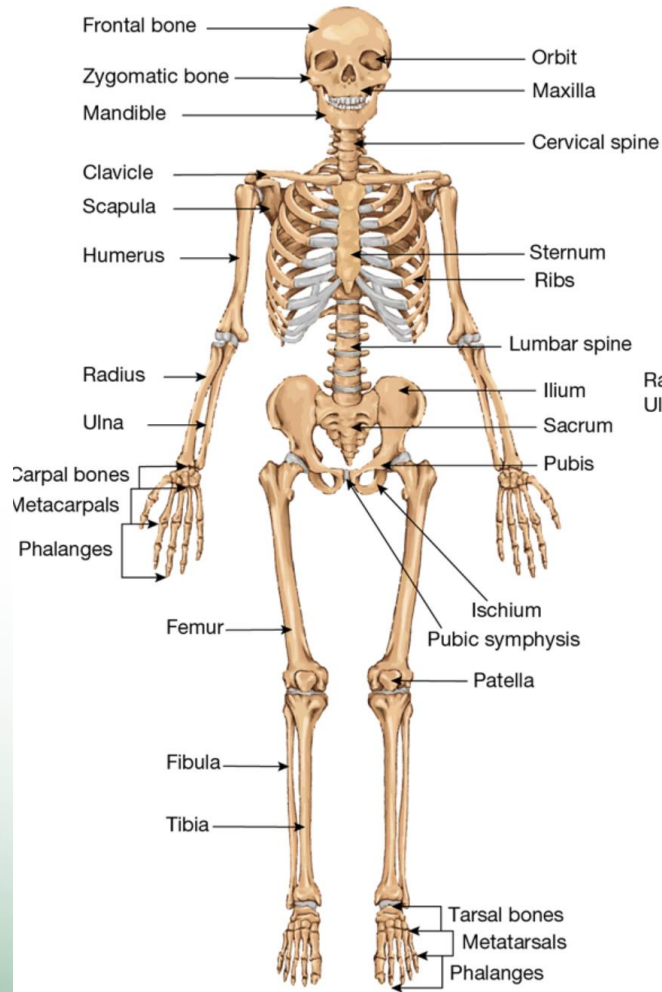
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The Skeleton

Anterior
view



Posterior
view

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FUNCTIONS OF THE SKELETAL SYSTEM

Bones and bone tissue performs several critical functions

- SUPPORT assists in the support of internal organs and tissues
- SHAPE provides scaffolding and gives the body it's shape
- PROTECTION protects internal organs from injury
eg. the ribs protect the heart and lungs,
the cranium protects the brain
- MOVEMENT enables the attachment of muscles to facilitate movement
bones act as levers, while joints act a fulcrums (pivot points)
- STORE stores minerals used in the body , eg calcium and phosphorus
- SUPPLY serves as a site for fat storage eg. bone marrow, where blood
cells are produced

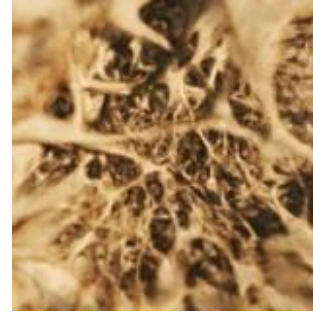
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The Skeletal System – Classification of Bones

The human body is made up of 206 bones.

Bones are classified according to shape.
Their shape and their functions are related.



Compact bone tissue found in long bones

LONG BONES

- are strong, cylinder shaped bones that are longer than wide
- functions as a lever
- made up of compact bone tissue
- slightly curved to give strength
eg. femur, humerus, metacarpals



Femur
- a long bone

SHORT BONES

- cube shaped bone that is approximately equal in width, length and thickness
- provides limited movement
eg. carpals, tarsals

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The Skeletal System – the Classification of Bones

FLAT BONES

- thin and flat curved bones
- Made of spongy bone between layers of compact bone
- protects internal organs & serves as a point of attachment for muscles
eg. sternum, ribs, scapula, cranium

IRREGULAR BONES

- have a complex shape
- protects internal organs from compressive forces
eg. vertebrae, facial bones

SESAMOID BONES

- small round bones embedded in a tendon
- protects the tendon from compressive forces
eg. patella, bones of the foot

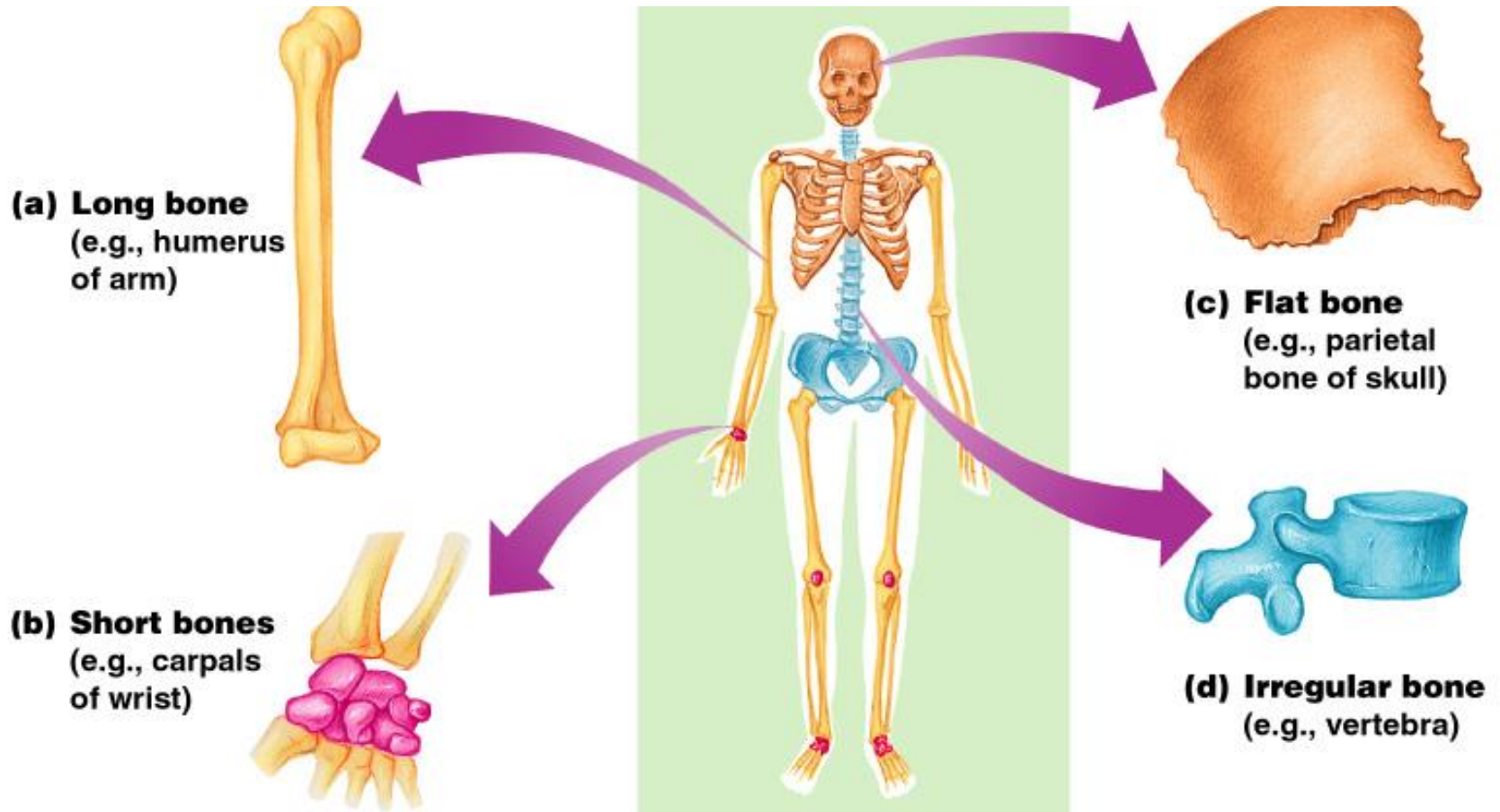
Example of a sesamoid bone – the patella



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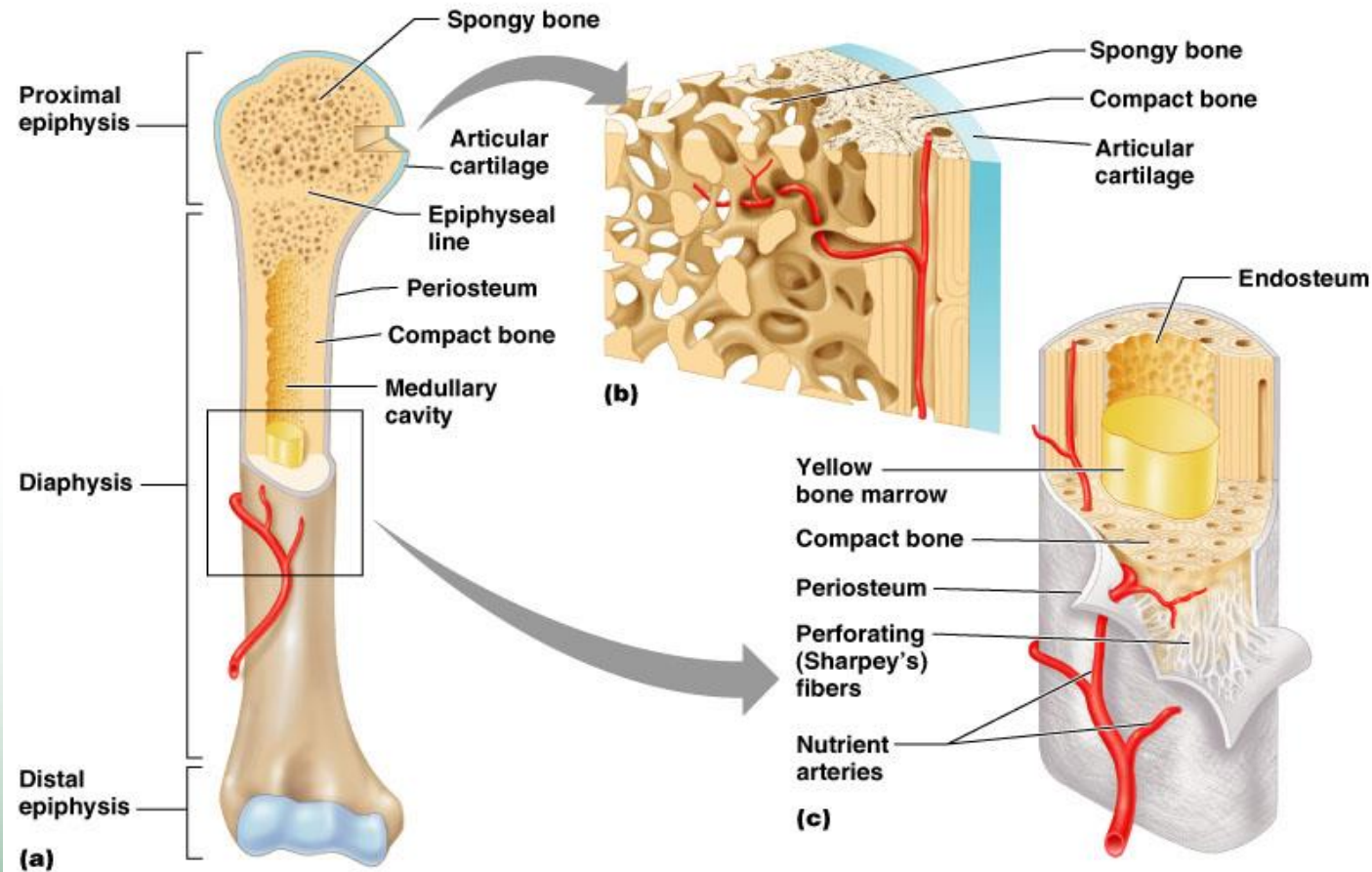


The classification of Bones



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Structure of a Long Bone



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Some Terminology

EPIPHYSEAL PLATES

- are also called growth plates
- is a layer of hyaline cartilage
- Is where the greatest growth of bone occurs here
- found at the ends of the shaft of long bones
- once the bone stops growing, the cartilage is replaced by osseous tissue and the plate becomes an epiphyseal line

OSSIFICATION

- the process of the hardening of the bone

OESTEOPLASTS

- are “bone builders”
- enlarges bones by adding bone to the outside surface

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The Skeletal System

These are categorised into two groups .

THE AXIAL SKELETON

- includes the bones that along the body's long axis
- made up of the skull, spine, rib cage, clavicle
- bones of the appendicular skeleton "append" to the axial skeleton

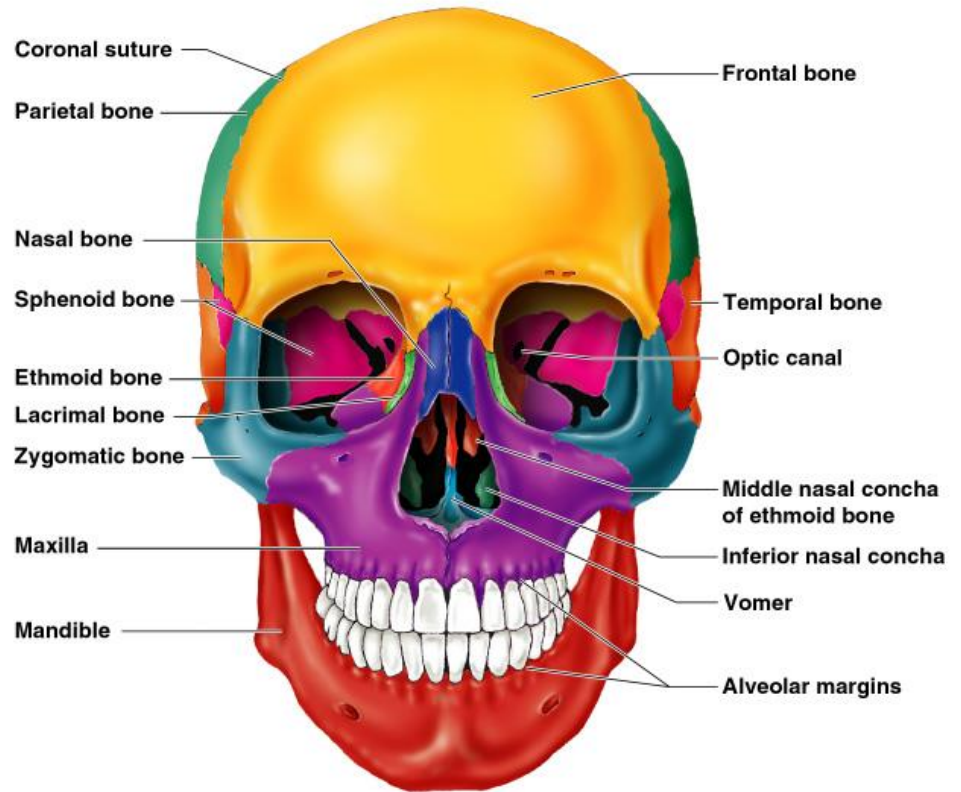
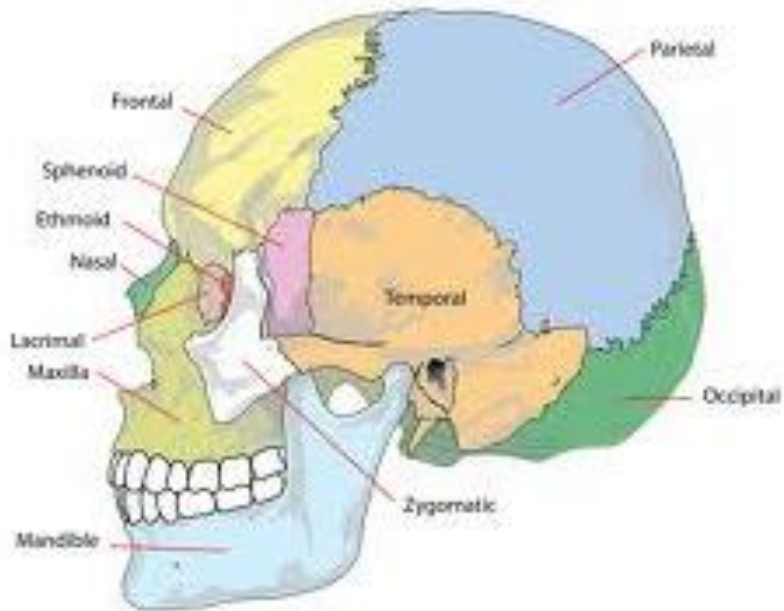
THE APPENDICULAR SYSTEM

- includes the bones that form the upper and lower limbs, the shoulders and pelvic girdle bones

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Bones of the skull



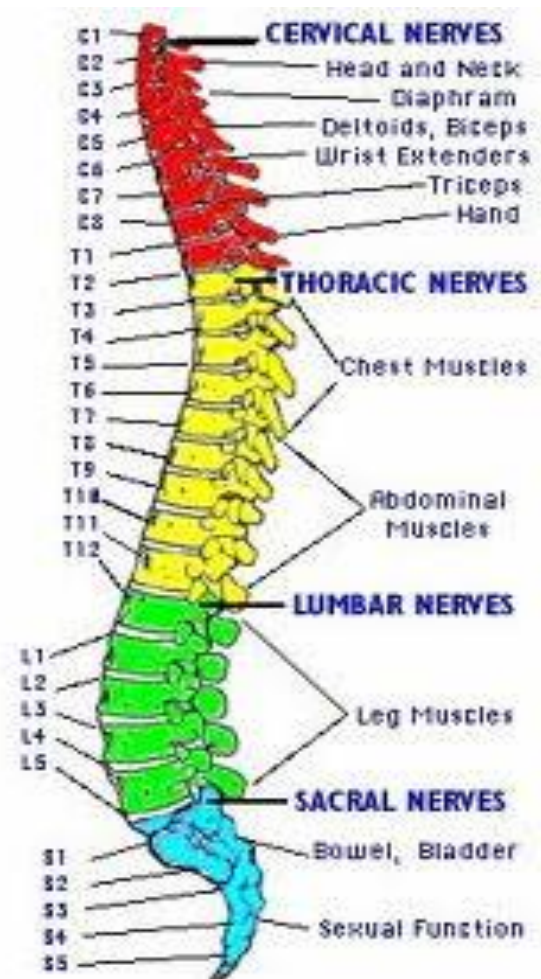
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The Spine & Vertebrae

The vertebral column is made up of the following -

- 7 cervical Vertebrae
- 12 thoracic Vertebrae
- 5 lumbar Vertebrae
- 5 sacral Vertebrae – fused together
- 4 coccyx Vertebrae – fused together

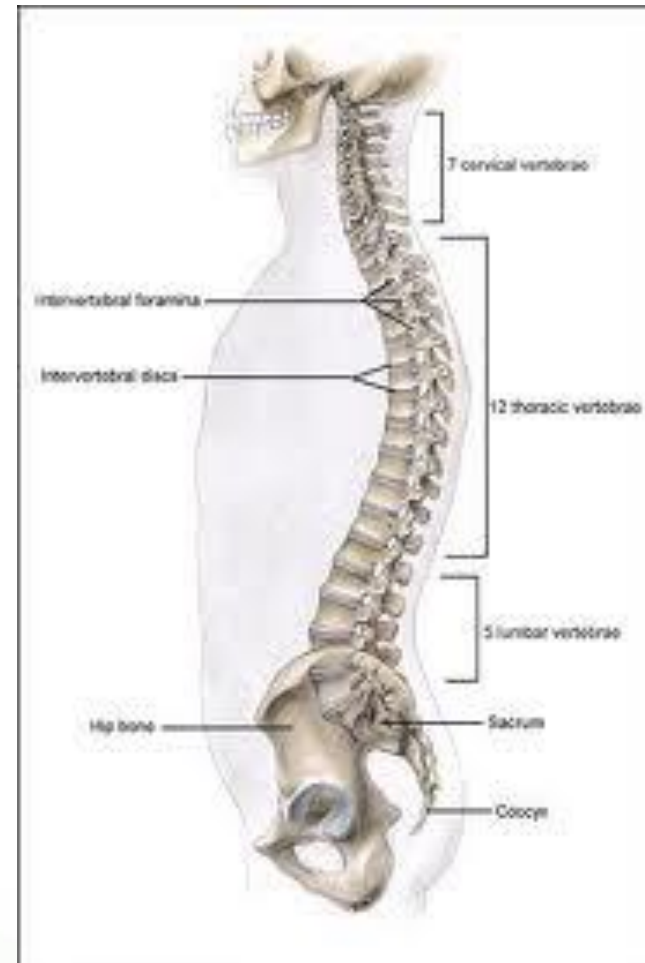
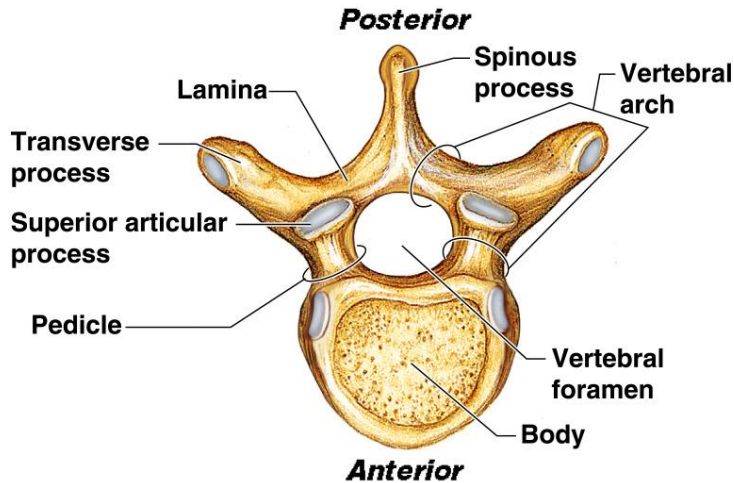


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The Spinal Column

Vertebrae are separated by intervertebral discs



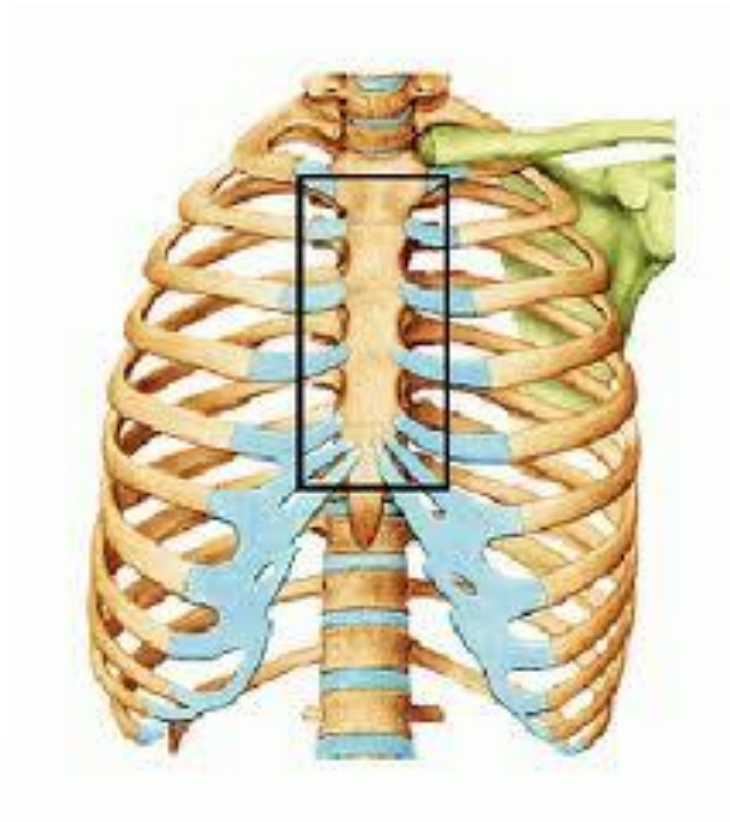
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The sternum

One of it's main roles is protection of the heart & lungs in the chest cavity

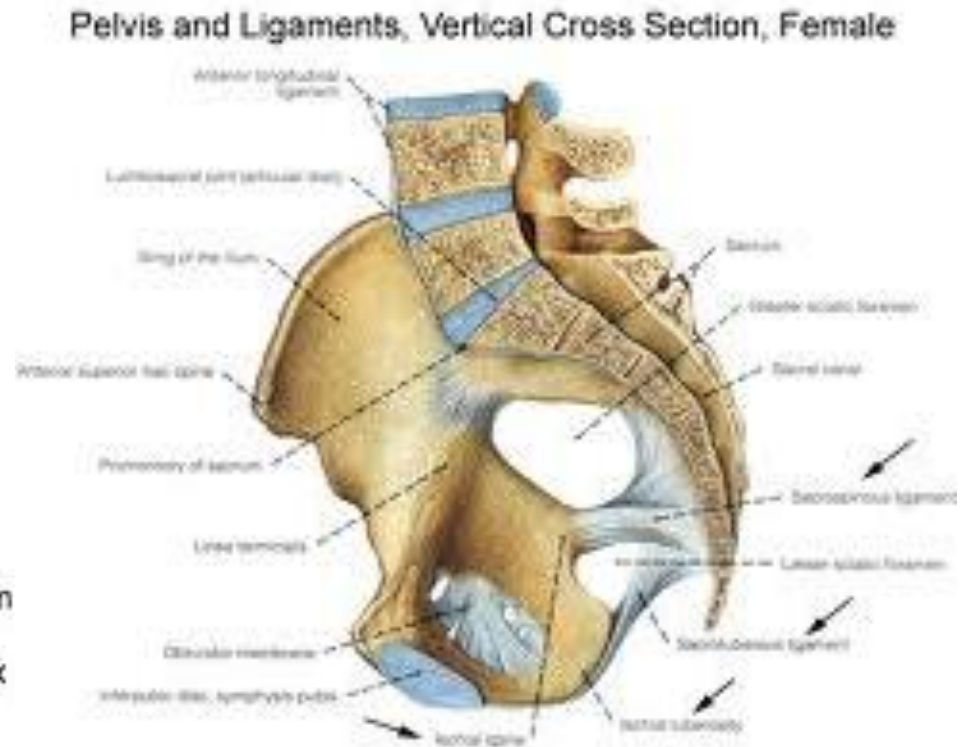
- The rib cage attaches via costal cartilage
- The clavicle (the collarbone) also articulates with the sternum



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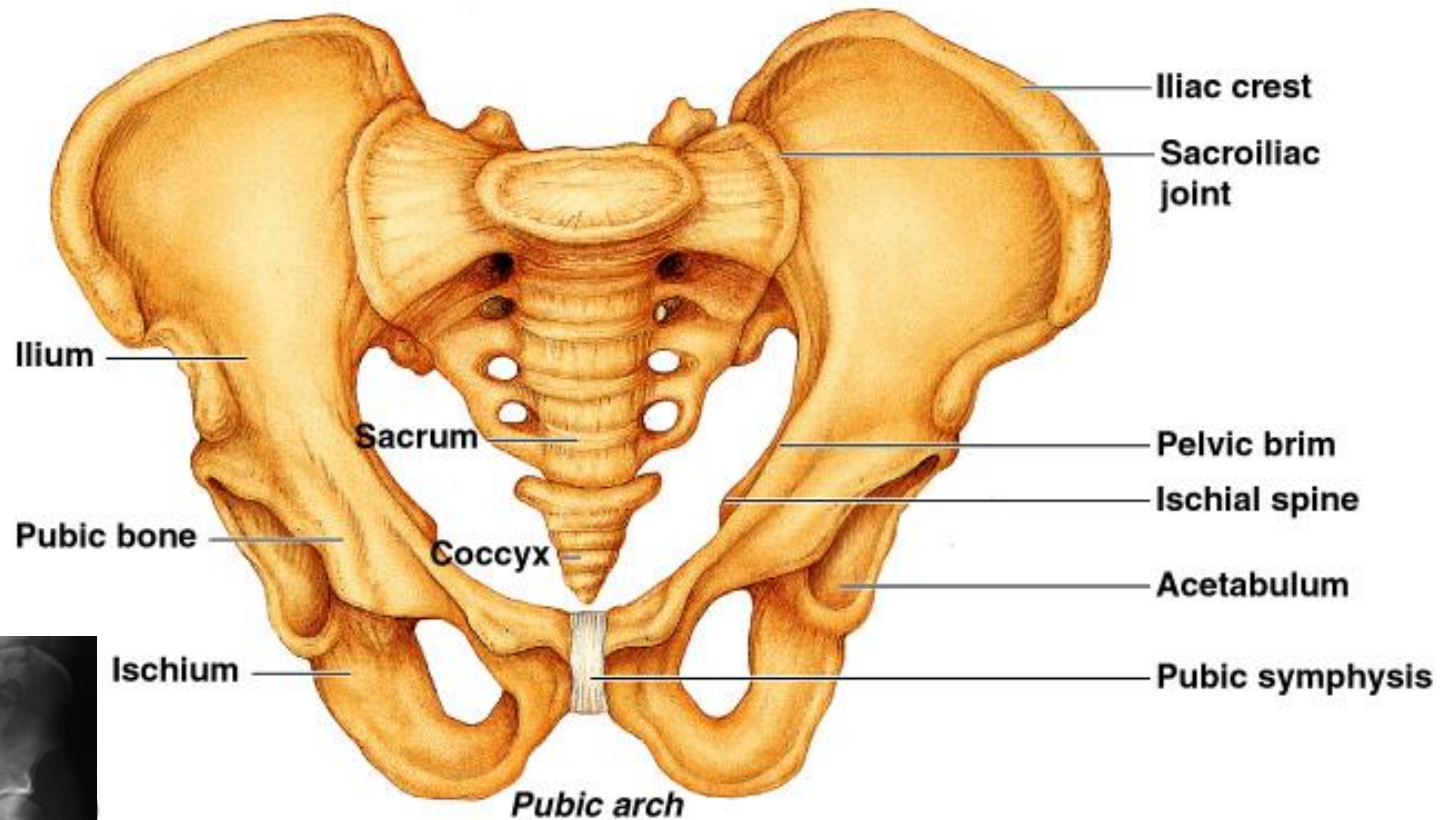
The Pelvis & it's connection to the spine



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The Pelvis



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Bones of the hand and foot



Example of short bones – carpal bones of the wrist



Bones of the hand

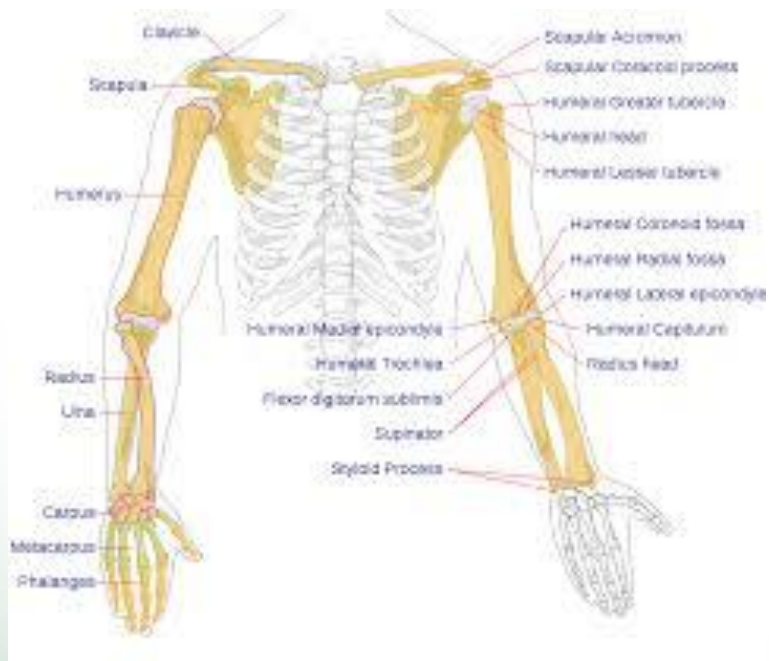


Bones of the foot

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Bones of the arms



Bones of the leg



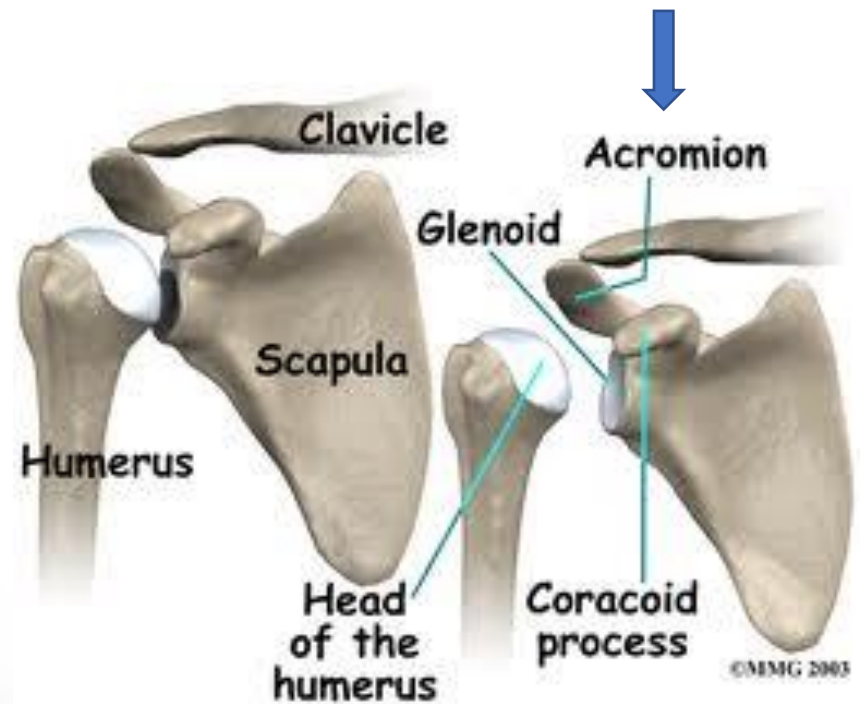
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The shoulder & the scapula



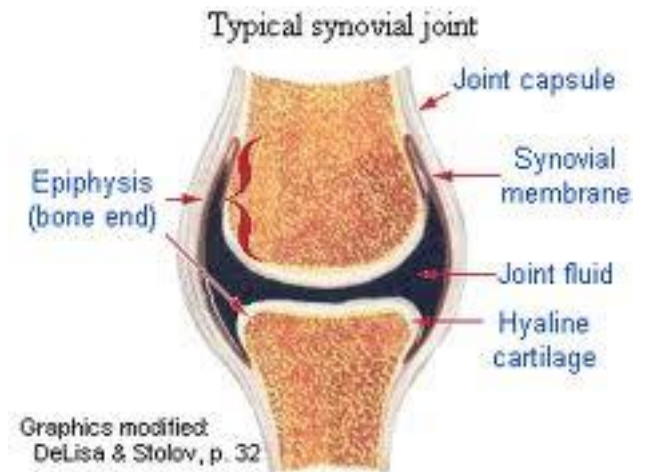
How it all fits together!



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The knee joint



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CARTILAGE AND LIGAMENTS

CARTILAGE

- is a smooth, shiny, semi hard tissue
- covers the ends of bones to enable smooth movement
- reduces friction and acts as a good shock absorber

LIGAMENTS

- joins bones to bones at the joint
- thick cords of fibrous (stringy) tissue,
- are not elastic, and fairly rigid
- prevent bones from moving out of place & restrict movement

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TENDONS AND BURSAE

TENDONS

- flexible but inelastic cord of strong fibrous tissue
- attaches the muscles to bones

BURSAE

- are small sacs filled with synovial fluid
- found in joints where friction is likely to occur, eg. knee, ankle
- often can become inflamed, cause pain and restrict movement

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THE ARTICULAR SYSTEM - JOINTS

JOINTS

- occur when two or more bones meet
- enables the muscular system to facilitate a range of movements

THERE ARE THREE TYPES OF JOINTS IN THE HUMAN BODY

1. FIBROUS JOINTS

- Immovable Joints
- no movement is possible
- bones are fixed or fused together
eg. cranium,, pelvis, sacrum,, sternum

2. CARTILAGINOUS JOINTS

- Slightly Immovable Joints
- bones joined by cartilage
- only a small amount of movement is possible
eg. ribs joining sternum, vertebrae of spine

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SYNOVIAL JOINTS

3. SYNOVIAL JOINTS

- Freely moveable joints
- most of our joints are SYNOVIAL JOINTS
- these joints allow us to move and exercise
- allows free movement in at least one direction
eg. knee, elbow, ankle, hip, shoulder, fingers, wrist

CHARACTERISTICS OF SYNOVIAL JOINTS

- ✓ smooth hyaline cartilage covers the ends of bone
- ✓ ligaments – strong “leather like” straps join bones to bones
- ✓ Has a synovial membrane, which creates synovial capsule
- ✓ the synovial capsule enable stability & keeps out unwanted material
- ✓ the capsule includes synovial fluid
- ✓ synovial fluid is a clear, jelly-like liquid that acts as a lubricator, so bones move with less friction, acts as a cushion, and provides nutrients for cartilage,

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TYPES OF SYNOVIAL JOINTS

HINGE JOINT

- allows back & forth, flexion & extension movements only
- eg. – knee, elbow

BALL & SOCKET JOINT

- allows flexion, extension, rotation adduction, abduction, circumduction, and a combination of these movements
- eg. hip, (femur, pelvis) shoulder (scapula, humerus, clavicle)

PIVOT JOINT

- allows rotation only
- eg. radius/humerus, atlas/axis - skull/spine

GLIDING JOINT

- a gliding/sliding type action along the flat surfaces of the bone
- eg. vertebrae, tarsals, carpals

SADDLE JOINTS

- does not allow rotation, but does enable back and forth, and side to side movement
- eg. the joint at the base of your thumb

CONDYLOID JOINT

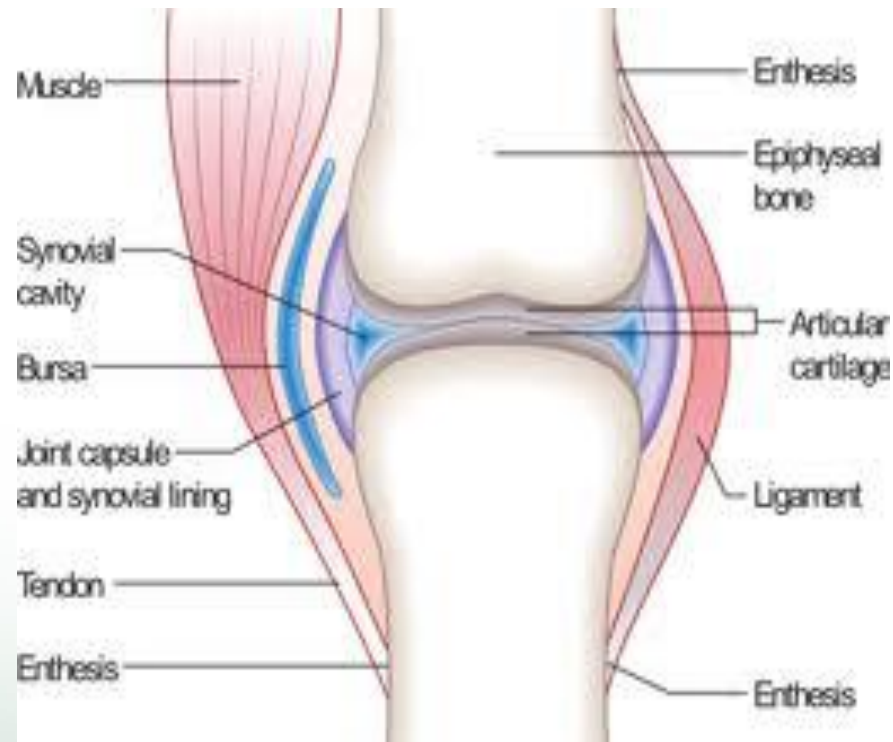
- allows movement, but not rotation
- eg. finger joints, mandible (jaw)

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A synovial Joint

The Knee – a hinge joint

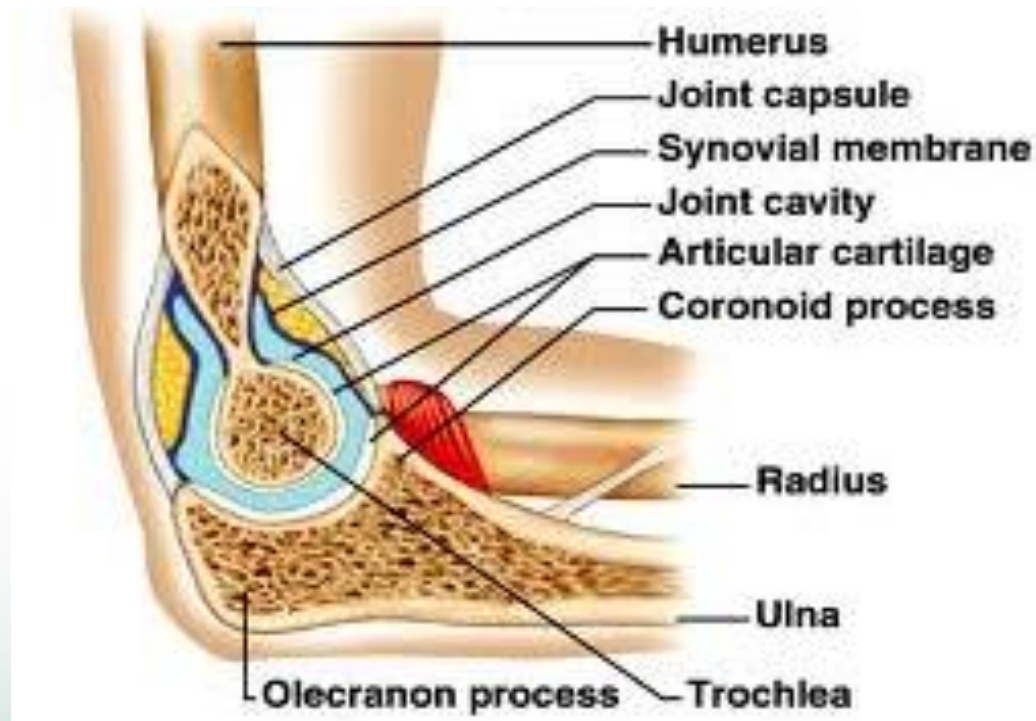


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A synovial Joint

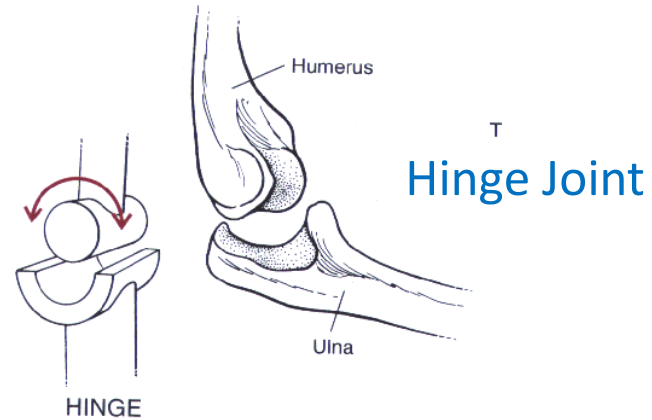
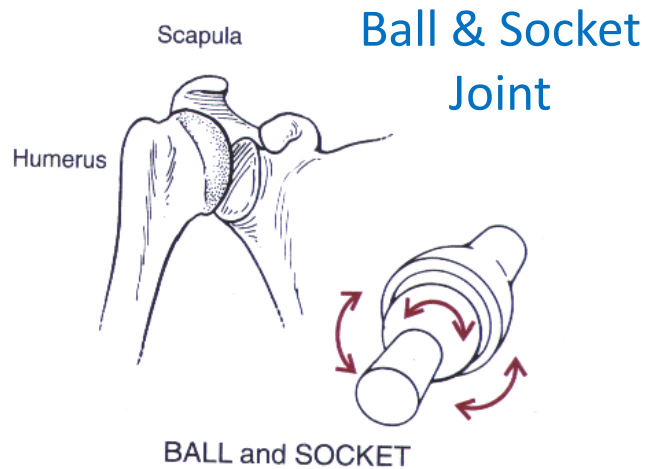
The elbow – a hinge joint



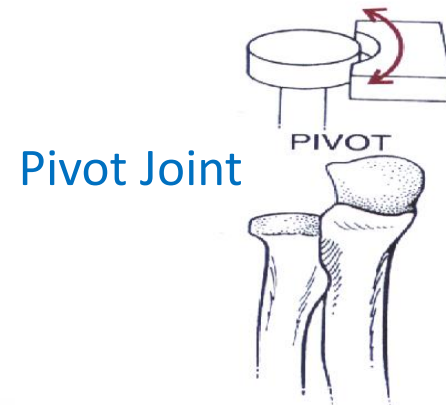
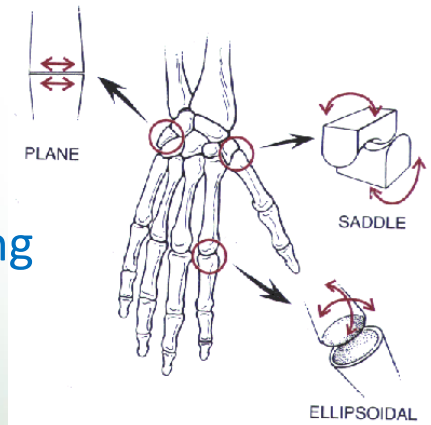
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Other examples of SYNOVIAL joints



Sliding Joint



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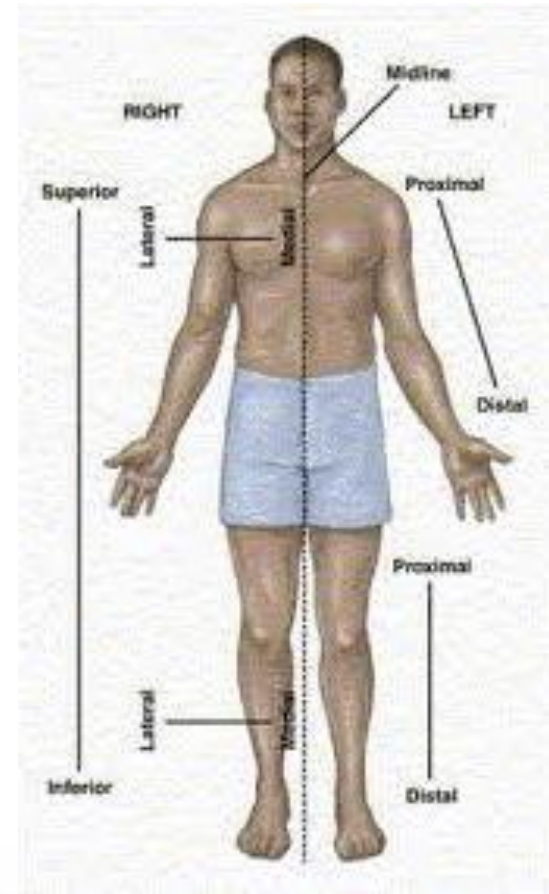
The Anatomical Position

Enables a consistent reference point, for the consistent describing of movements of the body

- Arms held to the side
- Palms facing forwards
- Feet facing forwards

Anatomical Terminology

- Particular terms are used to describe movements of the body



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Types of Joint Movements

FLEXION	decreasing the angle between the bones eg. bending at the elbow and leg
EXTENSION	increasing the angle between the bones eg. bending backwards at the waist
ABDUCTION	moving body parts away from the midline
ADDUCTION	moving body parts away towards the midline
ROTATION	moving a bone around a central axis
CIRCUMDUCTION	moving the ends of a bone so that it makes a circle

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Types of Joint Movements

PRONATION turning the hand to have it palm downwards

SUPINATION palms facing upwards

DORSIFLEXION pointing the toes upwards towards the tibia

PLANTARFLEXION pointing the toes away from the tibia

INVERSION moving the sole of the foot inwards at the ankle

EVERSION moving the sole outwards at the ankle

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Healthy bones.....

VITAMINS & MINERALS ARE VITAL FOR HEALTHY BONES

VITAMIN A	good for bone development & tooth formation <ul style="list-style-type: none">• (milk fat, egg yolks, dark green & yellow vegetables, liver, kidney)
VITAMIN C	aids in bone strength & collagen production <ul style="list-style-type: none">• (citrus fruits, eg. lemons, oranges, limes, all types of vegetables)
VITAMIN D	promotes calcium absorption & influences the rate of growth of developing bones <ul style="list-style-type: none">• (milk, fish-liver oils, safe exposure to sunlight)
CALCUIM	create bone rigidity, strength & structural support <ul style="list-style-type: none">• (dairy products are excellent sources of calcium)

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Other useful references

www.anatomyarcade.com. - Interactive sites for anatomy

www.bbc.co.uk/science/humanbody

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click on the URL link below to view a short video
of the The Skeletal System.
When the video is completed please return and go to the next slide
in this presentation.

<https://youtu.be/aLoY1wjmVvg>

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