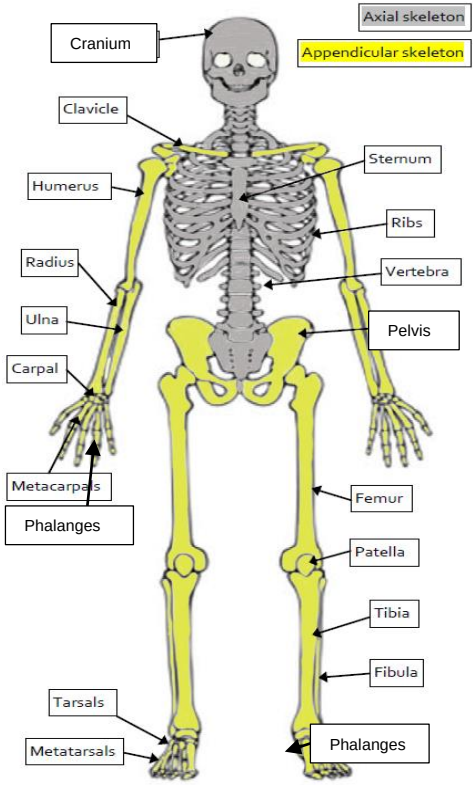
HGS GCSE PE

Applied Anatomy and Physiology
The Skeletal System

The Structure and Function of the Skeletal System



LEARNING OUTCOMES

By the end of this topic you should …

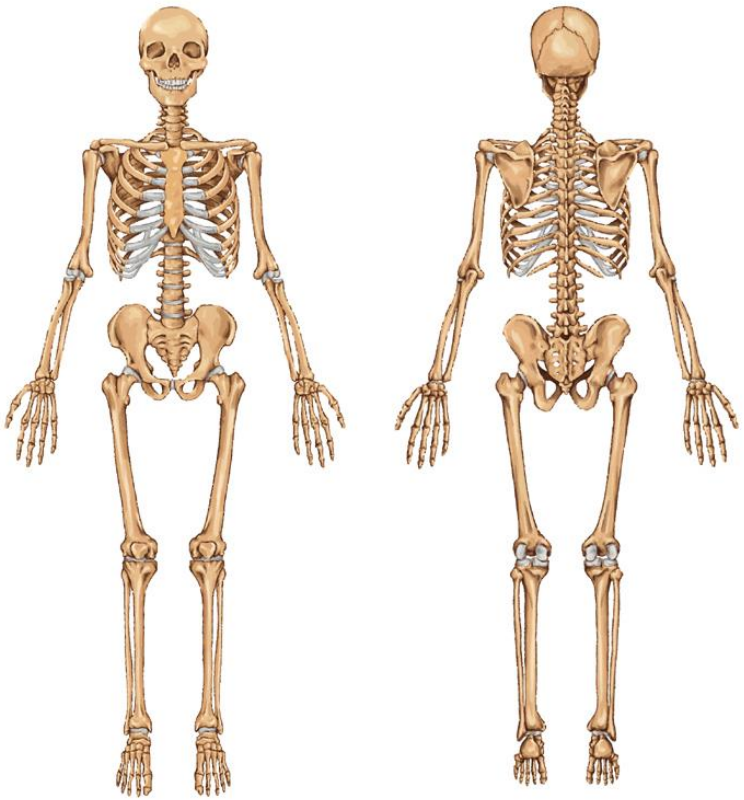
- Know the name and location of bones in the human body.
- Be able to describe the 6 functions of the skeleton.
- Know the definition of a synovial joint.
- Know hinge joints and ball and socket joints
- Know the types of movements at hinge and ball and socket joints.
- Know the roles of ligaments, cartilage and tendons.

Know the location of the major bones

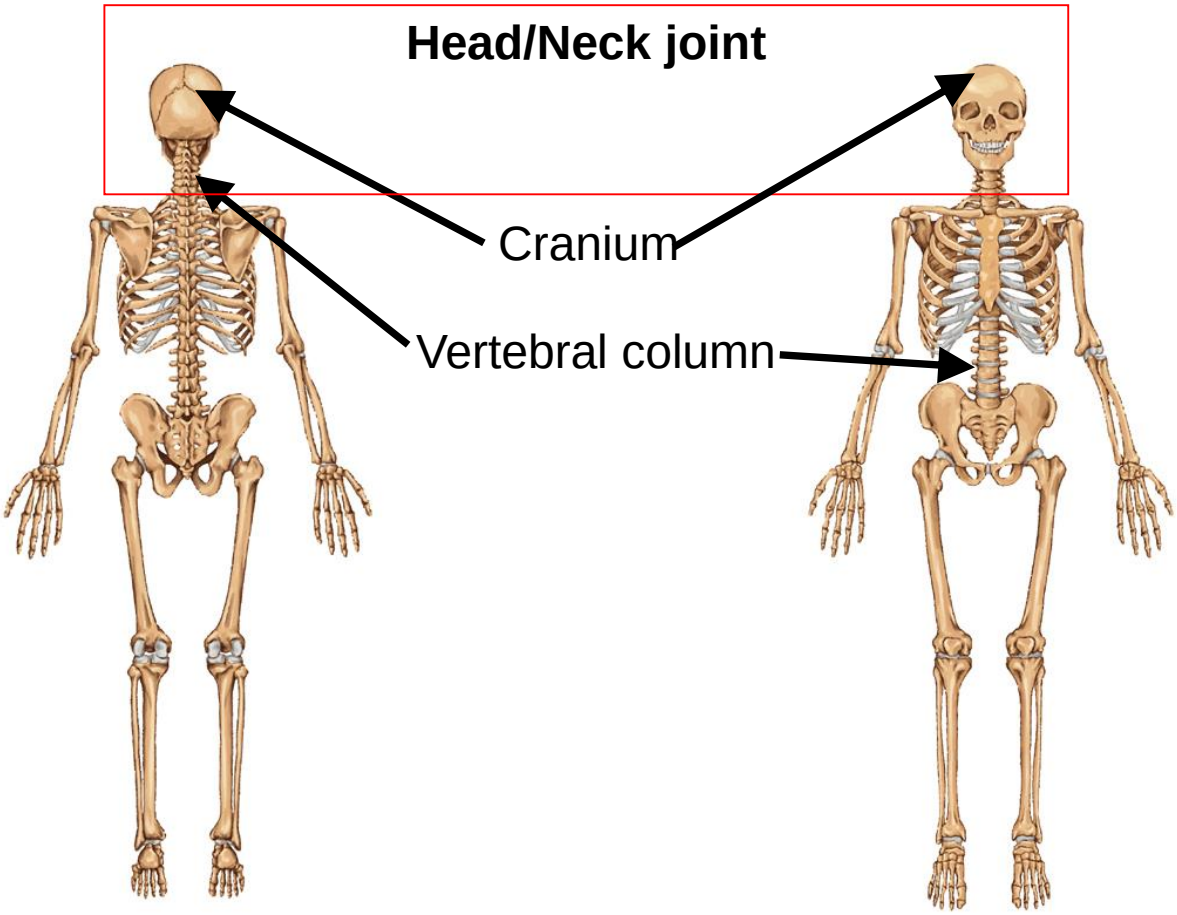
The adult skeleton has **206 bones** and provides the framework for all movement.

You need to know the location of the following bones:

- Cranium
- Vertebrae
- Ribs
- Sternum
- Clavicle
- Scapula
- Humerus
- Ulna
- Radius
- Carpals
- Metacarpals
- Phalanges
- Pelvis
- Femur
- Patella
- Tibia
- Fibula
- Tarsals
- Metatarsals



Know the location of the major bones



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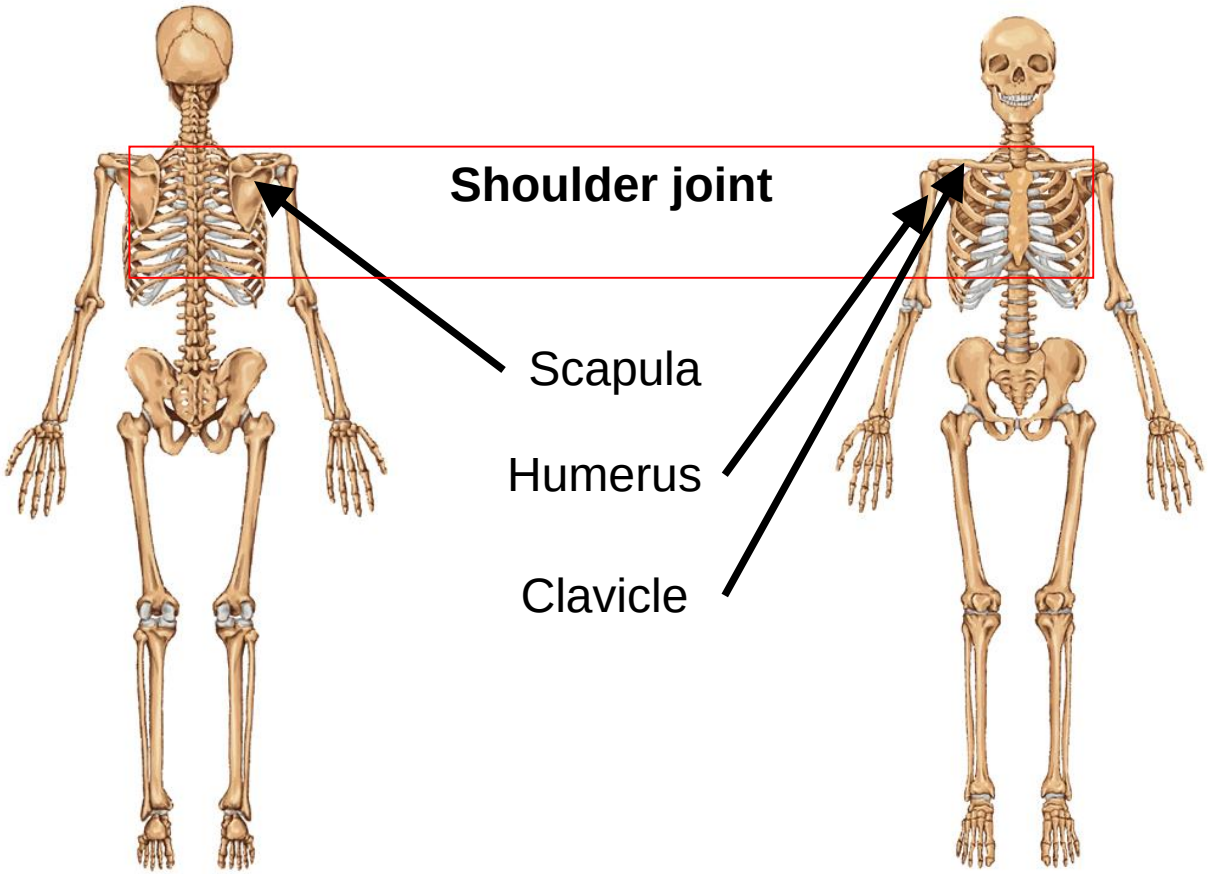

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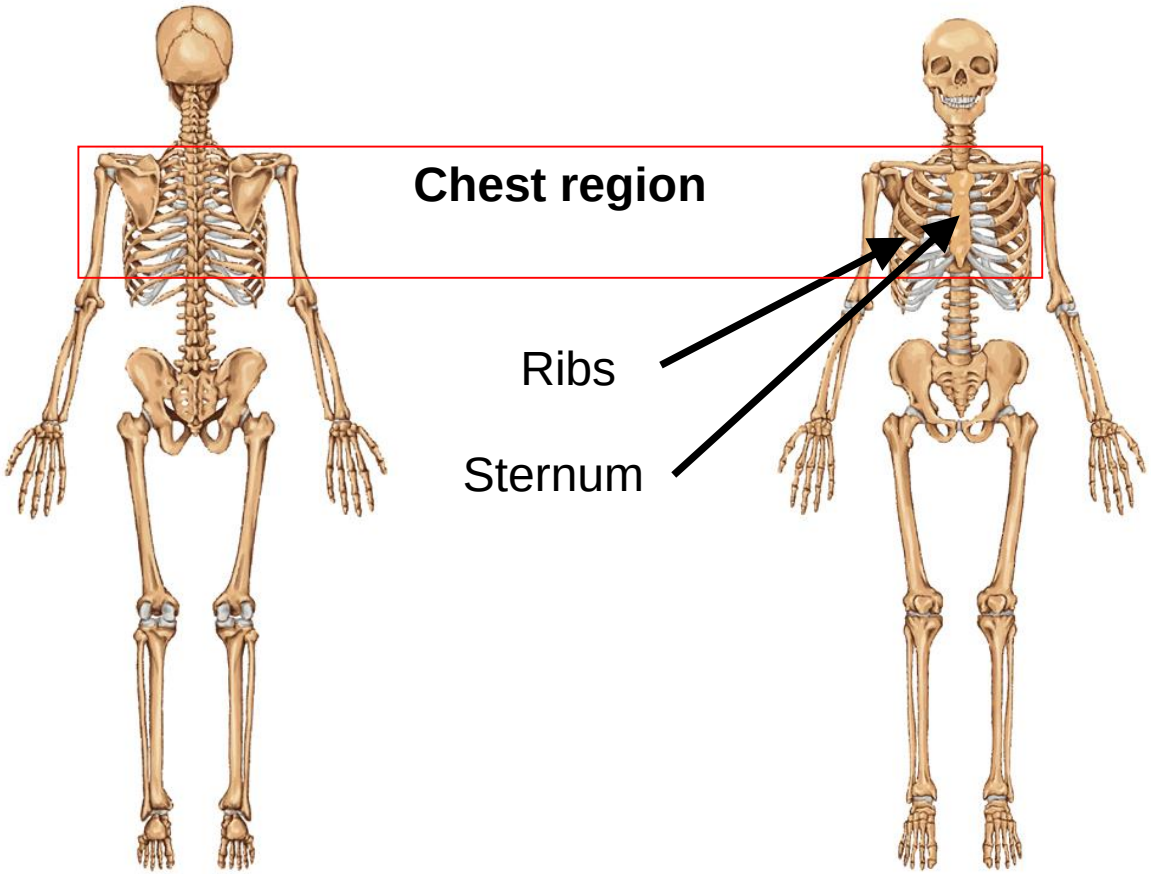

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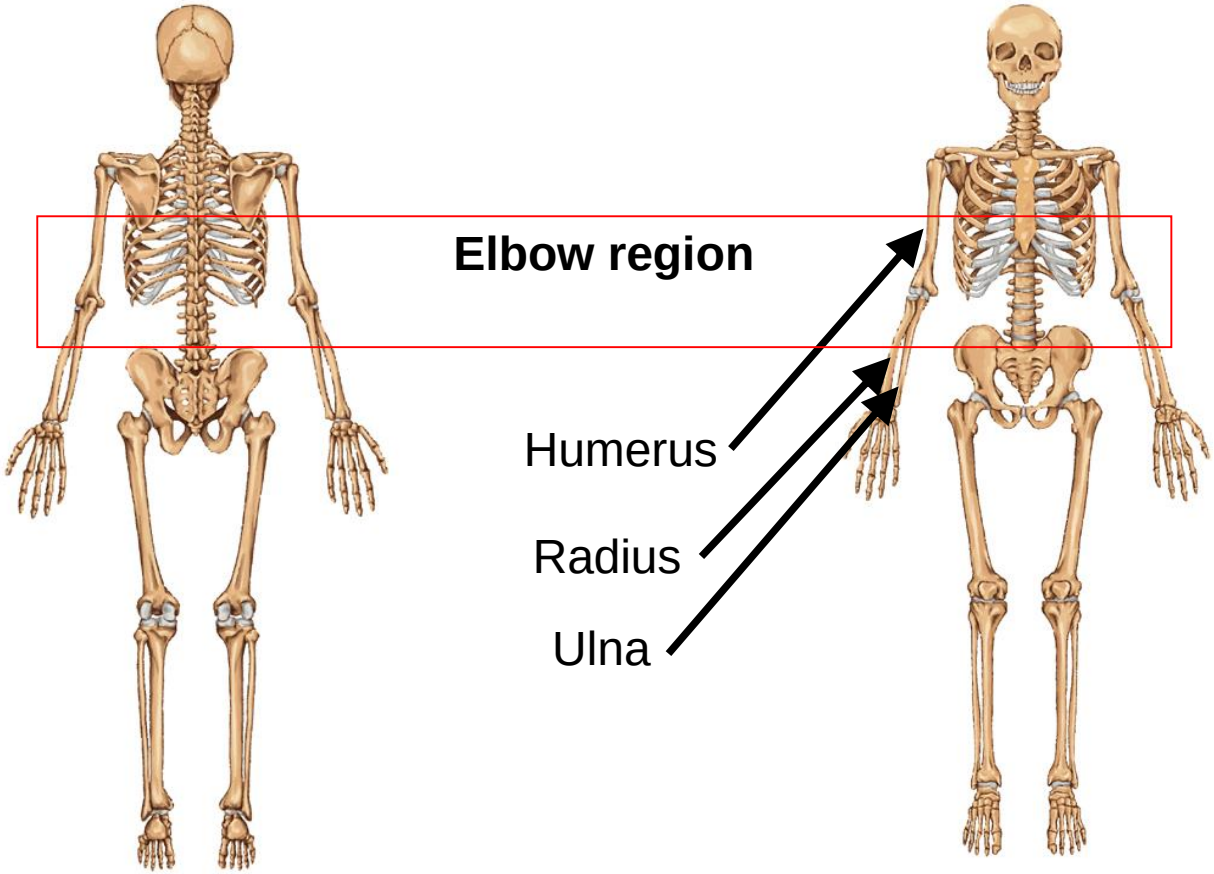

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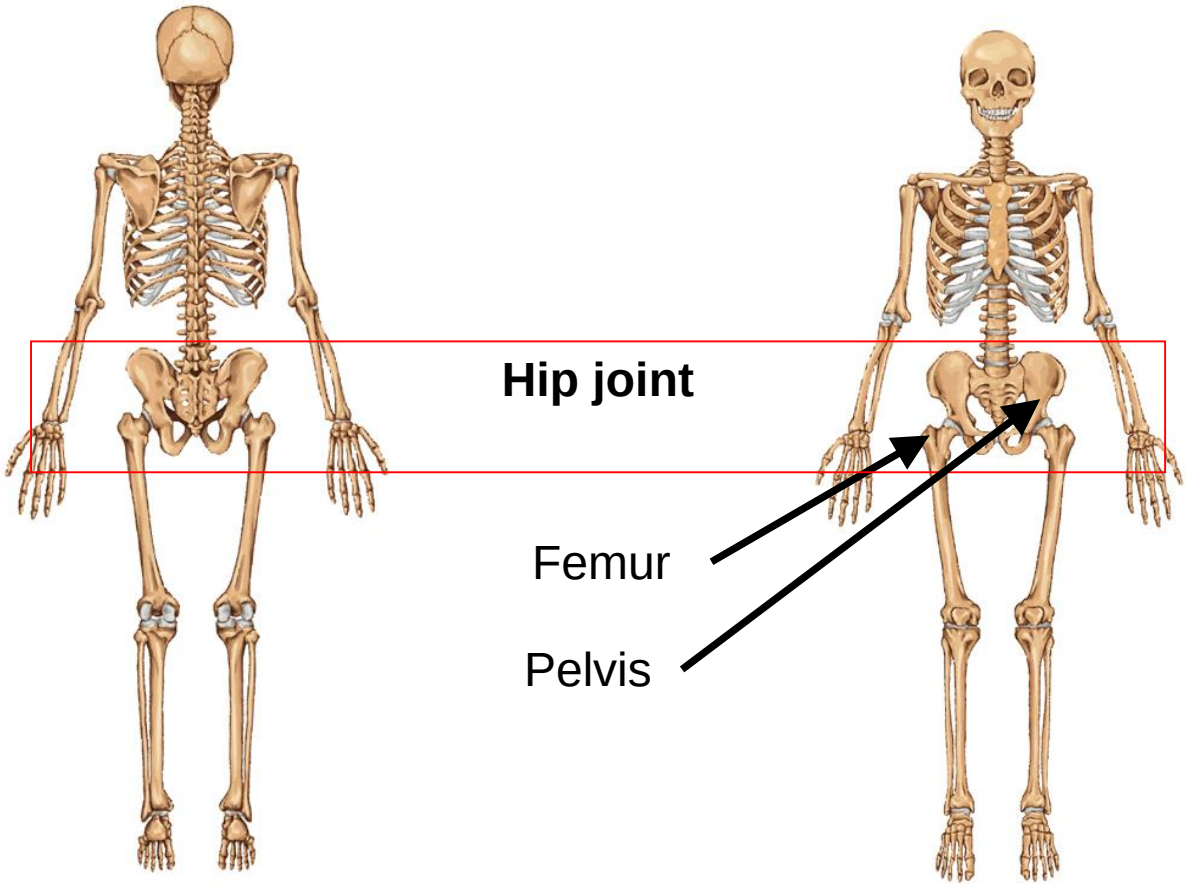

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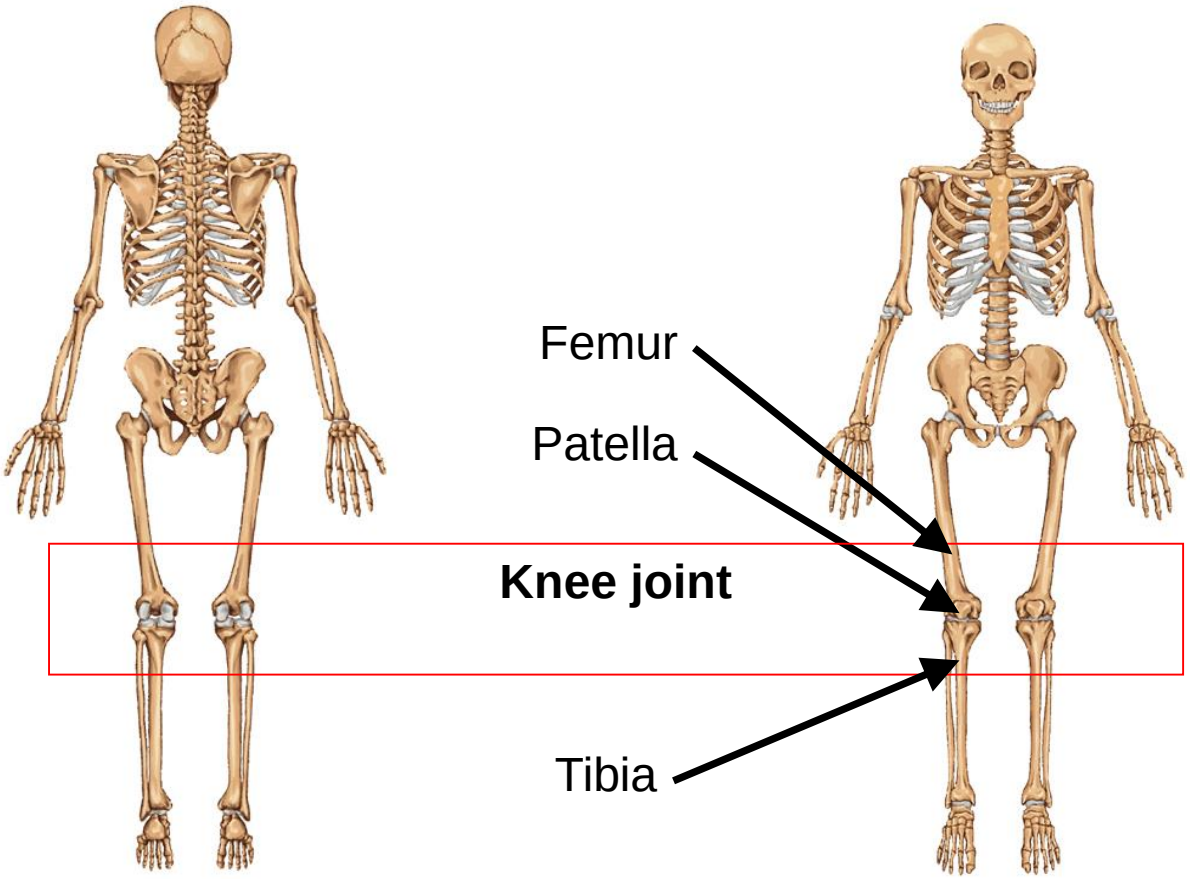

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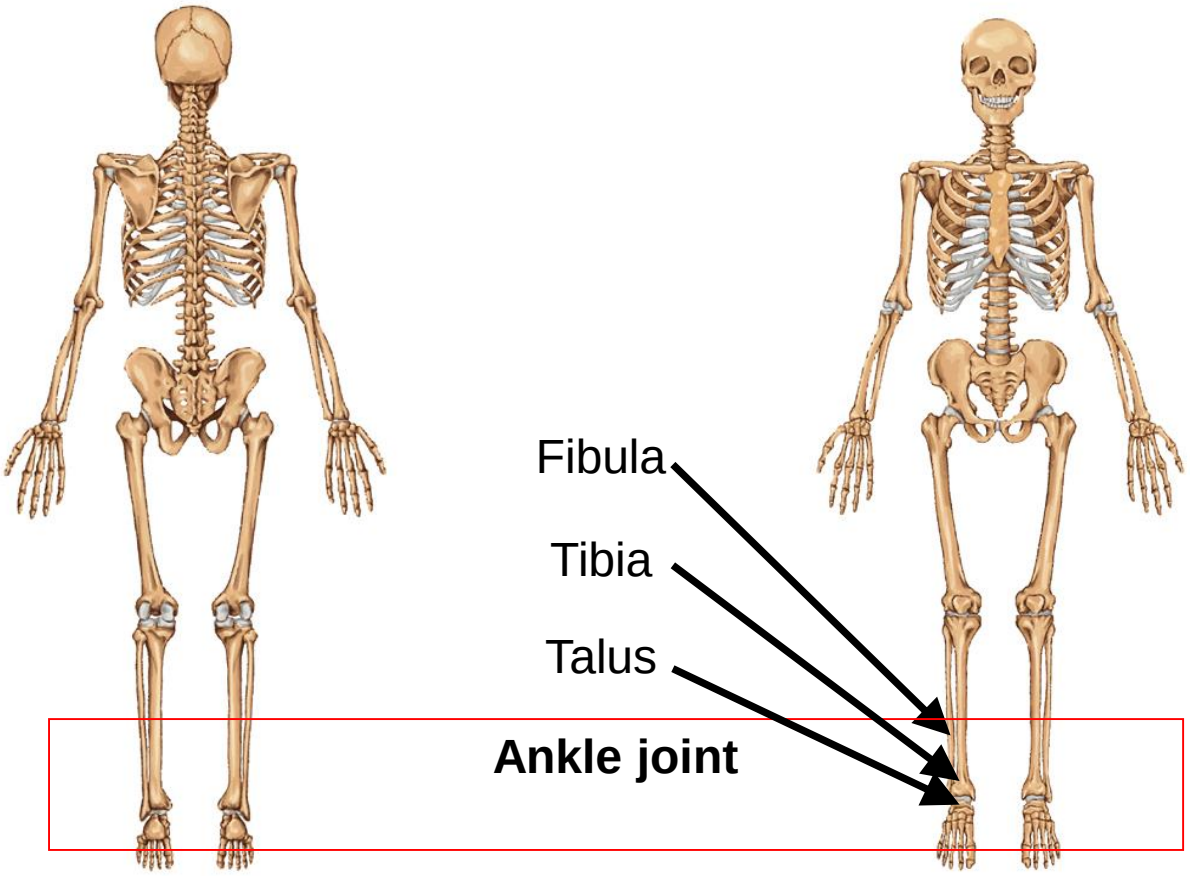
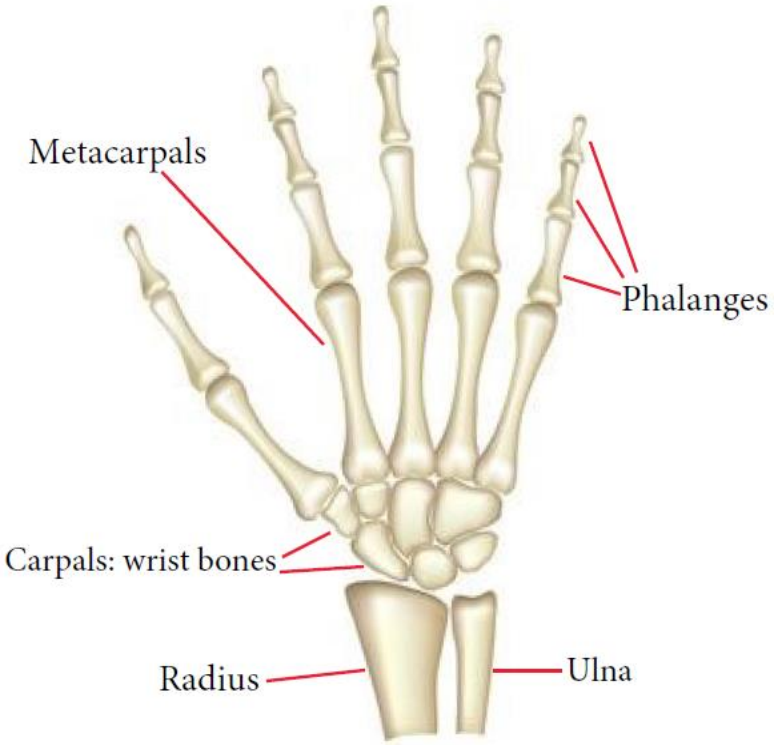
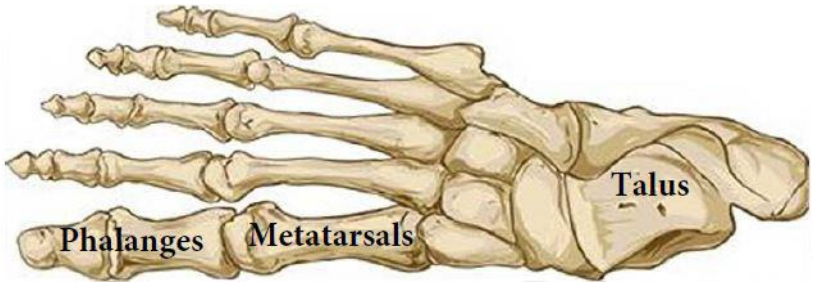


Know the location of the major bones

Bones of the HAND



Bones of the FOOT



Main functions of the skeleton

How might we remember these? https://www.youtube.com/watch?v=aUHh8uMdBso

Did you get these?

1. To give Posture and Support to the body
2. To allow Movement of the body
3. To give Protection to the internal organs
4. To produce Blood (White and Red) Cells
5. To Store Minerals

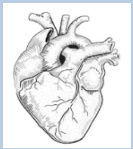
Main functions of the skeleton

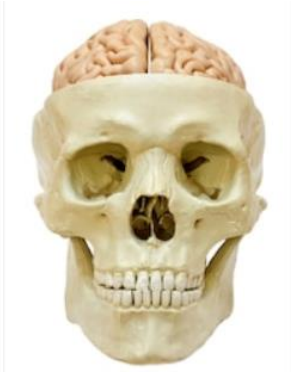
1. Support

It gives the body **support**, enabling us to stand. The bones of the body are held together by **ligaments**.
The skeleton provides a framework for the muscles, which are attached to bones by **tendons**.

2. Protection

Some of our body parts, such as the brain, are very delicate and need **protection**.
Bones can protect body parts from **impacts** and **injuries**.

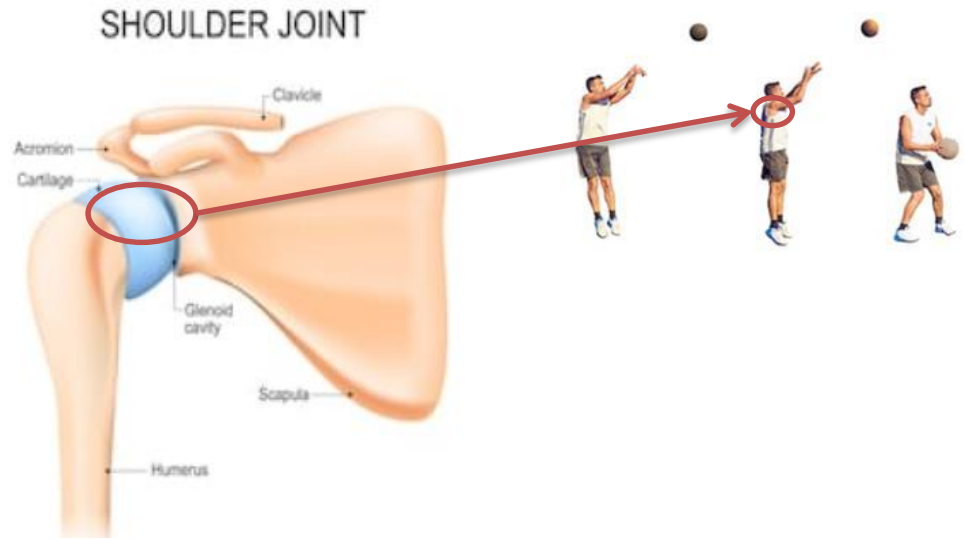
What vital organ does the Cranium protect?	What vital organ does the Rib Cage protect?
Answer: 	Answer: 



Main functions of the skeleton

3. Movement

The skeleton has many different joints.
At joints, muscles and bones form levers to allow sporting movements.



4. Posture & Structural Shape

The skeleton acts as a framework.

Muscles are firmly attached to bones forming our body shape and holds us upright.

Main functions of the skeleton

5. Mineral Storage

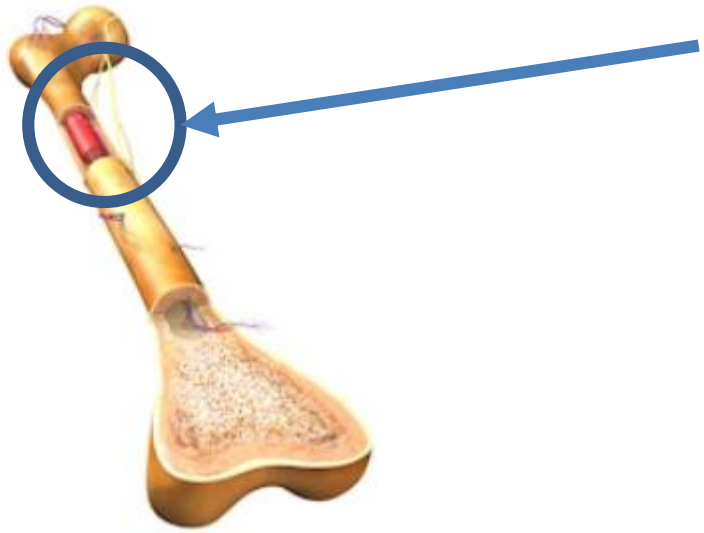
The minerals in your bones serve two main functions.
Minerals transform spongy bone matrix into a rigid structure and in turn increase density and strength.

Your bones also function as a mineral storage depot, releasing dissolved calcium, phosphorus and magnesium into your bloodstream when needed.

Main functions of the skeleton

6. Blood cell production

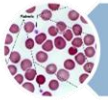
The ends of long bones and some other bones including the ribs, humerus, femur and even vertebrae bones, contain red bone marrow.



This is where the red blood cells are produced which carry oxygen.

Other functions include:

White blood cells to combat illness



Platelets for clotting and healing.

Types of synovial joint

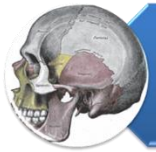
Structure of the skeleton

“A joint is a place where two or more bones meet”

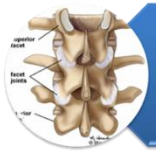
The skeletal system has a number of joints which are responsible for the huge range of **movement**.

There are several **different types of joint** in the body which allow different types of movement.

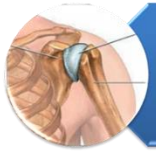
These different Type of Joint include:



Fixed



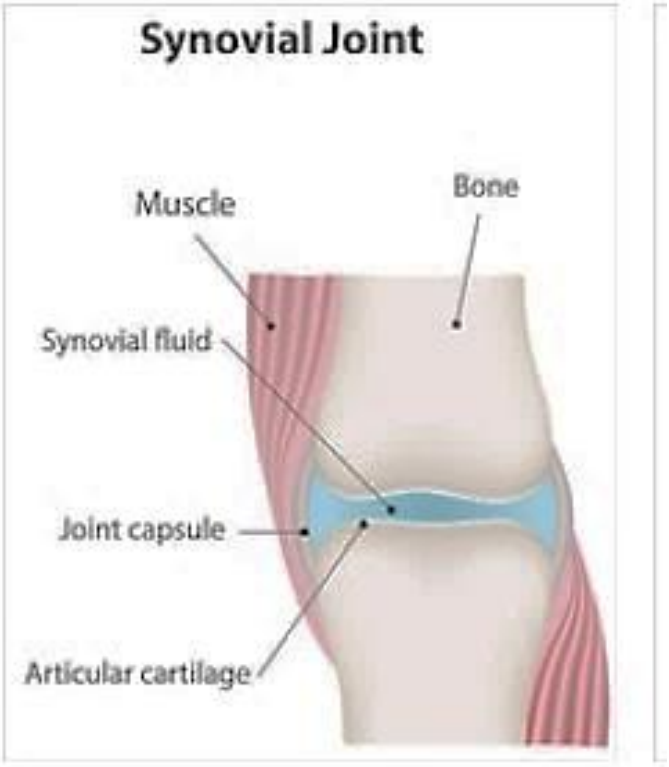
Slightly moveable



Freely moveable or synovial

Types of synovial joint

Synovial Joints https://www.youtube.com/watch?v=0cYal_hitz4



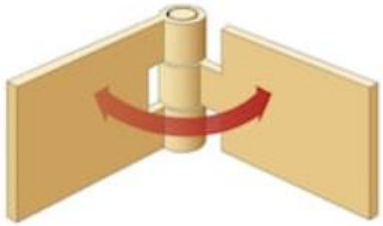
A **Synovial Joint** is a freely movable joint in which the bones surfaces are covered by cartilage, called **Articular Cartilage**, and connected by a **fibrous connective tissue** capsule lined with Synovial Fluid

You Need to Know This!

Types of synovial joint (hinge joint)

Hinge Joints **Only** allow **flexion and extension** movement like the hinge on a door.

Examples found in the body are the knee and elbow joints



Why are these joints important for sport?

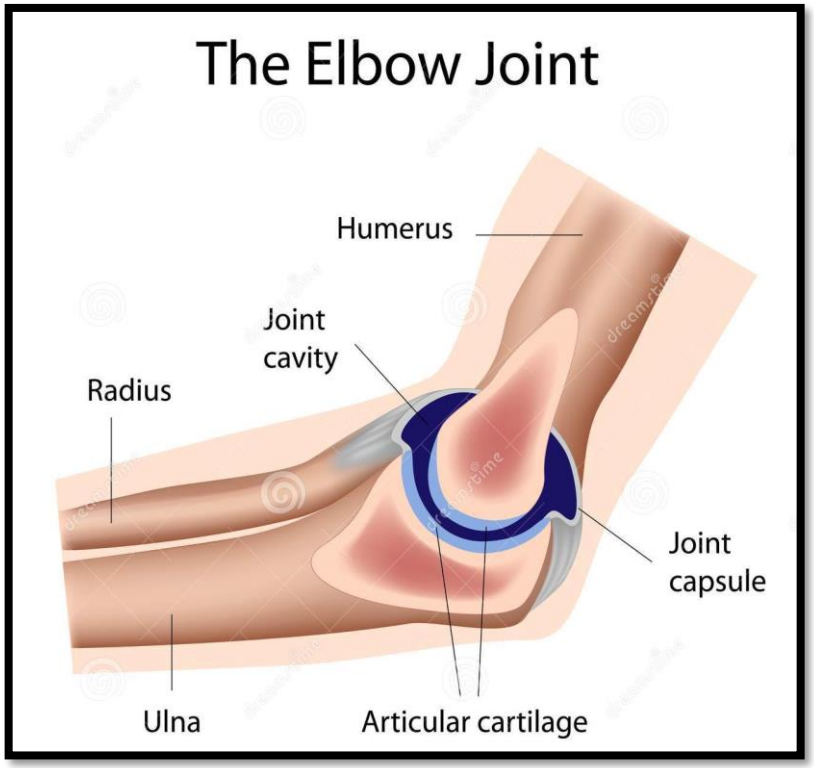
These joint are extremely powerful and in conjunction with surrounding muscles can produce power and speed *i.e. Knee drive during a 100m sprint*

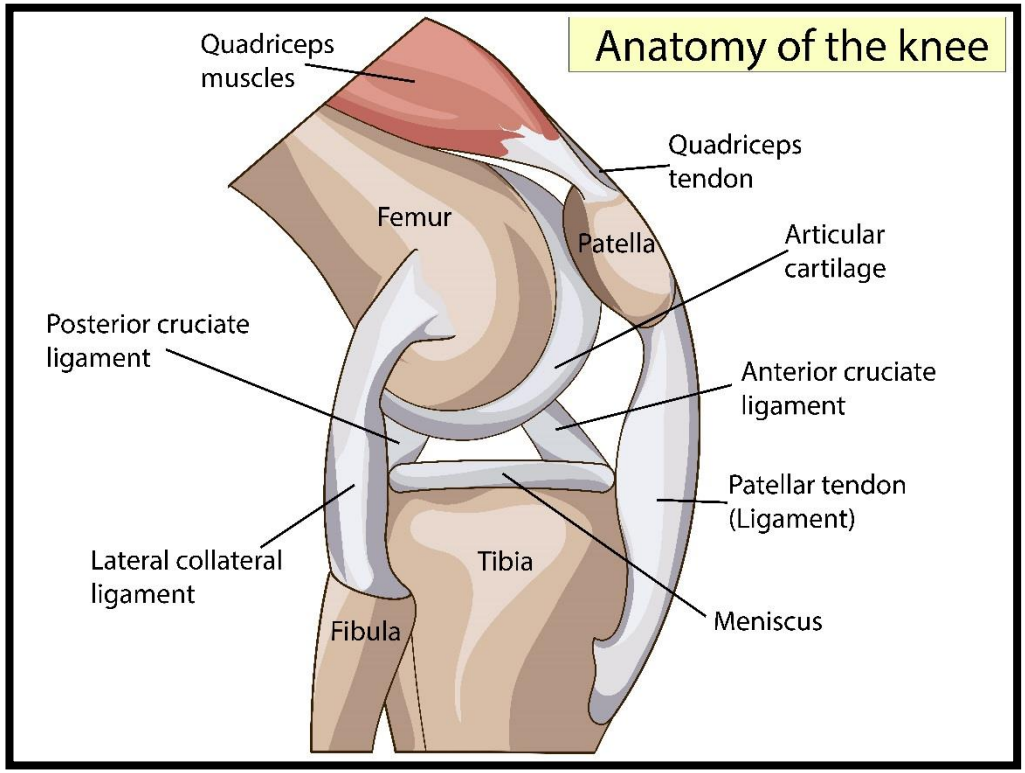
The Articulating bones are bones that move within a joint, for example the Articulating bones for the elbow joint are:

1. Humerus
2. Radius
3. Ulna

Types of synovial joint (hinge joint)

Hinge Joints **You need to know the make up of the Knee and Elbow Joints.**





Types of movement at hinge joints

Movement at A Hinge Joint

<u>FLEXION</u> – Decreasing the angle at a joint. ***(Bending*** *the leg at the knee joint)*

Flexion

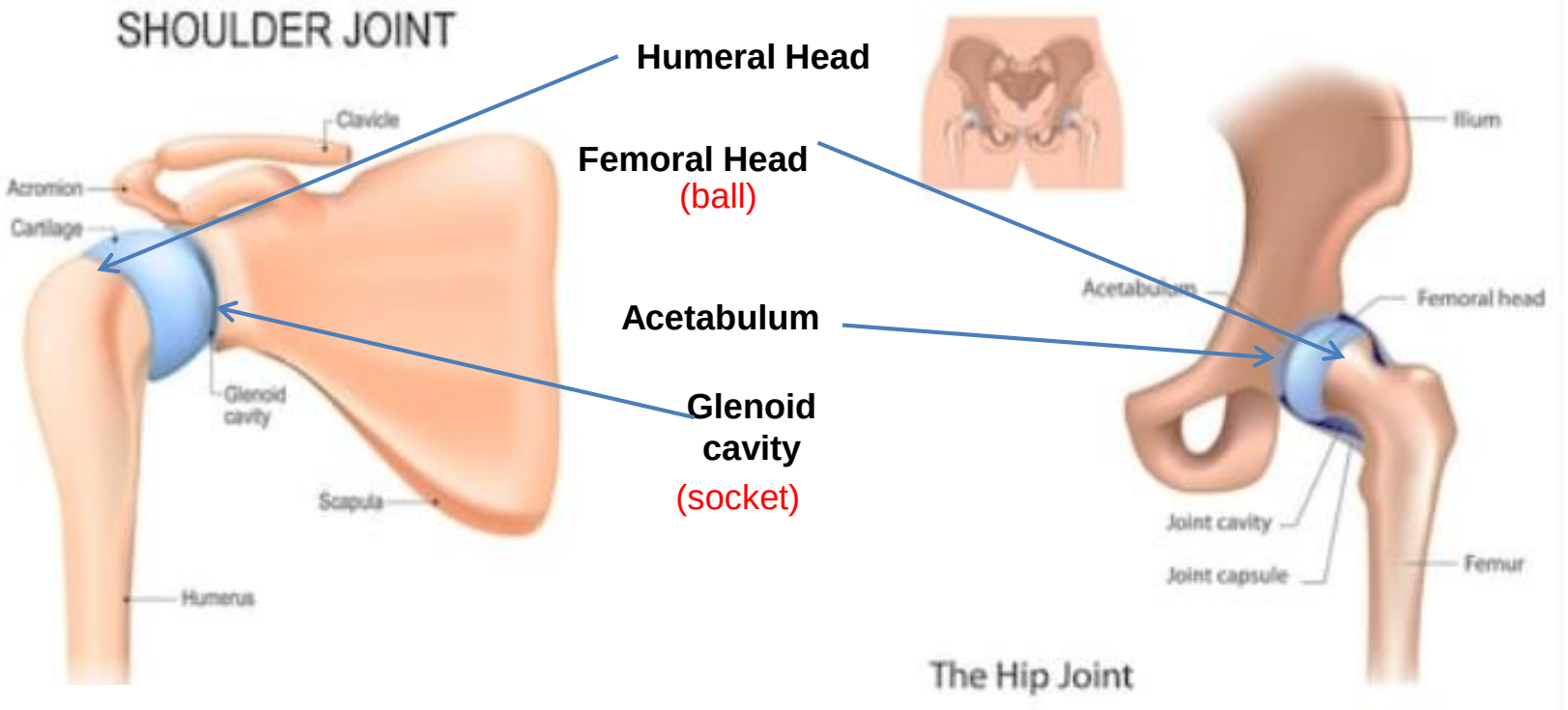
<u>EXTENSION</u> - Increasing the angle at a joint. ***(Straightening*** *the leg at the knee joint)*

Extension

TASK: Describe a specific sporting example of both Flexion and Extension at both the Knee and the Elbow.

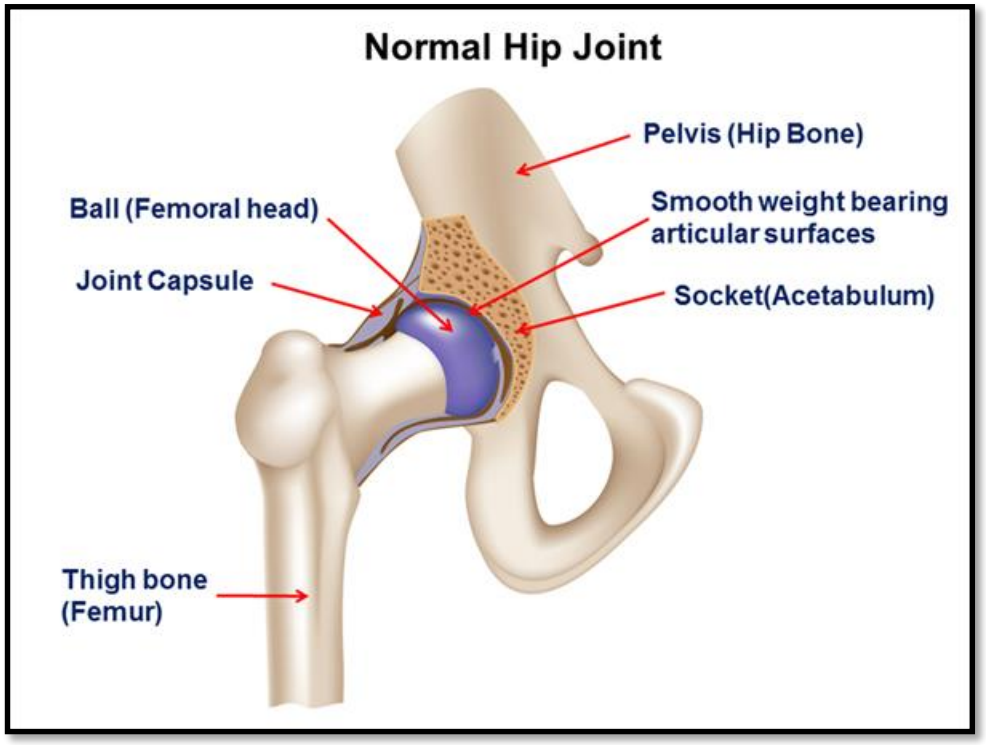
Types of synovial joint (ball and socket)

Ball & Socket Joints **You need to know the make up of the Shoulder and Hip Joints.**



Types of synovial joint (ball and socket)

Ball & Socket Joints You need to know the make up of the Shoulder and Hip Joints.



Types of movement at ball and socket joints

Ball & Socket Joints

Where the rounded end of one bone fits inside the cup-shaped end of another bone.

Ball and socket joints allow movement in **all directions**. These are the most mobile joints in the body.

Examples found in the body include the shoulder and hip joints.

Why are these joints important for sport?

Most sporting movements require the type of movement the shoulder and hip allow. *i.e. tennis serve*

Types of movement at ball and socket joints

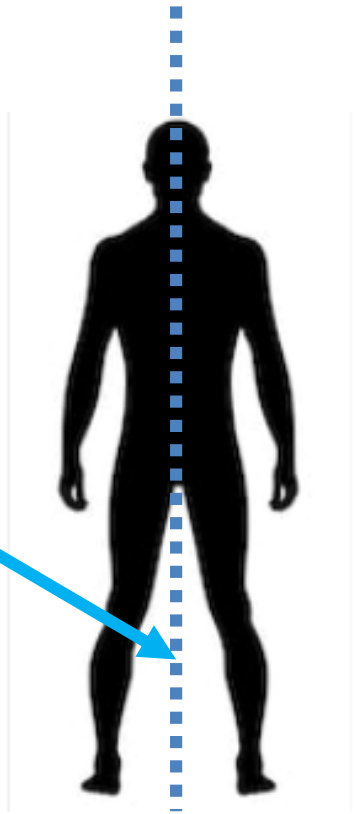
Movement at a Ball & Socket joint

Flexion and Extension: Increasing and decreasing the angle at the joint.

Abduction and Adduction: determined from the 'MIDLINE' of the body.

Abduction

Adduction



Types of movement at ball and socket joints

Adduction & Abduction

ADDUCTION –
Sideways moving limb towards midline of the body.

REMEMBER: Adduction is to ADD towards the midline.

ABDUCTION –
Sideways moving limb away from midline of the body

REMEMBER: Abduction is to TAKE AWAY from the midline.

Types of movement at ball and socket joints

Movement at a Ball & Socket joint

Rotation/Circumduction: The joint moves in a circular motion. e.g. Service action or bowling action.

Let's See if you Fully Understand

TASK 1: Draw and describe a simple diagram of the Knee Joint and label the bones that move around this (the Articulating Bones)

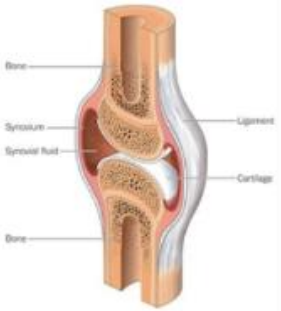
TASK 2: Name a Physical Activity that involves both Flexion and Extension of the Knee Joint

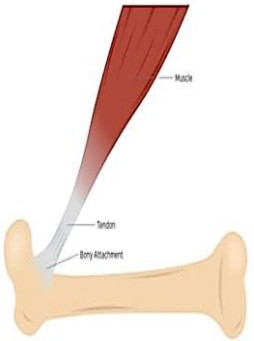
TASK 3: Draw and describe a simple diagram of the Hip Joint and label the bones that move around this (the Articulating Bones)

TASK 4: Describe a skill in a physical activity that involves both abduction and adduction of the hip joint.

Other components of joints

Structure of a synovial joint





Cartilage prevents the ends of bones rubbing together at joints.

Synovial fluid – lubricates the joint allowing the parts to move freely.

Ligaments – these are tough, elastic fibres that link bones to bones.

Tendons – These connect muscles to bones.

Other components of joints

Structure of a synovial joint

YOU NEED TO KNOW THESE!

Ligaments:
Bands of connective tissue that connect bone to bone & stabilise moment.

Cartilage:
Designed to reduce friction and act as a shock absorber for the joint

Synovial fluid:
Acts like an oil and lubricates the joint.

Tendons:
Attach Muscle to Bone (example - Achilles tendon)

A **Synovial Joint**
is a freely movable joint in which the bones surfaces are covered by cartilage, called **Articular Cartilage**, and connected by a **fibrous connective tissue** capsule lined with Synovial Fluid

Apply your knowledge

***TASK*: USE YOUR KNOWLEDGE OF THE SKETAL SYSTEM TO LABEL AS MUCH INFO AS POSSIBLE ON THE ATHLETE BELOW.**
(BONES / JOINTS /MOVEMENT ACTIONS).