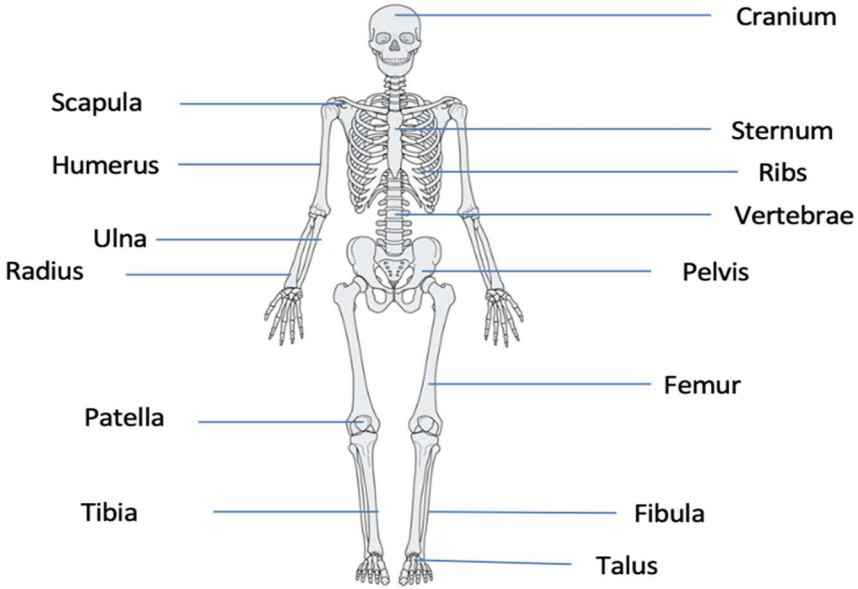
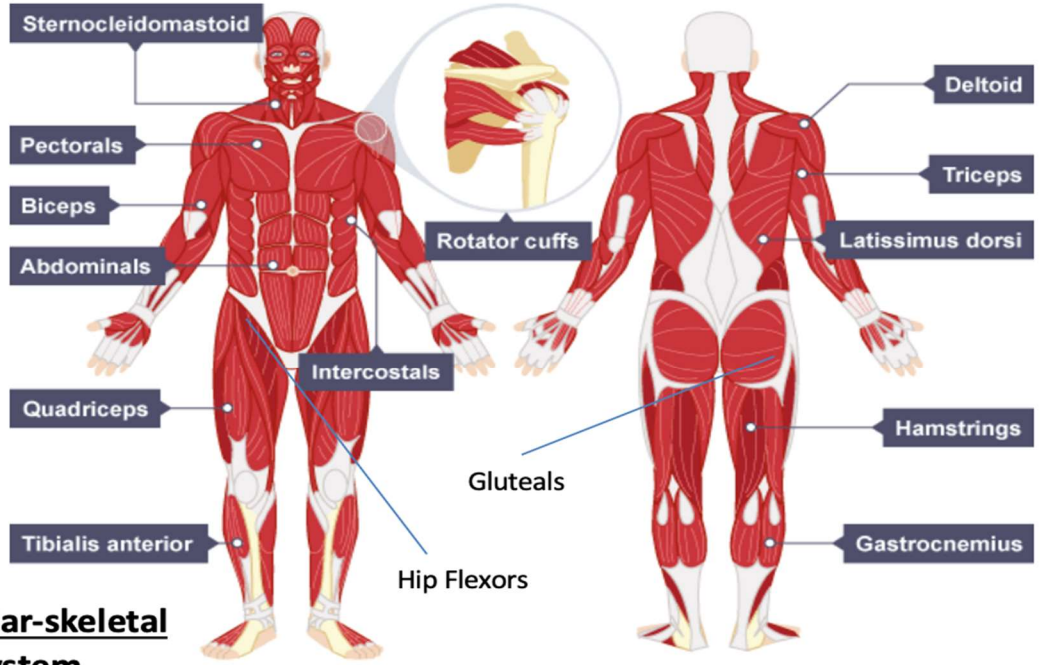




Muscular-skeletal system

Types of Muscle Contraction

Isotonic Contractions

These contractions occur when there is movement of the body. The ends of the muscles move closer together to cause the movement.

Isometric Contractions

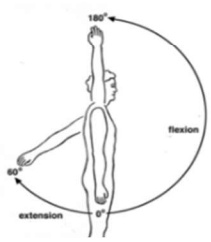
This type of contraction takes place when the body is being held in the same position. The length of the muscle during these contractions stays the same length.

Isotonic Concentric Contraction occurs when the muscle shortens e.g. biceps contracting concentrically during the upwards phase of a bicep curl / triceps contracting concentrically during the upwards phase of a press-up

Isotonic Eccentric Contraction occurs when the muscle lengthening (antagonist) is under tension. An eccentric contraction provides the control of a movement on the downward phase and it works to resist the force of gravity e.g biceps contracting eccentically when lowering the weight in a bicep curl / triceps contracting eccentically during the downwards phase of a press-up.

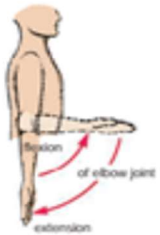
Flexion and extension at the shoulder

- The **Deltoid** causes flexion at the shoulder
- The **Latissimus dorsi** causes extension at the shoulder



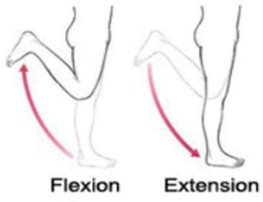
Flexion and extension at the elbow

- The **Biceps** cause flexion at the elbow
- The **Triceps** cause extension at the elbow



Flexion and extension at the knee

- The **Hamstrings** cause flexion at the knee
- The **Quadriceps** cause extension at the knee



Flexion and extension at the hip

- The **Hip Flexors** cause flexion at the hip
- The **Gluteals** cause extension at the hip

Flexion and extension at the ankle

- The **Tibialis Anterior** causes dorsiflexion at the ankle
- The **Gastrocnemius** cause plantar flexion at the ankle

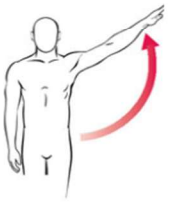
Rotation & Circumduction of the Shoulder

The **Rotator Cuff** causes rotation at the shoulder

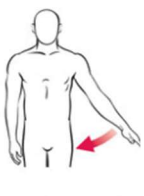
The **deltoids, latissimus dorsi, pectorals and rotator cuff** cause circumduction.

Abduction and Adduction at the shoulder

- The **deltoid** causes abduction at the shoulder
- The **Pectorals / Latissimus Dorsi** cause adduction at the shoulder



Shoulder abduction



Shoulder adduction

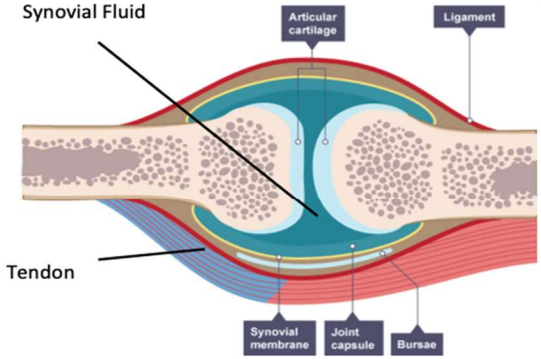
Function of the Skeleton

- **Support:** the bones are solid and rigid. They keep us upright and hold the rest of the body – the muscles and organs – in place.
- **Movement:** the skeleton helps the body move by providing anchor points for the muscles to pull against.
- **Structural shape and points for attachment:** the skeleton gives us our general shape such as height and build. The skeleton also provides anchorage points for the muscles to attach via tendons, so when muscles contract movement occurs.
- **Protection:** certain parts of the skeleton enclose and protect the body's organs from external forces e.g. the brain is inside the cranium. This function is especially important in activities that involve contact. E.g. rugby, boxing.
- **Production of Blood Cells:** the bone marrow in long bones and ribs produce red and white blood cells.
- **Mineral Storage:** bones store several minerals e.g. calcium, which can be released into the blood when needed.

Types of Bones

FLAT bones protect vital organs e.g. cranium protects your brain, ribs protect heart and lungs.
LONG bones enable gross (large) movements e.g. femur, tibia and fibula in the leg which allow us to run, humerus, radius and ulna in arm which allows us to throw a ball.
SHORT bones enable fine (small) movements e.g. fingers allowing you to spin a cricket ball.

Synovial Joints



Ligaments
Attaches bone to bone to keep the joint stable eg knee when kicking the ball or restricts movement/prevents movement to stop injury.
Cartilage
Found between bones and prevents friction by stopping the bones from rubbing together.
Synovial Membrane
Secrets synovial fluid.
Synovial Fluid
Is produced by the synovial membrane and helps lubricate the joint.
Joint Capsule
This is lined with synovial membrane. It encloses the joint making sure the cartilage and synovial fluid remain in place.
Bursae
Fluid filled sac providing cushion between bones and tendons. This stops friction at the joint.
Tendons
Attach muscle to bone. When a muscle contracts to move a joint, it is the tendon which pulls on the bone, keeps muscles/bones stable or holds join in place.

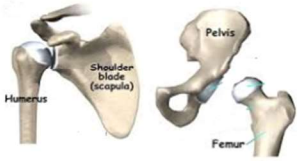
Bones Located at Joints

Head and Neck = Cranium and Vertebrae
Shoulder = Scapula and Humerus
Chest = Ribs and Sternum
Elbow = Humerus, Radius, Ulna
Hip = Pelvis, Femur

Knee = Femur, Tibia, Patella
Ankle = Tibia, Fibula, Talus

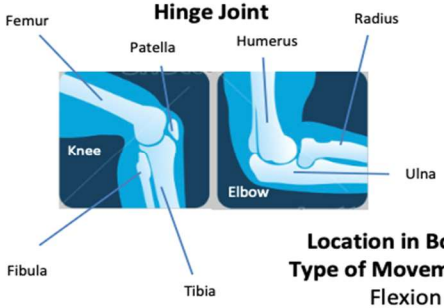
Musculo-skeletal System

Types of Joint
Ball and Socket Joint



Location in Body: Shoulder and Hip
Type of Movement Allowed by Joint:
Flexion, Extension, Adduction, Abduction, Rotation

Hinge Joint



Location in Body: Knee and Elbow
Type of Movement Allowed by Joint:
Flexion and Extension

Types of Bones

FLAT bones protect vital organs e.g. cranium protects your brain, ribs protect heart and lungs.
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How do MUSCLES WORK?

Muscles can only PULL they cannot push. This means that they must work in pairs to allow parts of the body to move back and forth. THESE PAIRS ARE CALLED **ANTAGONISTIC PAIRS.**

Antagonistic Pairs

- A muscle must work in partnership with another muscle to allow movement to occur.
- The muscle that causes the movement (the pulling muscle) is called the **AGONIST** or **PRIME MOVER**. When this muscle contracts in becomes shorter.
- During this time the other muscle within this partnership is relaxing. This muscle is called the **ANTAGONIST** and is lengthening while it relaxes.

EXAMPLES:
When we flex our elbow the bicep is the **agonist** and the tricep is the **antagonist**. However these roles are reversed when the elbow extends ,with the tricep becoming the **agonist** and the bicep becoming the **antagonist**.

When dorsiflexion occurs in our ankle the tibialis anterior is the **agonist** and the gastrocnemius is the **antagonist**. However these roles are reversed when plantar flexion occurs at the ankle, with the gastrocnemius becoming the **agonist** and the tibialis anterior becoming the **antagonist.**

BICEPS	TRICEPS
HAMSTRINGS	QUADRICEPS
GASTROCNEMIUS	TIBIALIS ANTERIOR
HIP FLEXORS	GLUTEALS
DELTOID	LATISSIMUS DORSI