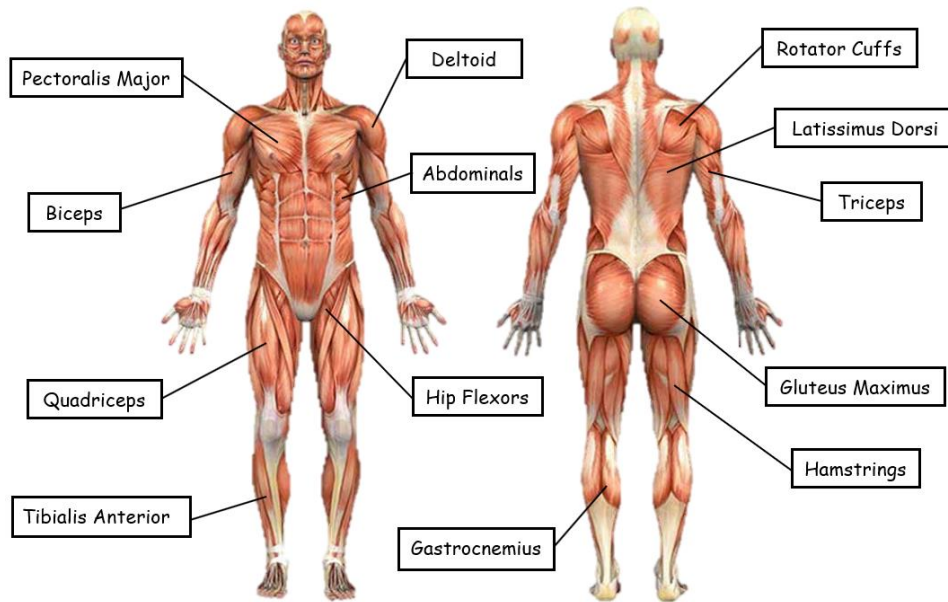















# Paper 1: The structure and functions of the musculoskeletal system (part 2)


## Voluntary muscles of the body:



## Muscles and their function:

Muscle	Location	Function	Sporting Example
 <b>Deltoid</b>	muscle on the upper arm and top of shoulder	Move the upper arm (shoulder) in all directions	Serve in tennis Front Crawl Cricket Bowling
 <b>Latissimus Dorsi</b>	Back muscle from the lower spine to the upper arm.	Adducts and extends the arm at the shoulder	Butterfly stroke Pull ups Rowing stroke
 <b>Rotator Cuff</b>	On the scapula in the shoulder	Rotation of the shoulder	Bowling in cricket Swimming front crawl
 <b>Pectoralis Major</b>	Muscle covering the chest	Adducts the arm at the shoulder	Forehand shot Hand off in rugby Boxing hook
 <b>Abdominals</b>	Side of the abdomen	Pulls the chest downwards Flexion of spinal column	Crunches
 <b>Biceps</b>	Front of Upper Arm	Elbow flexion (bending)	Boxing Uppercut Preparing to Throw a javelin
 <b>Triceps</b>	Back of Upper Arm	Elbow extension (straightening)	Throwing a javelin Hand off in rugby Boxing Jab
 <b>Gluteus Maximus</b>	Form the buttocks	Adducts & extends the hips pulling the leg backwards	Pull leg back before kicking a ball
 <b>Hip Flexors</b>	Front of the hip	Flexes the hip, moves the hip upwards	Lifting knees when sprinting
 <b>Quadriceps</b>	Front of Upper Leg	Knee extension (straightening)	Kicking a ball Jumping upwards on a lay-up shot
 <b>Hamstrings</b>	Back of Upper Leg	Knee flexion (bending)	Bending knee before kicking a ball
 <b>Gastrocnemius</b>	Calf muscle, attached by the Achilles tendon	Plantar flexion, points the toes	Running Diving and gymnastics
 <b>Tibialis Anterior</b>	Muscle that runs down the shin	Dorsi flexion, pulls toes upwards	Ski jumping Hurdling


## Antagonistic muscle pairs:



When we bend the elbow (flexion) the biceps contract and the triceps relax

**Agonist = Biceps**  
**Antagonist = Triceps**

E.g. upward phase of a bicep curl



When we straighten the elbow (extension) the triceps contract and the biceps relax

**Agonist = Triceps**  
**Antagonist = Biceps**

E.g. Straightening the arm to punch

## Other antagonistic pairs include:

- Quadriceps & Hamstrings
- Hip flexors & Gluteus Maximus
- Gastrocnemius & Tibialis Anterior

## Muscular contractions:

**Isotonic muscle contractions** are those that result in movement e.g. running and jumping

**Isometric muscle contractions** are when the muscle contracts but no movement e.g. holding a balance

## Concentric & eccentric isotonic contractions:

**Concentric muscle contraction** is when the muscle shortens during the contraction (positive/upward phase)

**Eccentric muscle contraction** is when the muscle lengthens during the contraction (negative/downward phase)



Upward phase of a bicep curl  
biceps are contracting concentrically



Downward phase of a bicep curl  
biceps are contracting concentrically