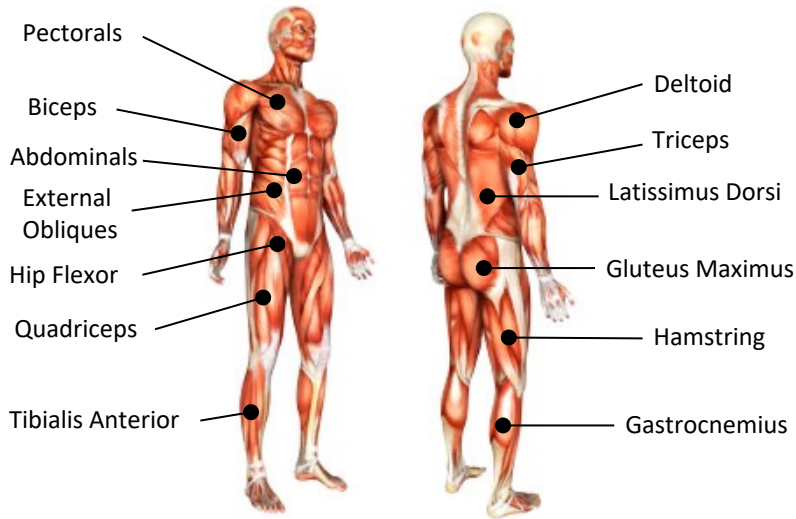


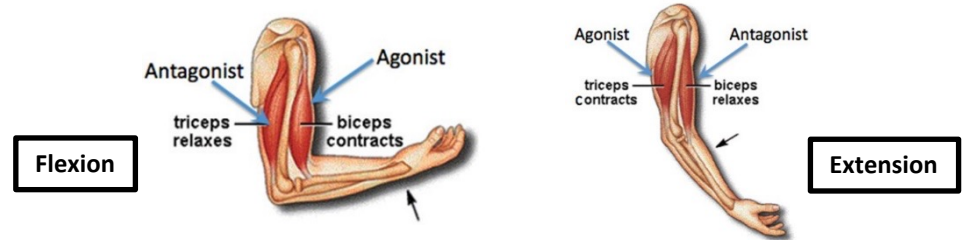
Millthorpe School GCSE Physical Education – The structure and functions of the muscular system

Structure of the muscular system



Antagonistic pairs - Muscles are arranged in antagonistic pairs.

As one muscle contracts (shortens) its partner relaxes (lengthens) *i.e.* **Biceps and Triceps**.



Agonist = the muscle that contracts to produce movement.

Antagonist = the muscle that relaxes to allow the movement to occur.

Examples in the body:

- Biceps & Triceps
- Quadriceps & Hamstring
- Hip Flexor & Gluteus Maximus
- Tibialis Anterior & Gastrocnemius

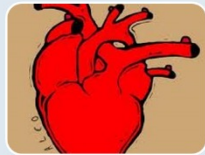
Types of muscle



Voluntary muscles enable movement throughout the body.



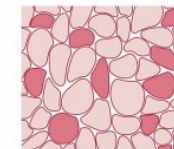
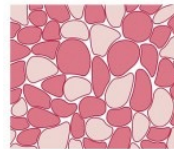
Involuntary muscles are essential in maintaining healthy body systems.



Cardiac muscle is vital in sport because it makes the heart pump. Fitness training will strengthen cardiac muscle making the heart more efficient at pumping blood around the body.

Muscle fibre types

Slow twitch muscle fibres (Type I)	Fast twitch muscle fibres (Type IIa)	Fast twitch muscle fibres (Type IIx/b)
<ol style="list-style-type: none"> 1. Smaller in size. 2. Work aerobically with high fatigue resistance. 3. Have a good oxygen supply = deep red in colour. 4. They contract slowly, but can work for long periods. <p>Marathon runner</p>	<ol style="list-style-type: none"> 1. Larger in size 2. Work anaerobically & linked to high intensity activities. 3. Are paler in colour and have limited oxygen supply. 4. They contract quickly and powerfully, but tire easily. <p>400/800m runner</p>	<ol style="list-style-type: none"> 1. Large in size 2. Work anaerobically & linked to extreme high intensity activities. 3. Very high speed of contraction but low fatigue resistance. <p>100m Sprinter</p>



Long Distance
Type 1
Slow twitch



400m / 800m
Type 2A
Fast twitch oxidative



Short Sprints
Type 2B
Fast twitch glycolytic

Low High
Fatigue rate

The short term effects of exercise on the muscles:

1. Working muscles produce heat
2. Increased muscle fatigue due to lactate accumulation
3. Blood is re-distributed to working muscles (Shunting)

Link of the muscular and skeletal system – both systems work together to produce movement. *i.e.* a contracting muscle pulls on a bone which changes the angle at a joint.