

## Key Vocabulary – Muscular System

**Voluntary Muscle** – muscles that are under your conscious control (biceps, quadriceps etc)

**Involuntary Muscle** – muscles that are not under your control (found in the organs, stomach, intestines)

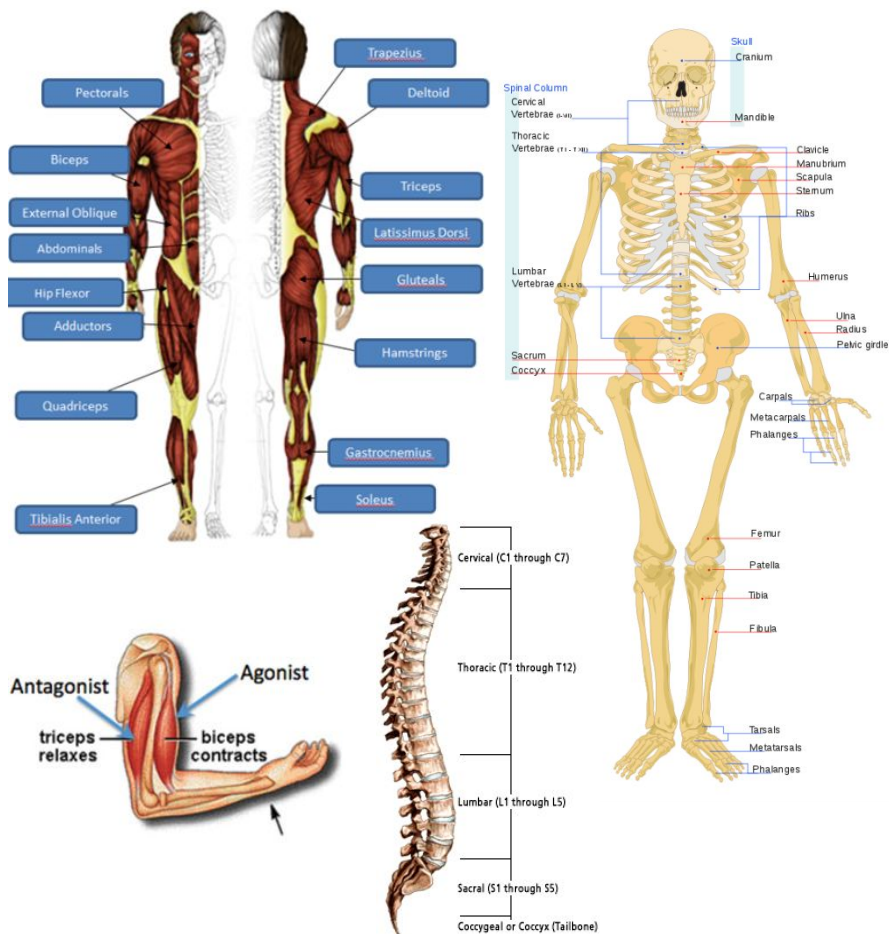
**Cardiac Muscle** – Found in the walls of the heart. Not under conscious control.

**Tendons** – attach muscle to bone

**Antagonistic Pairs** – a pair of muscles working together at a joint to create movement (one lengthens as the other shortens)

**Agonist** – a muscle that contracts and is directly responsible for the movement at a joint

**Antagonist** – a muscle that lengthens to allow movement at a joint.



## PE – YEAR 7

# Knowledge Organiser Muscular-Skeletal System

In this topic students will develop knowledge and understanding of the key body systems and how they impact on health, fitness and performance in physical activity and sport through the following content.

### 1.1 The structure and functions of the musculo-skeletal system

- 1.1.1 The functions of the skeleton applied to performance in physical activities and sports: protection of vital organs, muscle attachment, joints for movement, platelets, red and white blood cell production, storage of calcium and phosphorus
- 1.1.2 Classification of bones: long (leverage), short (weight bearing), flat (protection, broad surface for muscle attachment), irregular (protection and muscle attachment) applied to performance in physical activities and sports
- 1.1.3 Structure: cranium, clavicle, scapula, five regions of the vertebral column (cervical, thoracic, lumbar, sacrum, coccyx), ribs, sternum, humerus, radius, ulna, carpals, metacarpals, phalanges (in the hand), pelvis, femur, patella, tibia, fibula, tarsals, metatarsals, phalanges (in the foot), and their classification and use applied to performance in physical activities and sports
- 1.1.4 Classification of joints: pivot (neck - atlas and axis), hinge (elbow, knee and ankle), ball and socket (hip and shoulder), condyloid (wrist), and their impact on the range of possible movements
- 1.1.5 Movement possibilities at joints dependant on joint classification: flexion, extension, adduction, abduction, rotation, circumduction, plantar-flexion, dorsi-flexion and examples of physical activity and sporting skills and techniques that utilise these movements in different sporting contexts
- 1.1.6 The role of ligaments and tendons, and their relevance to participation in physical activity and sport
- 1.1.7 Classification and characteristics of muscle types: voluntary muscles of the skeletal system, involuntary muscles in blood vessels, cardiac muscle forming the heart, and their roles when participating in physical activity and sport
- 1.1.8 Location and role of the voluntary muscular system to work with the skeleton to bring about specific movement during physical activity and sport, and the specific function of each muscle (deltoid, biceps, triceps, pectoralis major, latissimus dorsi, external obliques, hip flexors, gluteus maximus, quadriceps, hamstrings, gastrocnemius and tibialis anterior)
- 1.1.9 Antagonistic pairs of muscles (agonist and antagonist) to create opposing movement at joints to allow physical activities (e.g. gastrocnemius and tibialis anterior acting at the ankle - plantar flexion to dorsi flexion; and quadriceps and hamstrings acting at the knee, biceps and triceps acting at the elbow, and hip flexors and gluteus maximus acting at the hip - all flexion to extension)
- 1.1.10 Characteristics of fast and slow twitch muscle fibre types (type I, type IIa and type IIx) and how this impacts on their use in physical activities
- 1.1.11 How the skeletal and muscular systems work together to allow participation in physical activity and sport

## Key Vocabulary – Skeletal System

**Protection** – flat bones protect the vital organs in the body

**Movement** – long bones make levers and joints which enable us to move

**Muscle attachment** – Muscles attach to bones by tendons which allows us to move

**Blood Cell production** – red and white blood cells and platelets are produced in the bone marrow

**Mineral storage** – calcium and phosphorus are stored in bones

**Short bones** – weight bearing

**Irregular bones** – protection and weight bearing

**Pivot** – a type of joint found at the neck and elbow

**Hinge** – a joint found at elbow ankle and knee

**Ball and Socket** – a joint found at the shoulder and hip

**Condyloid** – a joint found at the wrist

**Flexion** – lessening of the angle at a joint

**Extension** – increasing of the angle at a joint

**Adduction** – moving towards the mid-line of the body

**Abduction** – moving away from the mid-line of the body

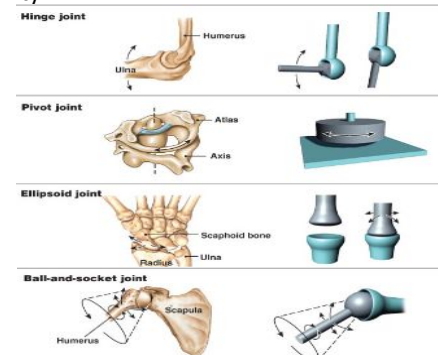
**Rotation** – moving around a fixed point

**Circumduction** – conical movement around a joint

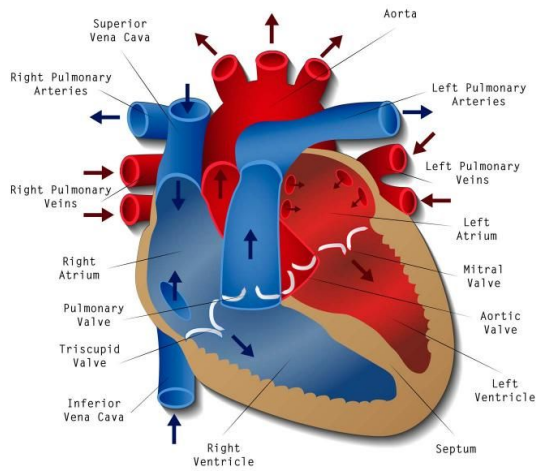
**Plantar-flexion** – pointing the toes

**Dorsi-flexion** – pulling the toes back towards the shin

**Ligament** – attaches bone to bone to provide stability



# Diagram of human heart



# PE – YEAR 7 Knowledge Organiser Cardio-vascular System

## 1.2 The structure and functions of the cardio-respiratory system

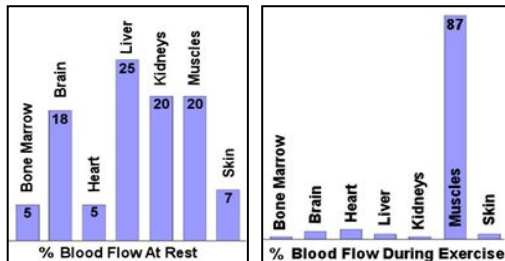
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| 1.2.1 | Functions of the cardiovascular system applied to performance in physical activities: transport of oxygen, carbon dioxide and nutrients, clotting of open wounds, regulation of body temperature  |
| 1.2.2 | Structure of the cardiovascular system: atria, ventricles, septum, tricuspid, bicuspid and semi-lunar valves, aorta, vena cava, pulmonary artery, pulmonary vein, and their role in maintaining blood circulation during performance in physical activity and sport |
| 1.2.3 | Structure of arteries, capillaries and veins and how this relates to function and importance during physical activity and sport in terms of blood pressure, oxygenated, deoxygenated blood and changes due to physical exercise                                     |
| 1.2.4 | The mechanisms required (vasoconstriction, vasodilation) and the need for redistribution of blood flow (vascular shunting) during physical activities compared to when resting  |
| 1.2.5 | Function and importance of red and white blood cells, platelets and plasma for physical activity and sport  |

## Key Vocabulary - Cardiovascular System

- Cardio** – Heart
- Vascular** – blood vessels (arteries, veins, capillaries)
- Arteries** – Carry blood away from the heart, thick wall, high blood pressure, wide lumen
- Veins** – Carry blood back to the heart, narrow lumen, valves, low blood pressure
- Capillaries** – very thin walls (one cell thick), very narrow lumen
- Lumen** – the space inside a blood vessel that blood travels through
- Haemoglobin** – the oxygen carrying part of red blood cells
- Anaemia** – low red blood cell count
- White blood cells** – destroy pathogens which cause illness
- Platelets** – formed in bone marrow, block cuts in the skin by clotting
- Plasma** – straw coloured liquid in the blood which carries minerals, antibodies and waste products
- Atria** – upper chambers of the heart
- Ventricle** – lower chambers of the heart
- Septum** – divides the heart preventing oxygenated and deoxygenated blood from mixing
- Vena Cava** – deoxygenated blood enters the heart through this valve
- Aorta** – Carries oxygenated blood away from the heart to the body
- Vascular Shunt** – restricting blood flow to certain parts of the body during exercise and increasing blood flow to where it is needed (muscles)
- Vasodilation** – increasing the volume of the capillaries to increase blood flow
- Vasoconstriction** – decreasing the volume of the capillaries to restrict blood flow
- Gaseous Exchange** – the process by which oxygen diffuses from the air in the alveoli into the blood while carbon dioxide moves from the blood into the alveoli

## Important Ideas:- Vascular Shunting

When you start to exercise, muscles need more oxygen to help you move. Your heart beats faster and blood vessels that take blood to non-active areas constrict, which stops as much blood flowing to them. This extra blood is redirected to the working muscles because the blood vessels that lead to the muscles dilate and increase blood flow – this is called **Vascular Shunting**. The amount of blood supplied to working muscles depends on the level of intensity that the performer is working at. More blood is supplied to muscles when the performer is working harder.



## Gas Exchange Between Alveoli and Capillaries

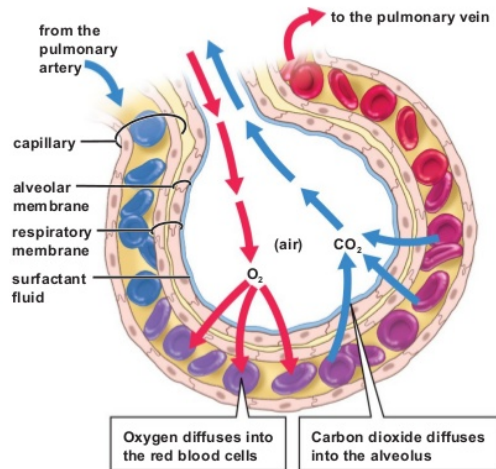


Fig. 33-9

Deoxygenated blood (low in O<sub>2</sub> / high in CO<sub>2</sub>) is pumped from the heart to the lungs. The capillaries have very thin walls, so CO<sub>2</sub> can diffuse through into the alveoli and be exhaled. Oxygen diffuses through from the alveoli in to the blood and returns to the heart to be pumped around the body.