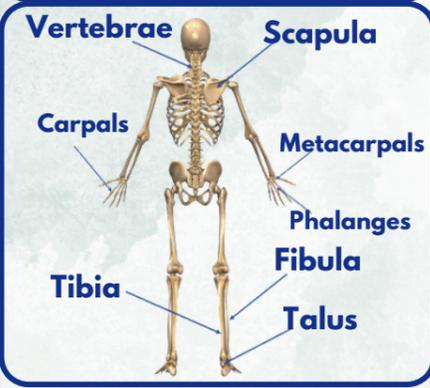
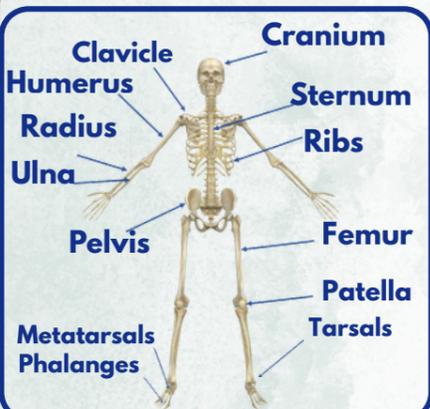


OCR GCSE PE: Systems of the Body Part 1

The Skeletal System



Functions of the skeletal system:-

- Movement
- Support
- Blood Cell Production
- Muscle attachment
- Protection of vital organs
- Mineral storage (e.g. Calcium/Phosphorus)

Types of Bones:-

- Long Bones
- Short Bones
- Flat Bones
- Irregular Bones

Ball & Socket Joints

- Shoulder Joint
- Hip Joint

Hinge Joints

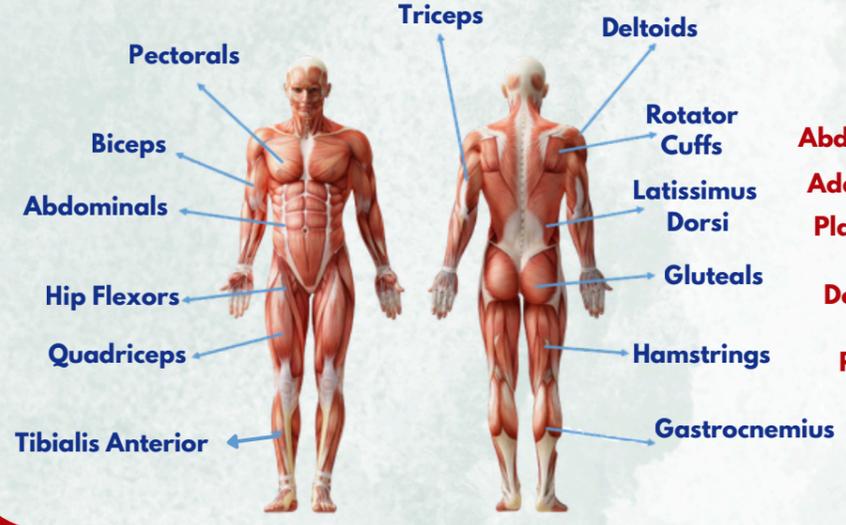
- Elbow Joint
- Ankle Joint
- Knee Joint

→ Joints allow **movement and rotation**.
→ Synovial joints are where **two or more bones** meet.

Role of Joints

- **Ligaments** - Connect bones to bones
- **Cartilage** - Protects joints and bones
- **Tendons** - Connect bones to muscle tissue

The Muscular System



Joint Actions

Flexion - narrowing of the angle at a joint
Extension - widening of the angle at a joint
Abduction - movement away from the body midline
Adduction - movement towards the body midline
Plantarflexion - widening of the angle at the ankle joint
Dorsiflexion - narrowing of the angle at the ankle joint
Rotation - the action of rotating around an axis
Circumduction - action of rotating 360 degrees around an axis

Antagonistic Pairs

CONTRACTS = Agonist
RELAX = Antagonist

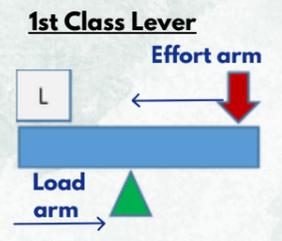
Fixator Muscle

This is a muscle which acts as a stabiliser and helps the agonist work effectively during movement

Lever Systems

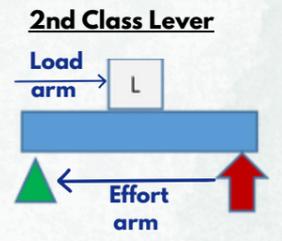
1st Class → Fulcrum in the Middle
2nd Class → Load in the Middle
3rd Class → Effort in the Middle

Fulcrum - The axis around which the lever rotates
Load - The force of the thing that you want to move
Effort - The force that is applied by the user of the lever system



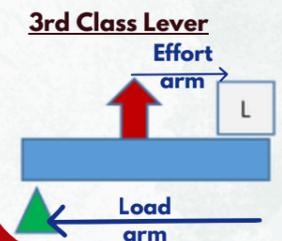
1st Class Lever
 A First Class Lever System may have a **mechanical advantage** or a **mechanical disadvantage** depending on the length of the effort arm in relation to the load/resistance arm.

Mechanical Advantage = Effort Arm ÷ Resistance Arm.



2nd Class Lever
 A Second Class Lever System will **always have a mechanical advantage** due to the effort arm being longer than the load arm.

Greater the effort arm in comparison to the resistance arm, the greater the mechanical advantage, therefore less effort is needed to lift a large load



3rd Class Lever
 A Third Class Lever System will **always have a mechanical disadvantage** due to the load arm being longer than the effort arm.

Planes and Axes

Planes of Movement



Frontal Plane

- Divides body front to back
- Movement in sideways direction



Sagittal Plane

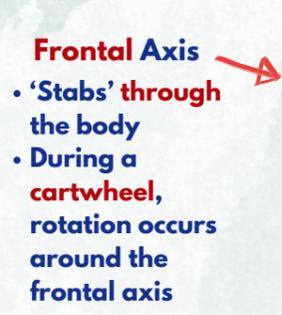
- Splits body down the midline (left and right side)
- Walking or running forward



Transverse Plane

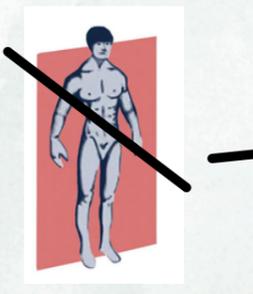
- Divides the body across the middle so there is top and bottom section
- Spinning takes place within the transverse plane

Axes of Rotation



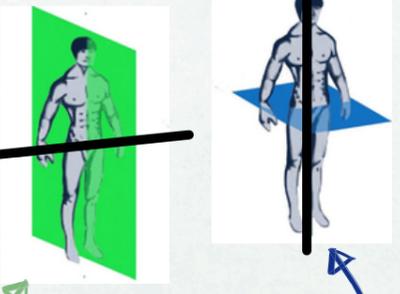
Frontal Axis

- 'Stabs' through the body
- During a cartwheel, rotation occurs around the frontal axis



Transverse Axis

- Runs 'hip to hip'
- During a forward roll, rotation occurs around the sagittal axis



Longitudinal Axis

- The Longitudinal Axis runs through the body as a vertical line
- Spinning takes place along the longitudinal plane

1st Class Lever Systems
Rowing
 Load - Water
 Fulcrum - Top of Oar
 Effort - Biceps
Tricep Dip
 Load - Body weight through the hands
 Fulcrum - Elbow
 Effort - Triceps

2nd Class Lever Systems
Long Jump
 Fulcrum - Balls of the Feet
 Load - Bodyweight through the centre of the foot
 Effort - Gastrocnemius
Kicking a Ball
 Fulcrum - Knee
 Effort - Quadriceps
 Load - Ball

3rd Class Lever Systems
Bicep Curl
 Fulcrum - Elbow
 Effort - Biceps
 Load - Dumbbell/Barbell

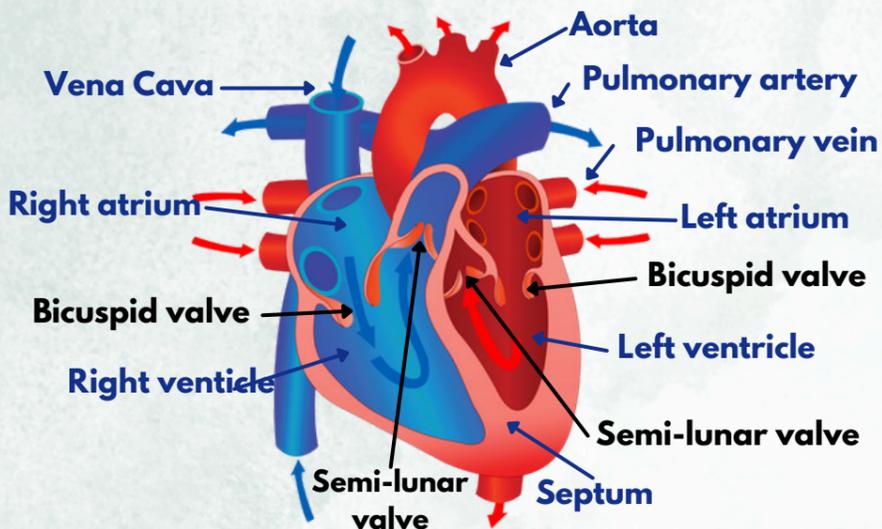


The PE Classroom

OCR GCSE PE: Systems of the Body

Part 2

The Cardiovascular System



Vasodilation
Blood vessels become wider, increasing blood flow to the working/active muscles

Vasoconstriction
Blood vessels become narrower, reducing blood flow to less active/inactive areas.

Red Blood Cells

Also known as Erythrocytes

- Transport oxygen muscles
- Transport carbon dioxide to lungs
- Contains haemoglobin to carry oxygen
- Lacks a nucleus to maximise oxygen carrying space



Arteries carry blood away from the heart at high pressure → Thick & muscular walls

Veins carry blood towards the heart at low pressure → Thin walls

Capillaries connect arteries and veins, allowing diffusion of gases → Very thin walls

Heart Rate (HR) No. beats per minute

Stroke Volume (SV) Amount of blood ejected each heart beat

Cardiac Output (CO) Heart Rate x Stroke Volume
Amount of blood ejected from the heart each minute

Lactic acid builds up in anaerobic exercise due to the lack of oxygen (known as oxygen debt) in muscles - this is toxic and causes cramp



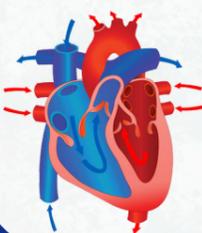
Short-Term Effects of Exercise

Increased muscle temperature
Redistribution of blood towards working muscles (oxygen)



Increased lactic acid production/oxygen production

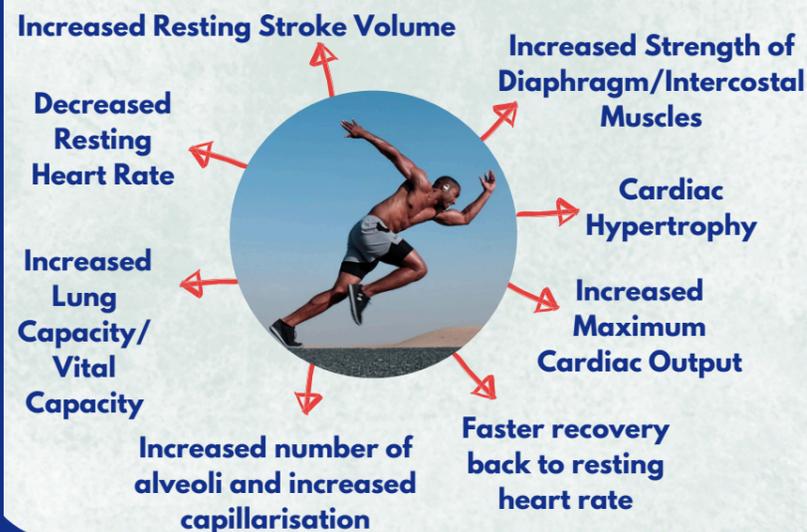
Increased respiratory rate, tidal volume, minute ventilation



Increased heart rate, stroke volume & cardiac output

Long-Term Effects of Exercise

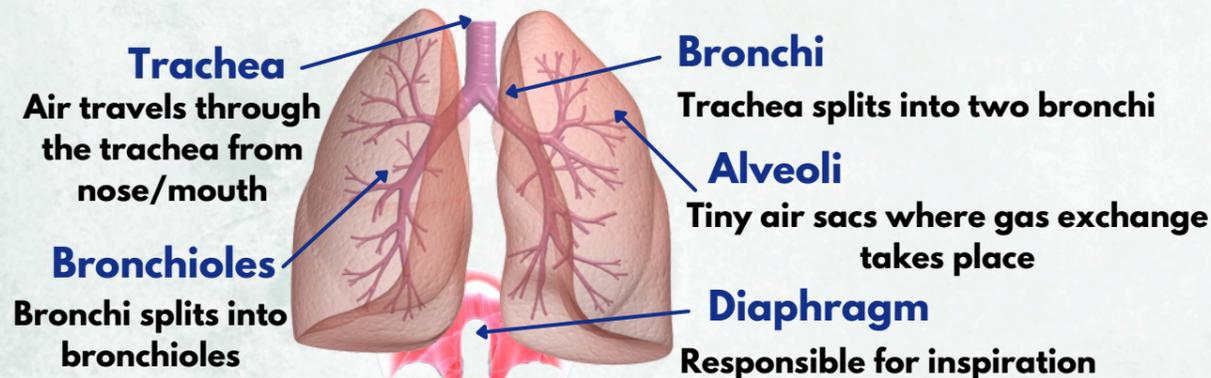
Cardio-Respiratory System



Musculoskeletal System

- Increased Bone Density → Weight bearing activities such as jogging strengthen the muscles and bones
- Muscular Hypertrophy → Increase in size and strength of skeletal muscles
- Increased Strength of Ligaments/Tendons → This will mean that an athlete is less likely to pick up injuries
- Increased resistance to fatigue → Muscular endurance will be improved

The Respiratory System



Respiratory muscles and breathing

Inhalation: Diaphragm contracts - dome → flatter shape
Intercostal muscles contract - expands the ribcage outwards and upwards

Exhalation: Diaphragm relaxes - flatter shape → dome
Intercostal muscles relax - ribcage moves inwards and downwards

	Inhaled Air	Exhaled Air
Oxygen	21%	16%
Carbon Dioxide	0.04%	4%

Alveoli - Site of Gas Exchange

The oxygen in the alveoli diffuses into the bloodstream and is transported to the working muscles

The CO₂ from the bloodstream diffuses into the alveoli in order to be exhaled by the lungs

Breathing Rate: The number of breaths taken in a minute

Minute ventilation: The volume of gas inhaled or exhaled from the lungs per minute

Tidal volume: The amount of air which enters the lungs during normal inhalation at rest or during exercise