

	Movement.	Explanation.
Pair 1	Flexion	Bending a part of the body away from the body
	Extension	Straightening a part of the body
Pair 2	Abduction	Sideways movement away from the body
	Adduction	Sideways movement towards the body
Pair 3	Rotation	Rotating on itself on an imaginary axis
	Circumduction	Moving a limb in circles
Pair 4	Plantar flexion	Moving toes away from the tibia
	Dorsiflexion	Moving toes towards the tibia

Muscle: a band of fibrous tissue which contracts to produce movement, there are between 650 and 840 muscles in the body, here are the main voluntary muscles.

Sport.	Muscle.	Action.
Swimming	Trapezius	Rotates and holds the shoulder and moves your head
Badminton	Deltoids	Rises the arms forwards, backwards and sideways
Tennis	Pectorals	Moves the arms through adduction
Archery	Biceps	Bends the arm at the elbow
Javelin	Tricep	Straightens the arm
Pull ups	Latissimus dorsi (lats)	Pulls the arms down or towards you
Rowing	Abdominals (abs)	Flexes your spine

Sprinting	Hip flexors	Supports the upwards movement of the leg and knee
Hurdling	Gluteals	Biggest muscle. Pulls your leg back and sideways at the hip
Jumping	Quadriceps (quads)	Straightens the leg
Football (kick)	Hamstring	Bends the leg at the knee
Cycling	Gastrocnemius (calves)	Straightens the ankle joint
Walking	Tibialis anterior	Helps with dorsiflexion

Tendon: A strong band of fibrous tissue that anchors the muscle to a bone and allows movement to happen, they have limited elasticity.

Exercising regularly brings many benefits to the muscles, for example when the muscle will increase in size and strength which will help to stabilise and have a good posture.

Muscles in the skeleton only pull in one direction therefore they always come in pairs. For example the biceps and triceps, when the biceps contracts the triceps relaxes.

Origin: the point where a muscle joins a stationary bone.

Insertion: the point where a muscle joins a moving bone.

Origin, insertion and joints of the main voluntary muscles:

Origin	Joint	Insertion	Joint	Muscle
Scapula	Shoulder	Radius	Elbow	Biceps
Scapula	Shoulder	Ulna	Elbow	Triceps
Femur	Hip	Tibia	Knee	Quadriceps

Unit 3

Circulatory system: The body's transport system which consists of the lungs, heart, blood and blood vessels.

Blood: A liquid composed of 4 components; plasma, red blood cells, White blood cells and platelets.

Haemoglobin: A dark red chemical in the blood which contains iron so oxygen can bond to it and therefore transport it.

Oxyhaemoglobin: A bright red chemical which is formed when oxygen bonds in the iron in haemoglobin.

Blood vessels: There are 3 different types of vessels (tubes) that carry the blood, arteries, veins and capillaries.

The circulatory system is the method by which oxygen and nutrients travel all around the body. The oxygen travels through the blood, there are 2 types of blood: oxygenated (contains oxygen) and deoxygenated (does not contain oxygen).

The 4 components of blood are:

- Plasma – it's mainly water so the other substances can dissolve in it
- Red blood cell – contain haemoglobin to form oxyhaemoglobin
- White blood cell – part of the immune system, it defends the body from pathogens (diseases); there are 2 main types, lymphocyte (creates antibodies to kill the pathogens) and phagocyte (engulfs in the pathogen and kills the pathogens)
- Platelets – contains enzymes which cause blood to clot and prevent bleeding

Double circulation: The heart has a double pump and circulation; the pulmonary circuit (on the right side) pumps blood towards the lungs and back to the heart and the systemic circuit (on the left side) pumps blood towards the body and back to the heart.

The heart is divided in 2 sides and composed of 4 chambers which are divided into the left and right ventricles (at the bottom) and the left and right atria (at the top). Both sides are separated by a thick, muscular wall called the septum to ensure that the oxygenated and deoxygenated blood does not mix and that the blood only flows in one direction. The heart also contains valves to prevent the backflow of blood. *Be careful in exams as the left side on the heart will be on the right side of the diagram and viceversa.*

Search diagram of the heart as this summary does not include pictures.

Heart: A muscular organ which contracts (to force blood out) and expands to allow blood inside, the blood leaves through the arteries and comes back through the veins.

The heart works in a sequence. First both atria contract at the same time and then both ventricles contract too. The heart pumps blood in 2 stages:

1. Deoxygenated blood from the body enters via the vena cava into the right atrium which then contracts forcing the blood out to the right ventricle, then the right ventricle contracts propulsing blood through the pulmonary artery into the lungs.
2. Oxygenated blood from the lungs enters the heart through the pulmonary vein into the left atrium which then contracts forcing blood into the left ventricle,

A trained athlete will be able to remove lactic acid as fast as it's produced in their muscles, if they increase the intensity more lactic acid will be produced than their muscles can remove. Regular exercise will help tolerating lactic acid through a method of training called interval training (very intense with periods of rest). During interval training the period of intense exercise is when the lactic acid and the period of rest is where is removed, this helps the body to tolerate lactic acid.

Unit 5

Forces: Used during sports (sometimes in very big quantities which can be controlled) it's a push or a pull applied on an object, measured in Newtons (N).

Inertia: the force of an object upon a change of motion.

Newton's First Law of Motion:

An object in motion stays in motion in the same direction and speed, and stays at rest unless it's affected by an external force.

Force is required to:

- Move an object at rest
- A moving object to change direction
- Change the shape of an object

Effect of Force
Cause a resting object to move
Cause a moving object to change direction
Cause an object to accelerate
Cause an object to decelerate
Cause an object to change shape

Mass: The amount of matter in an object/body without taking into account its volume or external forces applied to it.

Acceleration: the rate at which an object changes speed (acceleration is positive while deceleration is negative), it's measured in meters per second squared.

$$\text{Force (N)} = \text{Mass (kg)} \times \text{Acceleration (m/s}^2\text{)}$$

An object's mass is how heavy it is without gravity. The more matter the more it weighs and the bigger the mass, the bigger the mass the harder it's to move.

Newton's Second Law of Motion:

An object will accelerate when acted upon by an external force. The acceleration is proportional to the force and is in the same direction that the force acts.

An object will accelerate and reach a maximum speed then the object will start to decelerate (negative acceleration).

Newton's Third Law of Motion:

For every action there is an equal and opposite reaction

Gravity: The force which attracts any object/body with mass towards the ground.

Muscular force: A pull or a push applied to an object provoked by a contraction in the muscles.

Weight				
Includes lifting weights. The repetitions are the number of lifts and a set is the number of times a weight activity is completed.	Power, speed, strength and muscular endurance.	Easy to show progression, improves muscle strength, power and size.	Can be expensive as equipment is needed and it's prone to injuries.	Risk of overtraining, use correct technique and a spotter if needed.
Plyometric				
Eccentric muscle movement, the methods are squats jumps or box jumps.	Power and explosive strength.	Provides more energy, provides fast and powerful movements and the muscles will get stronger.	Muscles will be put under lots of stress and there is no benefit towards aerobic fitness. It may require equipment.	Risk of injury and use correctly of the equipment.
HIIT (High-Intensity Interval Training)				
Involves intense exercise and rest to allow the lactic acid and the excess of CO ₂ to be removed, it can be for a short period of time.	Muscular endurance, speed and anaerobic fitness.	Combines aerobic and anaerobic exercise, can be adapted according to fitness level and no special equipment is needed.	Can be boring and it needs to include rest.	Time limitation, risk of overtraining and correct use of equipment.

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Mechanical is the equipment you may need to start learning a skill.

	Advantages	Disadvantages
Visual guidance	Accurate, demonstrations can be repeated, slow motion in videos Works very good and it's useful at all levels of learning	Poor-quality videos will not work and the demonstrations need to be perfect to learn from
Verbal guidance	Can act as soon as instructions are heard and it can be combined with visual guidance which is very effective	Can be hard to understand the instructions, specially for begginers and some movements cannot be well explained with words
Manual/Mechanical guidance	Useful in the early stages of learning, very useful to develop muscle memory, can be in a safe environment and gives the sense of security	Learners can become dependent and can give learners unrealistic feelings.

Coaches should modify their guidance according to the level of their student. As they learn, they guidance should change as the performer produces.

Unit 9

Goal: A wanted aim or result which you are trying to achieve.

Performers set goals to reach their personal best, get into the first/better team, win the league or get a call from the national team; setting goals is a good motivator which can give direction to prepare physically and mentally.

Goals should be **SMARTER**: **S**pecific (target-specific), **M**easurable (the performer should be able to measure if the goal has been achieved), **A**greed (your coach should agree on the goal with the performer), **R**ealistic (if too difficult it could demotivate the

Official	Help to make correct decisions and improve communication	Reversed decisions may lead to officials being undermined and they may become too dependant on technolo
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Unit 11

PEDs: Performance-enhancing drugs are chemical substances that change the chemical balance of the body when taken, this affects the performer's ability giving an unfair advantage.

Doping: The illegal use of PEDs by athletes to improve performance.

Ethical: Related with moral or principals being honest and following the correct code of conduct.

Reasons why athletes use PEDs:

- Natural ability is not good enough
- Influence of others
- To be the best
- To improve performance
- To even things with other athletes who already use PEDs
- To build muscle faster
- To succeed
- To calm themselves
- To recover faster

Performers who take PEDs know their consequences; banned, damage reputation, losing sponsorship and negative health side effects.

R	Rest	Stop and protect
I	Ice	Apply ice when to reduce the pain and minimise swelling for 15-20min every 2-3 hours. Avoid the ice touching the skin directly
C	Compression	Wrap the area in an elastic bandage to decrease swelling
E	Elevation	Keep the injured body part raised above heart level when possible, this may help reduce swelling

Injury	Description	Treatment
Muscular	Overstretched or torn caused when muscles are overused and is common in the legs and back	RICE and limited training
Tendon	Overstretched or torn, inflamed tendons (tendonitis), usually happens during Sharp activities	RICE, reduce training and rest and painkillers if needed
Dislocation	Caused by a sudden force that moves the joint out of place	RICE and go to the hospital to relocate or operate if needed
Ligament	Also known as a sprain, caused by the ligaments being twisted or pulled past their range of motion	RICE and severe pain and lack of movement could indicate serious injury which could involve operation

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