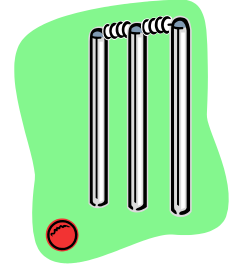
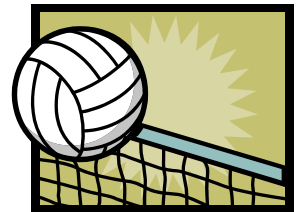
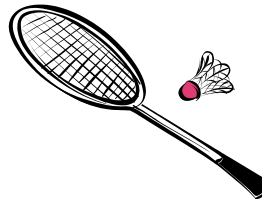


GCSE



PHYSICAL EDUCATION

REVISION BOOKLET



A1 - Reasons for taking part in activity



SOCIAL	MENTAL	PHYSICAL
<ul style="list-style-type: none"> • Develops friendships and social mixing • Co-operation • Competition • Physical Challenge • Aesthetic appreciation 	<ul style="list-style-type: none"> • Helps relieves stress/tension • Helps relieve stress related illness 	<ul style="list-style-type: none"> • Helps individual to feel and look good • Enhances body shape • Contributes to good health and enjoyment of life

KEY DEFINITIONS



- **Health** - State of complete mental, physical and social well-being.
- **Fitness** - The ability to meet demands of the environment
- **Exercise** - Form of physical activity done primarily to improve one's health and physical fitness



CARDIOVASCULAR FITNESS

- the ability of the heart to pump blood and deliver oxygen where needed in the body. Relies on a healthy heart, blood and blood vessels

Examples

- Playing 90 minutes in football matches
- Playing Cricket matches that could last for 3-5 days
- Running in a marathon

MUSCULAR ENDURANCE - The ability of muscles to move weight over a long period without tiring

Examples

- Long distance walking
- Long distance running
- Long distance swimming

STRENGTH is defined as the ability to lift a maximum weight in one attempt

Muscular strength - Can be seen in person lifting heavy weights.

Examples

- **DYNAMIC** - required to start and maintain movement of the body *e.g. cycling or doing loads of press-ups*
- **EXPLOSIVE** - required when a high amount of force has to be applied quickly *e.g. shot putting*
- **STATIC** - required when applying strength to a fixed static object *e.g. pushing in a rugby scrum*

FLEXIBILITY -

movement at a joint to its fullest range

Examples

- Hurdling in athletics
- Gymnastics - performing complex sequences
- Swimming -

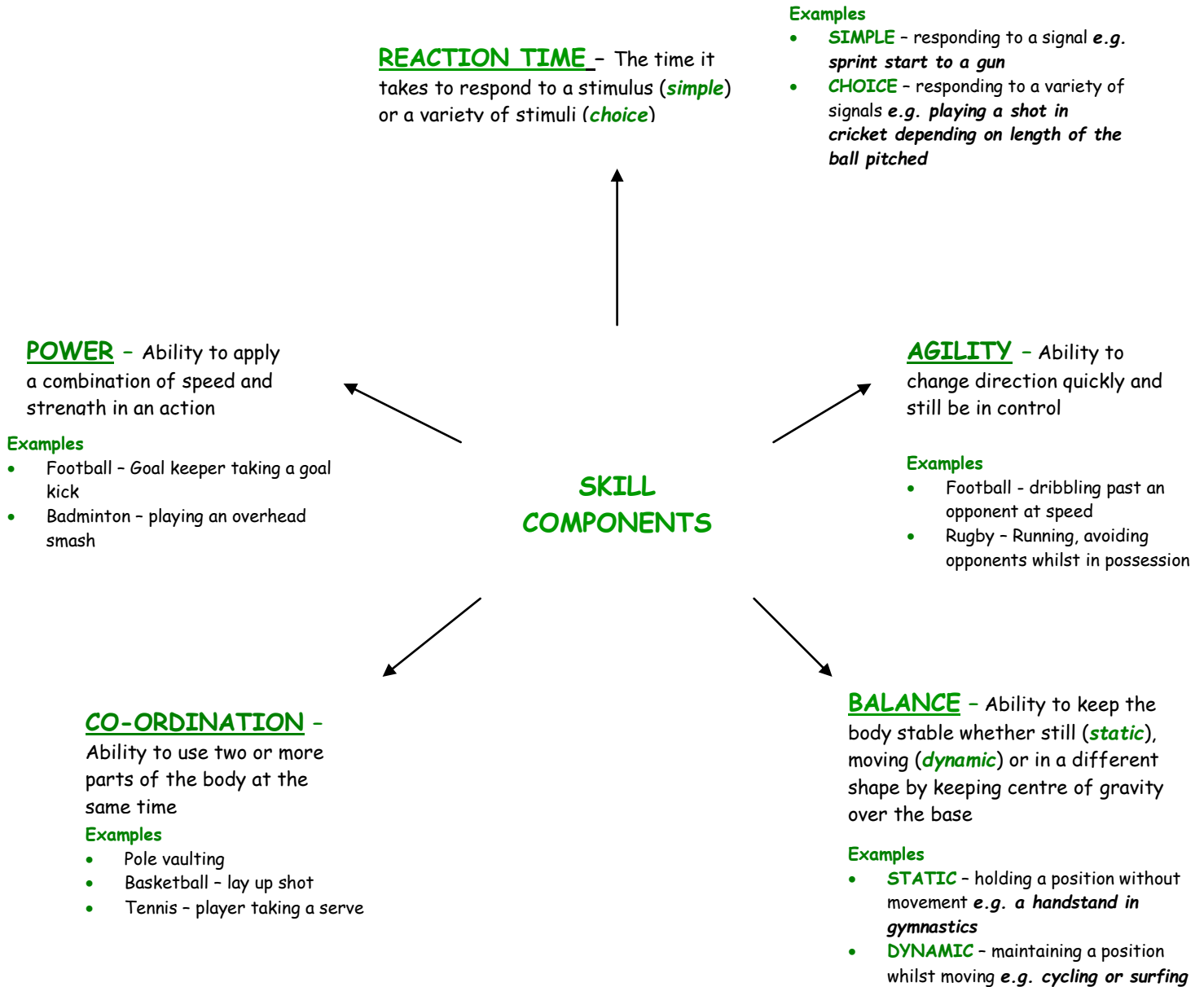
SPEED - Fastest rate at which a person can complete a task or cover a distance

Examples

- Running fast - 100m sprint
- Throwing a cricket ball at the stumps to get a run out

HEALTH RELATED COMPONENTS

A3 - SKILL RELATED FITNESS



There are several training principles, each influencing the training of the performer in a different way. Good training takes into account all of the principles and their effects on the body.

S.P.O.R.T. Principles

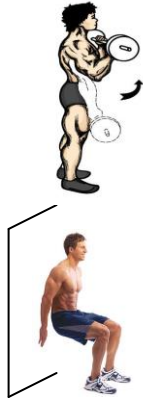
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- **SPECIFICITY** - Understanding the needs of the game or event, e.g. a goalkeeper will include reaction work in their training. The pace of training should be consistent to the pace of the game. Also the actions should be the same in training as it is in match situations e.g. *a swimmer needs to spend most of their time in the water.*
 - **PROGRESSION** - Exercising at the same degree of difficulty all the time will only maintain current fitness levels. Your body needs to be put under more pressure in order to improve. The easier a session is to complete, the performer should start to progress the next session.
 - **OVERLOAD** - Putting greater demands on the body by exercising. This can improve fitness. The point where exercise is demanding enough to have an effect on the body is called the '**threshold of training**'. There are 3 ways;
 - **Frequency** - number of sessions e.g. up to 3 per week
 - **Intensity** - increasing distances run, repetitions or weight
 - **Duration** - length of training sessions
 - **REVERSIBILITY** - The body will increase in strength, tone and skill with exercise; however it also loses them without it. After injury or illness, an athlete can lose their strength and skill, up to 3x as fast as they gain it - '**If you don't use it, You lose it!**'
 - **TEDIUM** - Use different ways of training to give variety, keep interest and avoid boredom. e.g. *go bike riding instead of running*
 - **INDIVIDUAL NEEDS** - Whether training to compete or training for health, everyone has different needs. People vary in height, size, shape and preference. Therefore, even though they have the same goals they may not reach them by the same means.

F.I.T.T PRINCIPLES

- F**
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- FREQUENCY** - How often the exercise is done (be it an individual set or the whole session) - e.g. *Training 3 times a week or 2 per day.* Elite performers train more frequently to achieve results good enough. Remember, the body needs time to recover so training very, very hard, every day can be harmful even to an elite performer.
- INTENSITY** - The difficulty of the exercise - could be the amount of weight or the speed you move. Consider cardiovascular fitness, your pulse rate can show you how intensely you're working. Fitness will increase by working in 60-80% target zone of the maximum heart rate, e.g. *Training with heart rate of 120bpm - 160bpm.* Strength training is similar, by calculating 60-80% of their maximum weight they can lift and working to it.
- TIME** - The duration of the Exercise. Keeping your pulse at 60-80% of its maximum for 2minutes is the target. The time begins once the pulse rate hits 60%. The warm up is not included. Also you can vary the duration of each session e.g. *30mins, 45mins or 60mins*
- TYPE** - What kind of exercise you do - For general fitness then personal preference to suit the individual is usually done e.g. *swimming, cycling or running.* But if its for a specific activity then choice becomes limited as it should reflect the activity. However remember to vary to keep interesting and work all different muscle groups

TYPES OF CONTRACTION

- **Isotonic Contraction** - In this contraction, the muscle changes length and so something moves. *E.g. Bicep Curl*
- **Isometric Contraction** - In this contraction, the muscle stays the same length and so nothing moves. *E.g. the Wall Sit*



AEROBIC and ANAEROBIC ACTIVITY

- Aerobic** - with oxygen
- Lower intensity
 - Endurance activities - Marathon
- Anaerobic** - without oxygen
- Higher intensity
 - Short distance activities - Sprinting

TRAINING METHODS

There are many types of training methods.

- **CIRCUIT TRAINING** - Has between 8 - 15 stations in it. Each station has a specific exercise to do. A short rest is allowed between each station.
- **WEIGHT TRAINING** - Improves **muscle strength and tone**. Be done in a gym using free weights.
- **INTERVAL TRAINING** - Mixing periods of hard exercise and rest periods. Similarity to games activities e.g. Rugby and Football
- **CONTINUOUS TRAINING** - Exercising aerobically at a constant rate doing activities like running or cycling, with **no rests**.
- **FARTLEK TRAINING** - Swedish for '*speed play*' - Changing speed, distances and times of exercise in same session.
- **CROSS TRAINING** - Uses a combination of different training methods.

Effects of Exercise on the Body

Immediate Effects of Exercise	Effects of Regular Training	Long Term Benefits
Heart Rate increases	Bigger and Stronger Heart - <i>Athletes heart</i>	Helps prevent Heart Disease
Cardiac Output & Stroke Volume increases	Lower Resting Heart Rate	Helps prevent Type 2 diabetes
Blood Pressure increases	Improve Cardiac Output & Stroke Volume	Helps prevent Cardiovascular Disease
Increase of Blood to working muscles	Lower Blood Pressure	Helps prevent Obesity
Skin becomes Red - Vasodilation of blood vessels	More Blood Vessels - Capillarisation	Improves General & Mental Health
Increase Tidal Volume	Improved VO2 Max	Helps prevent depression
Increase breathing rate - more Oxygen uptake	More efficient gaseous exchange	Boosts Immune System
Increase in Gaseous exchange - more blood to lungs	Stronger muscles, ligaments, tendons	
Increase Flexibility in Muscles and joints		
Sweat Production		



BALANCED DIET - Daily intake of food containing right amounts and types of nutrients



	Function	Foods found in	Aid to Sportsperson
Carbohydrates	Ready source of energy Store of energy as Glycogen	Fruit, cakes, beer, sweets, granulated sugar and bread, pasta rice, potatoes.	Ready source of energy when muscles need it. Athletes training hard use carbohydrates quickly so diet should be high in this food type.
Proteins	Growth and Repair of tissues, enzymes and hormones	Meat, fish, pulses (chick peas, lentils and beans), nuts, eggs and poultry	Builds muscle and repairs tissue within body. Essential after injury to heal quickly. Sportspeople who have large muscles need extra protein.
Fats	Source of energy (slow release) Can be stored in body	Milk, cheese, butter, oils, chocolate, fatty meats, soya beans and corn.	Increase size and weight of body beneficial to performers with extra bulk e.g. Shot putter. Excess weight can inhibit performance though.
Vitamins	Helps general health - vision, skin condition, forming of red blood cells and clotting, good condition of bones and teeth	Fruit - vitamin C Liver, carrots - Vitamin A Whole grain, nuts - Vit B1 Vegetable oil - Vitamin E	General health is important to perform well. When training hard vitamins from B group are used up more so need replenishing.
Minerals	Calcium helps growth of bones, Iron helps making red blood cells and the way blood is carried by haemoglobin.	Milk and salt water fish (iodine), red meat, liver and green vegetables (iron), cheese and cereal.	Increase oxygen carrying capacity to working muscles. Iodine aids growth, essential for athlete's energy production. Iron helps produce red blood cells so carry more oxygen around body preventing fatigue. Calcium helps blood to clot, aiding recovery and strengthens bones and muscles.
Fibre	Helps Digestion. There are 2 types. <ul style="list-style-type: none"> Insoluble - adds bulk to food so moves through digestive system Soluble - helps reduce cholesterol, keeping heart healthy 	Leaves, seed cases, cereals and whole grains.	Less Cholesterol in the body makes the heart more efficient By keeping digestive system functioning regularly the body retains less waste
Water	Two-thirds of the body is water Need to replenish water which is lost in urine, sweat and condensation when we breathe	Fluids and foods	Water allows blood to flow more easily - important when exercising as the body demands more oxygen, nutrients, heat control and waste removal.

DEFINITIONS

OVERWEIGHT - having weight excess than normal, harmless unless accompanied with over fatness

OVER FAT - person having more fat than recommended for gender and age

OBESE - term used to describe people who are very over fat

ECTOMORPH

- Slightly built, delicate body
- Narrow shoulders and hips
- Lean, fragile
- **E.G. Marathon Runner**



WHAT ARE THE DIFFERENT SOMATOTYPES?

MESOMORPH

- 'Athletic Build'
- Muscular, large trunk
- Broad shoulders, narrow hips
- **E.G. 100m Sprinter**



ENDOMORPH

- Round/ 'pear drop' shape
- Narrow shoulders and broad hips
- Carry weight around waist and on hips and upper thighs
- **E.G. Sumo wrestler**



ALCOHOL

- Affects co-ordination, speech and Judgement
- Slows your reactions
- Makes your muscles tire quickly
- Eventually damages heart, liver, kidneys, brain, muscles and digestive and immune

'LEGAL BUT HARMFUL'

SMOKING

- Causes nose, throat and chest Irritations
- Makes you short of breath
- Increases risk of developing heart disease, lung cancer and bronchitis and other diseases



PERFORMANCE ENHANCING DRUGS

These drugs are banned by the International Olympic Committee (IOC)

S.N.A.P.D	Advantages	Disadvantages
Stimulants	<ul style="list-style-type: none"> Speeds up reactions and increases aggression Make you feel less pain 	<ul style="list-style-type: none"> Feeling less pain can make athlete train too hard Lead to high blood pressure, heart and liver problems, and strokes They're addictive
Narcotic Analgesics	<ul style="list-style-type: none"> Kill pain - so injuries and fatigue doesn't affect performance 	<ul style="list-style-type: none"> Addictive with unpleasant withdrawal symptoms Feeling less pain can make athlete train too hard Lead to constipation and low blood pressure
Anabolic Steroids	<ul style="list-style-type: none"> Increase Muscle size Allow athletes to train harder 	<ul style="list-style-type: none"> Cause high blood pressure, heart disease, infertility and cancer Women may facial and body hair, and their voices may deepen
Peptide Hormones	<ul style="list-style-type: none"> Most have similar effects as anabolic steroids EPO - allows more oxygen carrying capacity due increase of red blood cells 	<ul style="list-style-type: none"> Cause strokes and abnormal growth
Diuretics	<ul style="list-style-type: none"> Weight loss - important if competing in a certain weight division Can mask traces of other drugs in body 	<ul style="list-style-type: none"> Cause cramp and dehydration

'B CALM' DRUGS

The IOC **RESTRICTS** the use of these drugs

B CALM	
Beta Blockers	<ul style="list-style-type: none"> Lower heart rate, steady shaking hands and reduce anxiety Banned in sports it may ban advantage - Snooker, shooting
Corticosteroids	<ul style="list-style-type: none"> Help reduce pain and inflammation from injuries Serious side effects - depression, diabetes
Alcohol	<ul style="list-style-type: none"> Calms nerves and can be used in snooker or shooting
Local Anesthetics	<ul style="list-style-type: none"> Reduce pain but maybe allowed for medical purposes
Marijuana	<ul style="list-style-type: none"> Calms nerves and can be used in snooker or shooting

HYGIENE

Hygiene means the different ways to keep our body clean and healthy.

Good hygiene helps to keep us healthy.

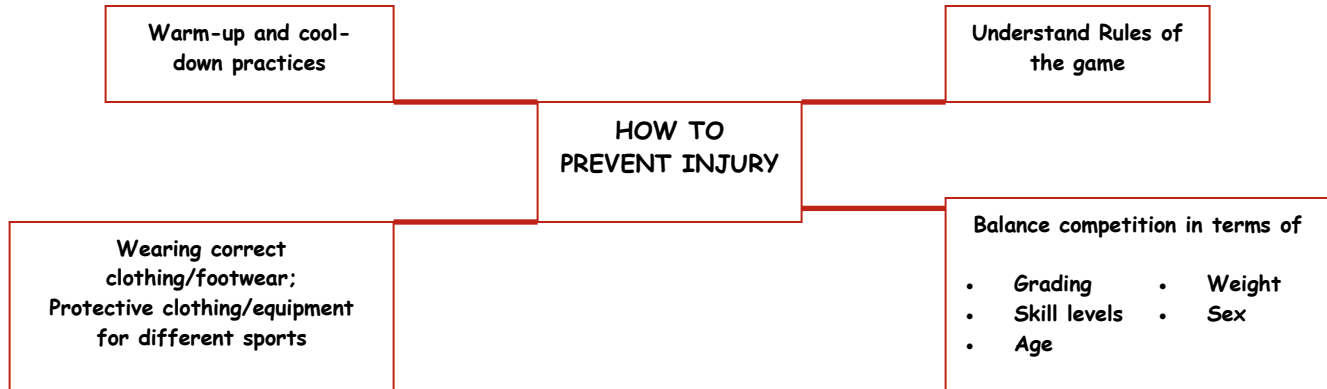
- Healthy skin = resist most infections
- Clothing should be washed and changed regularly
- Nails should be cut and cleaned so reduces injury
- Jewellery - pierced ears and earrings should be cleaned carefully to prevent infection
- Hair should be washed regularly to keep it clean and healthy
- Teeth should be brushed at least twice a day to be healthy
- Feet should be washed regularly and dried carefully. Also change socks to avoid odour

	Athlete's Foot	Verrucae
Recognition	Feet smell Skin flakes Itching & irritation	Viral wart painful when applying pressure
Treatment	Wash feet regularly Wear clean socks Dry between toes	Applying creams Medically remove
Prevention	Use foot powder from chemist	Wearing verruca sock



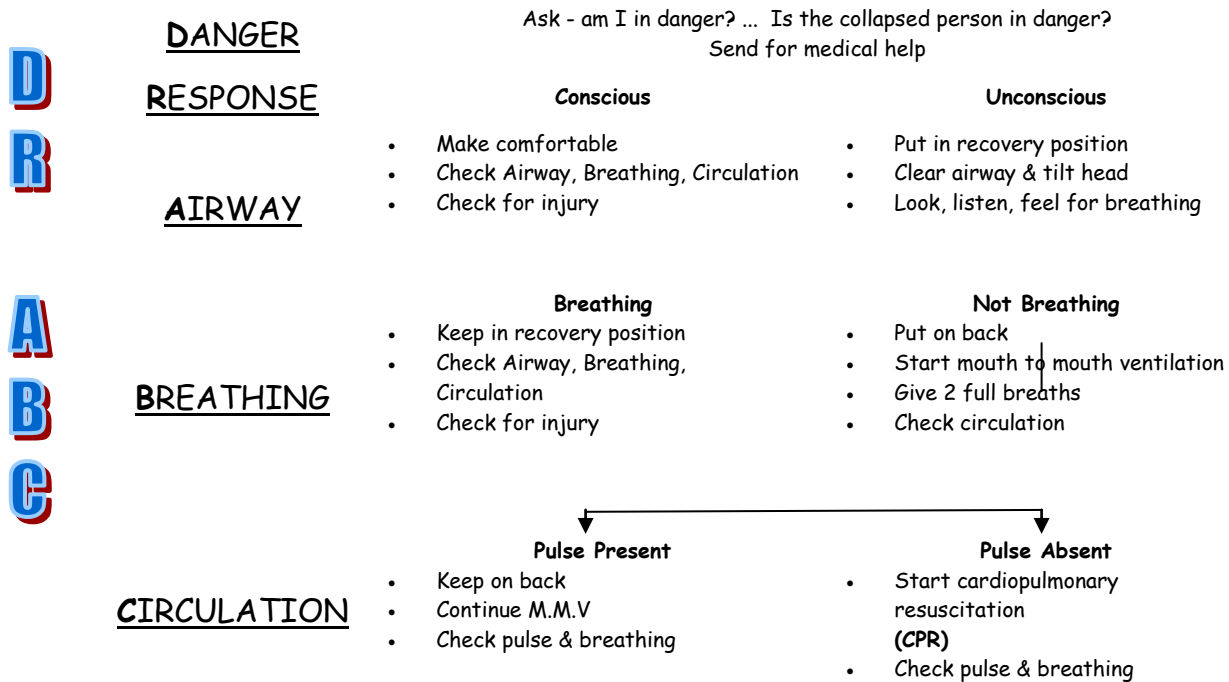


B1 - PREVENTION OF INJURY



B2 - SPORTS INJURIES

EMERGENCIES - WHEN SOMEONE COLLAPSES

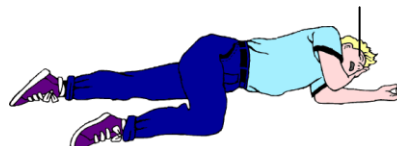


RECOVERY POSITION

When a person is unconscious we place them in this position to prevent them:

1. from being sick
2. from choking
3. from their tongue falling back and blocking the airway

After placing a person in this position, dial 999 for help. You must keep checking their breathing every 2-3 minutes until help arrives.





HARD TISSUE INJURIES

These are injuries to the bone and include;

- Fractures
- Dislocations

FRACTURES - break in the bone. There are two types;

1. **Simple (closed) fracture**- bone stays under the skin
2. **Compound (open) fracture** - Bone breaks through the skin

All fractures are serious and need **URGENT medical attention**

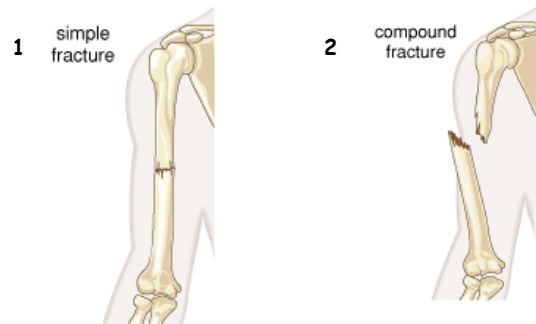
STRESS FRACTURES - Small cracks in the bone. Often an overuse injury and caused by running too much in a hard surface. We need to;

- Use ice to reduce inflammation
- Get immediate rest
- Keep fit doing over activities
- Check running and footwear for problems

DISLOCATIONS - Bone at a joint is forced out of its normal position.

Also could be possible ligament damage around the joint. Could be caused by strong force wrenching the bone e.g. rugby tackle.

All dislocations should be treated as a fracture.



SOFT TISSUE INJURIES

Includes;

- Sprains
- Strains
- Cartilage damage
- Tendon and ligament damage
- Minor injuries - cuts, grazes and bruises



TREATMENT - R.I.C.E

REST - Rest the injured part to prevent further injury

ICE - Apply ice or a cold compress to reduce blood flow, pain and swelling

COMPRESSION - Compress the injury to reduce bleeding and swelling

ELEVATION - Elevate the injured part to reduce bleeding, swelling and throbbing

BONE & JOINT INJURIES

RECOGNITION

- Recent blow or fall
- Snapping sound
- Difficulty moving limb
- Pain worse when moving
- Deformity - limb unusual shape
- Swelling, bruising
- Signs of shock

ACTION

- Keep him/her still & comfortable
- Support injured part
- Bandage injured part to their body/limb
- Reassure him/her
- Send for medical help

KEY TERMS

- **Heart Rate (HR)** - the amount of beats per minute
- **Stroke Volume (SV)** - the amount of blood pumped by heart in one beat
- **Cardiac Output (CO)** - the amount of blood pumped by the heart in one minute

$$CO = SV \times HR$$

WHAT ARE THE COMPONENTS OF THE BLOOD?

- **Red blood cells** - made in bone marrow of long bones. Carry oxygen and transport nutrients and waste products
- **White blood cells** - made in bone marrow and lymph tissue. Protect body from disease
- **Platelets** - in charge of blood clotting. Clotting is important to stop blood loss from the body and stop internal bleeding
- **Plasma** - made up of mostly water and makes up 55% of volume of blood; helps blood fluidity

WHAT ARE ARTERIES, VEINS & CAPILLARIES?

Arteries:

- Thick, flexible vessel walls
- Has a pulse. No valves
- Work under high pressure
- Transports blood away from heart (**OXYGENATED**)
- Narrow lumen

Veins:

- Thin walls
- Valves present; prevents backflow. No pulse
- Pulsating muscles close to veins prevent backflow- 'skeletal pump'
- Work under low pressure
- Transports blood towards the heart (**DEOXYGENATED**)
- Wide lumen

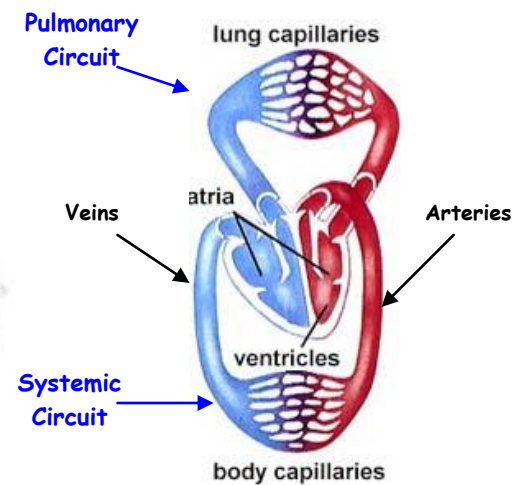
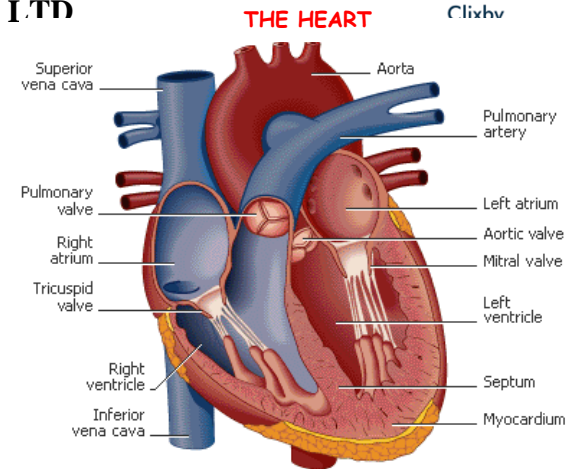
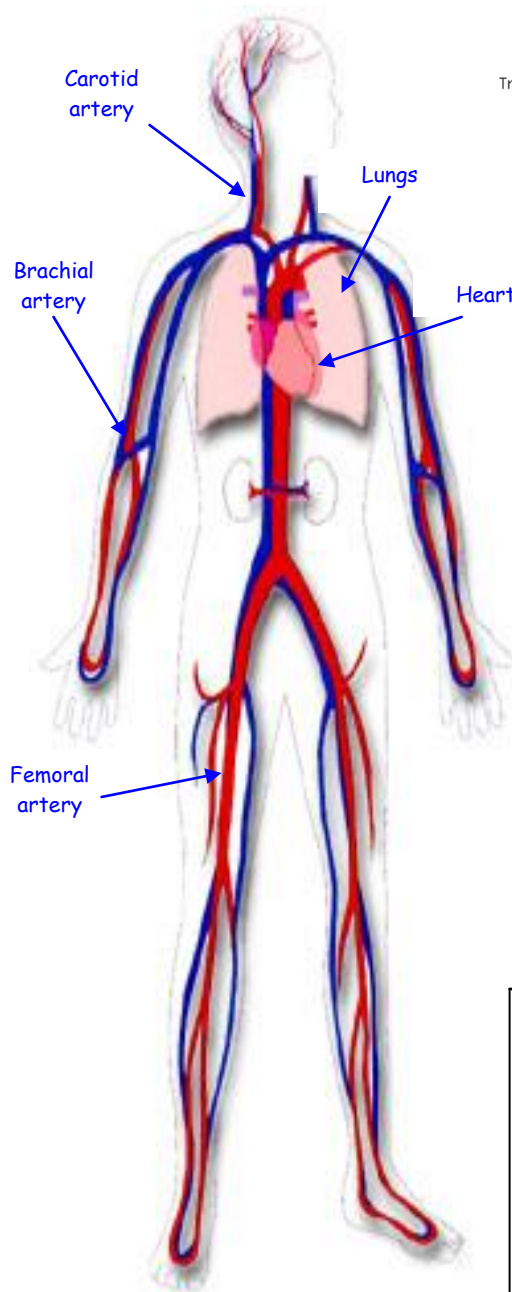
Capillaries:

- Smallest of all vessels - walls one cell thick
- They are 'semi-permeable' - substances pass through
- At one end - they feed muscles, organs and body tissue with oxygen and nutrients
- At other end - carbon dioxide and waste products pass into veins to be removed
- They bring blood within reach of every cell

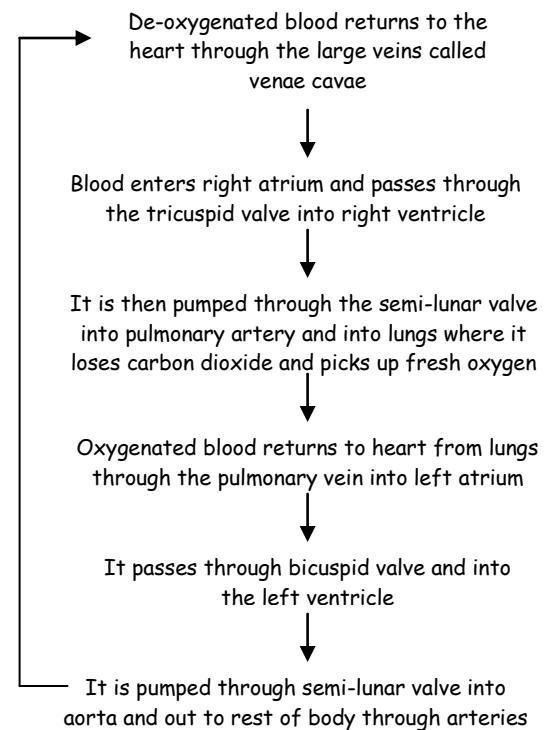
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C1 - THE CIRCULATORY SYSTEM

The 3 parts of the circulatory system are blood, heart and blood vessels



THE FLOW OF BLOOD



KEY TERMS

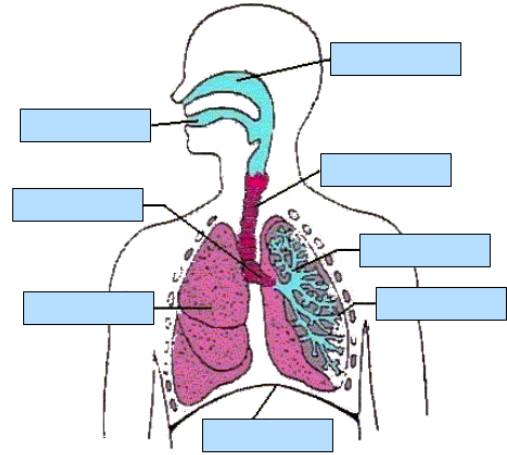
- **Oxygen debt** - Shortfall of oxygen to the body after maximal effort/anaerobic exercise, resulting in deep and shallow breathing
- **Vital Capacity** - The maximum amount of air that can be forcibly exhaled after breathing in as much as possible
- **Tidal Volume** - Amount of air breathed in or out at rest

The 3 parts of the respiratory system are the **diaphragm, lungs and air passages**

THE RESPIRATORY SYSTEM

The function of the respiratory system is:

- To get oxygen into the body
 - To remove carbon dioxide out of the body
- Oxygen is used by the body to release energy and carbon dioxide is released so it doesn't build up and poison the body



MECHANISM OF BREATHING

Lungs are not muscles therefore can't move on their own accord. They are helped by the **diaphragm** and **intercostal muscles** between the ribs.

When we breathe in - **Inspiration** - the following happens...

- Our diaphragm pulls down
- Our intercostal muscles contract
- Air pressure is reduced
- Air is sucked through the tubes into lungs
- Our chest expands

When we breathe in - **Expiration** - the following happens...

- Our diaphragm relaxes
- Our intercostal muscles relax
- Our chest becomes smaller
- Pressure increases on the lungs
- Air is forced out

COMPOSITION OF AIR

INHALED AIR	EXHALED AIR
• 79% - Nitrogen	• 79% - Nitrogen
• 20% - Oxygen	• 16% - Oxygen
• Trace - Carbon dioxide	• 4% - Carbon dioxide

AEROBIC and ANAEROBIC ACTIVITY

AEROBIC - with oxygen

- Lower intensity
- Endurance activities - Marathon

Formula - Glucose + Oxygen \longrightarrow Carbon dioxide, Water, ENERGY

ANAEROBIC - without oxygen

- Higher intensity
- Short distance activities - Sprinting

Formula - Glucose + Oxygen \longrightarrow Carbon dioxide, Water, ENERGY, Lactic acid

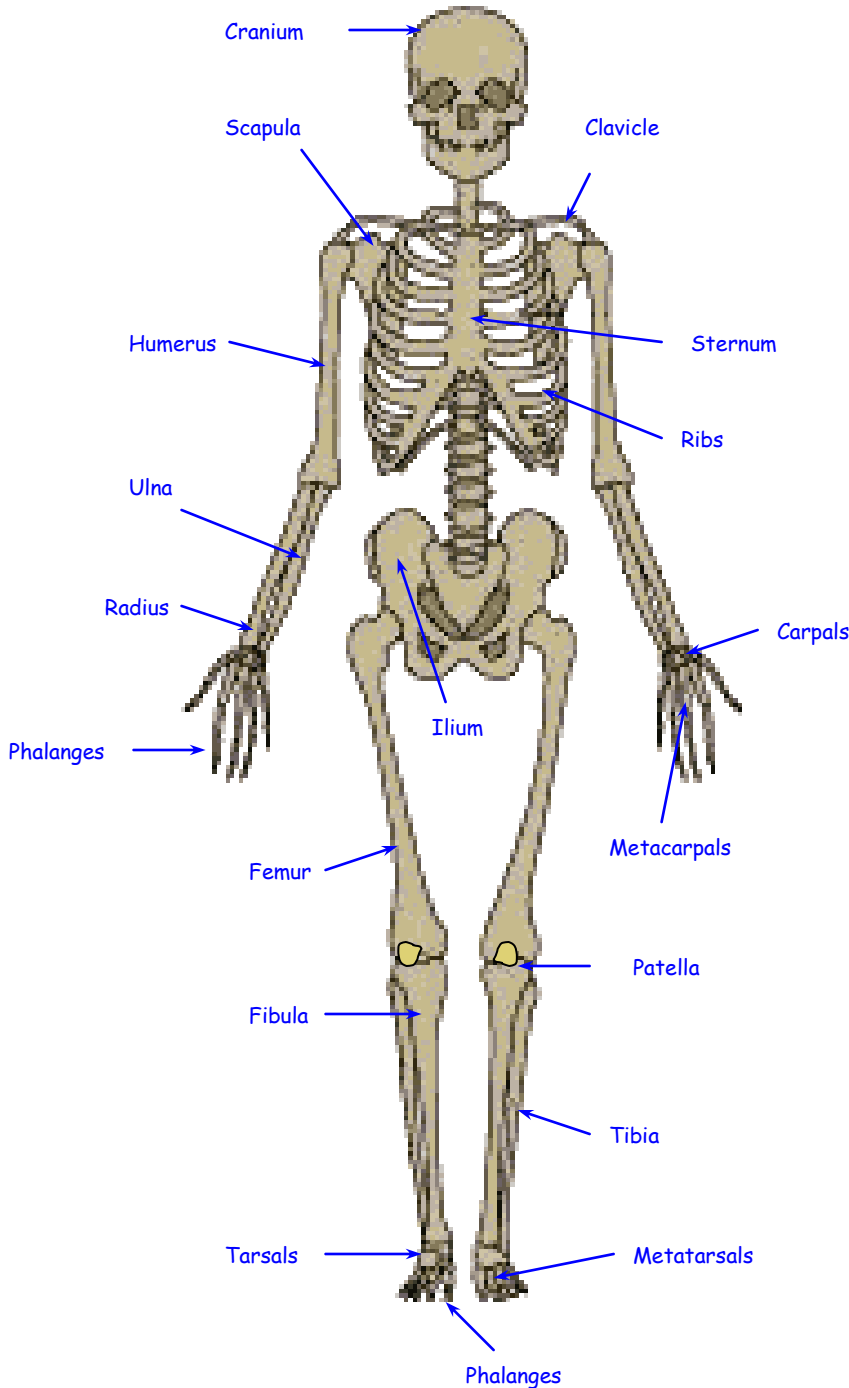
WHAT IS LACTIC ACID?

- Lactic acid is a bi-product of exercise. A build up of this can inhibit performance and cause pain, discomfort and fatigue.
- Lactic acid occurs in the anaerobic system because without the presence of oxygen, pyruvic acid turns to lactic acid.
- Cooling down properly with stretching helps the lactic acid be removed and prevents aching muscles after the exercise.



WHAT ARE THE FUNCTIONS OF THE SKELETON?

1. **Protection** - Ribs protect heart and lungs, Cranium protects brain.
2. **Shape** - gives framework - basketball player long, thin skeleton - jockeys small, thin skeleton
3. **Support** - firm, rigid and keep us upright.
4. **Movement** - Skeleton has 'anchor points' to which muscles attach and act as levers. **Long bones** help create the leverage to apply the force.
5. **Blood Production** - red and white blood cells are produced in the long bones.



HOW ARE BONES CLASSIFIED?

1. **Long bones** - Humorous, Femur
2. **Short bones** - Carpals and Tarsals.
3. **Flat bones** - Cranium, Scapula and Sternum
4. **Irregular bones** - Patella and Vertebrae. (odd shaped bones)

WHAT ARE THE 5 SECTIONS OF THE VERTEBRAE?

Come

To

Learn

Spinal

Column



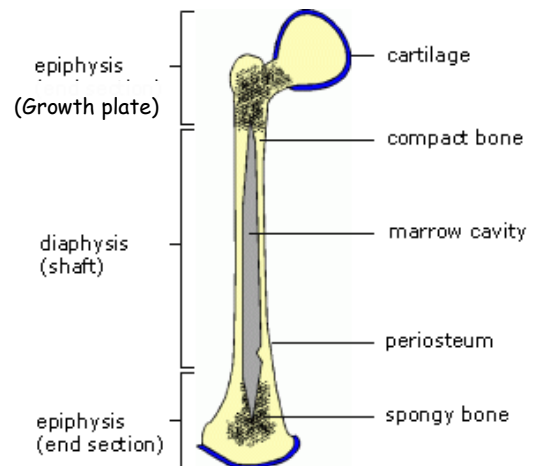
1. **Cervical** - 7 vertebrae forms the neck and allows movement at top of the spine.
2. **Thoracic** - 12 vertebrae. 10 are attached to ribs and help movement whilst breathing.
3. **Lumbar** - 5 large and robust vertebrae. This area allows most movement.
4. **Sacrum** - 5 vertebrae which become fused together in adulthood. They form part of the pelvic girdle.
5. **Coccyx** - 4 vertebrae here, all fused together.

THE DEVELOPMENT OF BONES

Bones start off as cartilage and then become bone by the process of **Ossification**.

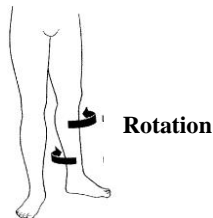
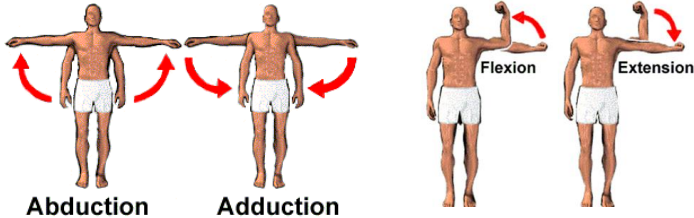
Bones have a tough outer layer called the **Periosteum**. As development continues there are 3 centres of ossification: in the **diaphysis** (middle) and **epiphyses** (end).

Ossification - The development of bone from cartilage. It occurs throughout childhood until adulthood.



IN WHAT WAYS DO JOINTS MOVE?

1. **Flexion:** decreasing the angle at a joint.
2. **Extension:** increasing the angle at a joint.
3. **Adduction:** movement of a limb towards the body
4. **Abduction:** movement of a limb away from the body.
5. **Rotation:** movement of a limb in a circular or part circular direction.



WHAT TYPES OF JOINTS ARE THERE?

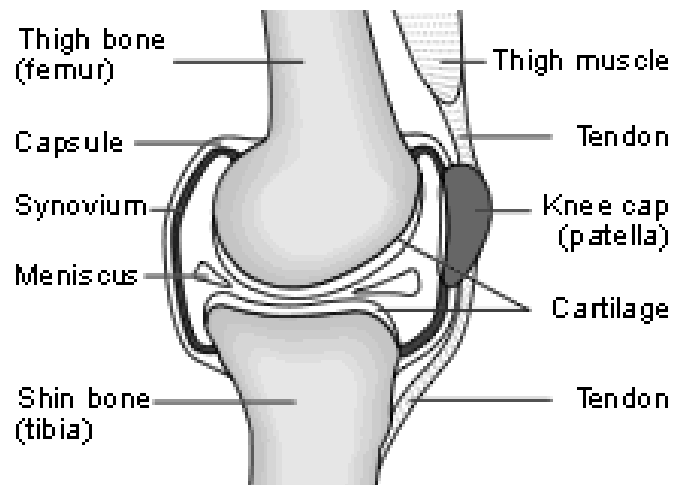
1. Fixed (fibrous) joints - *Skull*
2. Slightly moveable (cartilaginous) joints - *Vertebrae*
3. Synovial joints or Freely Moveable - *Knee/Elbow*

WHAT TYPES OF SYNOVIAL JOINTS ARE THERE?

1. **Ball and Socket** - movement in all directions and rotation - Hip, Shoulder
2. **Hinge** - movement Flexion and Extension - Knee or Elbow
3. **Pivot** - only rotation at Atlas and Axis at top of the spine
4. **Gliding** - Little bit of movement in all directions tarsals and carpals
5. **Condyloid** - movement forwards and backwards, left to right - in the wrists

SYNOVIAL JOINT

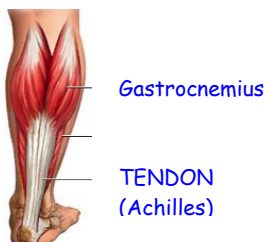
Example - The Knee



WHAT ARE TENDONS, LIGAMENTS & CARTILAGE?

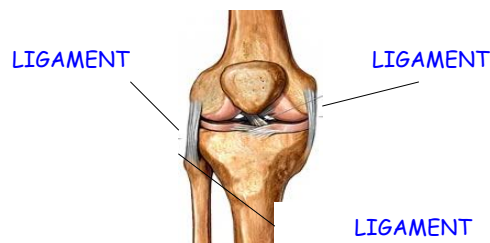
TENDONS

- Attach muscle to bone
- Strong, non-elastic connective tissue
- Joint stability



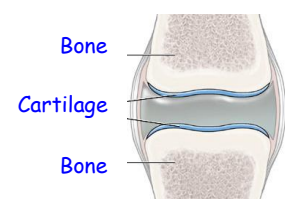
LIGAMENTS

- Attach bone to bone
- Very strong elastic fibres
- Joint stability



CARTILAGE

- Covers joints to allow bones to rub smoothly
- Acts as shock absorber
- Produces synovial fluid





C5 - MUSCLES AND MUSCLE ACTION



HOW ARE MUSCLES CLASSIFIED?

- **Skeletal (Voluntary)** - most common. They attach to the skeleton, give a person's shape - *Biceps/Triceps*
- **Smooth (Involuntary)** - work automatically and are not controlled - found in *intestines, blood vessels and urinary organs*.
- **Cardiac (Involuntary)** - involuntary and beats rhythmically - *Heart Muscle*

FAST TWITCH OR SLOW TWITCH?

FAST TWITCH

Used in explosive activities
Contract quickly
Produce powerful action
Limited Oxygen supply
White in colour
e.g. speed events, throwing & jumping

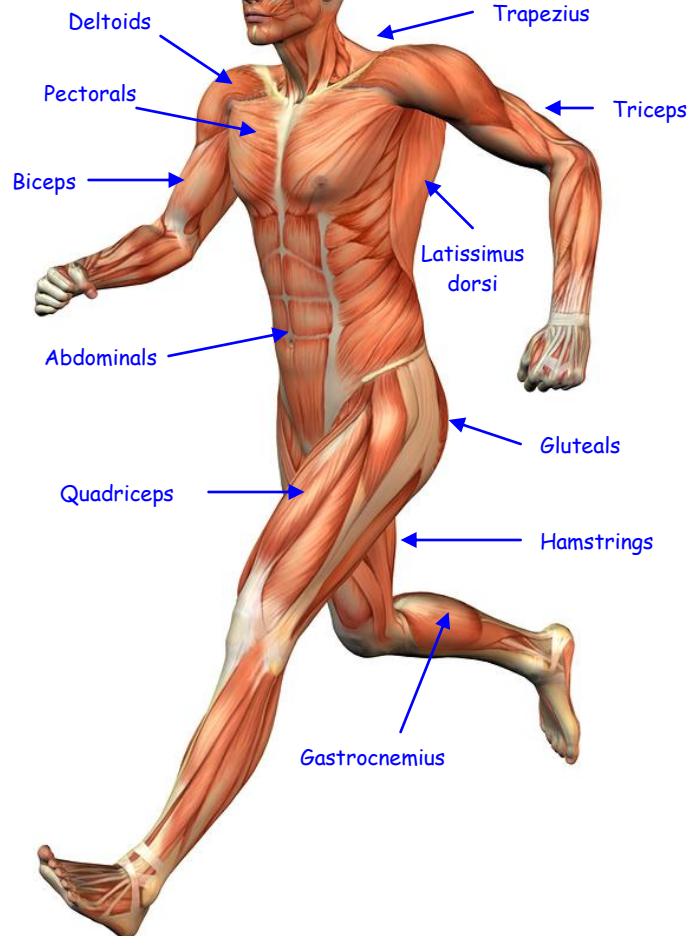
SLOW TWITCH

Used in endurance activities
Contract slowly
Long Lasting
Good oxygen supply
Red in colour
e.g. long distance running, cycling & swimming

WHAT IS MUSCLE TONE?

Some muscle fibres contract whilst others relax. These contractions tighten the muscles but aren't strong to cause movement. Different fibres contract at different times to prevent fatigue. This called **Muscle tone** and is very important for good posture.

MUSCLE TONE - Voluntary muscles in a state of very slight tension ready and waiting to be used



HOW DO MUSCLES WORK TOGETHER?

Antagonistic Pairs: Muscles working together to provide movement. E.g. Flexion of the arm, biceps contracts and triceps relax. To extend the arm, the triceps contract and the biceps relax.

- **Agonist (Prime mover)** - contracting muscle causing movement
- **Antagonist** - relaxing muscle that assists prime mover
- **Origin** - the end of muscle that is attached to a fixed bone
- **Insertion** - point where a tendon attaches muscle to bone where there is movement
- **Flexibility** - a joint's ability to move through its full

