Movement Function of the skeletal system	Support Function of the skeletal system	Protection Function of the skeletal system	Posture Function of the skeletal system
• Muscles are attached firmly to bones forming levers to allow for sporting movements. • When the muscles contract they pull on the bone, creating movement.	• The skeleton gives the body support, enabling us to stand. • The bones of the body are held together by ligaments. • The skeleton provides a framework for the muscles, which are attached to the bones by tendons.	• Some of our body parts, such as the brain, are very delicate and need protection. • Bones can protect body parts from impacts and injuries. • The cranium protects... • The rib cage protects...	• The skeleton acts as a framework. • Muscles are firmly attached to bones forming our body shape, this holds us upright.
Blood cell production **Function of the skeletal system**	Storage of minerals **Function of the skeletal system**	Hinge joint **Structure of the skeletal system**	Ball and socket joint **Structure of the skeletal system**
• **The ends of long bones and some other bones including the ribs, humerus, femur and even vertebrae bones, contain red bone marrow.** • **This is where the red blood cells that carry oxygen are produced.**	• **The minerals in your bones serve two main functions.** • **Minerals transform spongy bone matrix into a rigid structure and in turn increase density and strength.** • **Your bones also function as a mineral storage, releasing dissolved calcium, phosphorus and magnesium into your bloodstream if needed.**	• Hinge joints work like a hinge on a door and can bend to allow movement in two directions only. • For example, the knee, elbow and the ankle. • Movements possible at hinge joints: Flexion and Extension.	• Ball and socket joints are the most moveable joints in the body, they allow movement in all directions. • For example, the shoulder and hip. • Movements possible: Flexion, Extension, Adduction, Abduction, Rotation and Circumduction.

Flexion

Function of the skeletal system

Movement types

- This is bending or flexing a limb.
- When flexion occurs the angle at a joint is decreased.
- Example: The leg can be flexed at the knee.

Extension

Function of the skeletal system

Movement types

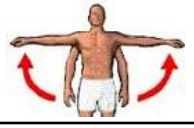
- This is straightening or extending a limb.
- When extension occurs the angle at a joint is increased.
- Example: The arm can be extended at the elbow.

Abduction

Function of the skeletal system

Movement types

- This is sideways movement of a limb away from the midline of the body.
- This happens during the first movement of a star jump with arms and legs.
- Example: The leg can be moved away from the centre of the body at the hip



Adduction

Function of the skeletal system

Movement types

- This is the opposite movement to abduction where the bone or limb moves towards the body.
- This happens during the return of the movement of the arms and legs in the star jump.
- Example: The arm can be moved towards the centre of the body at the shoulder.

Rotation

Function of the skeletal system

Movement types

- Where the bone turns about its longitudinal axis within the joint.
- Example: A tennis player uses rotation at the shoulder joint during the backswing of a serve.

Circumduction

Function of the skeletal system

Movement types

- A continuous circular movement of a limb around a joint.
- It is a combination of abduction, adduction, extension or flexion and rotation.
- Example: A swimmer during the front crawl arm action will take their arm out and round and back into the water, showing circumduction at the shoulder joint.

Articulating bones

Structure of the skeletal system

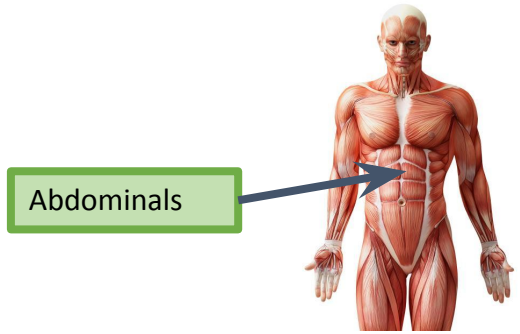
Bones which are moving around a joint e.g. during a bicep curl the bones which articulate (move) are the humerus, ulna and radios.

Synovial joint

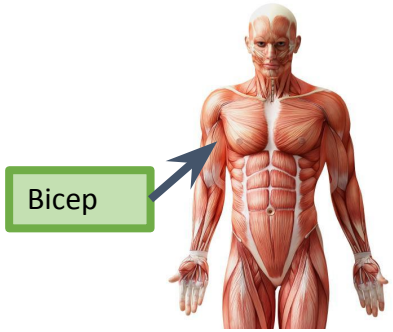
Structure of the skeletal system

A joint that is freely moveable and have

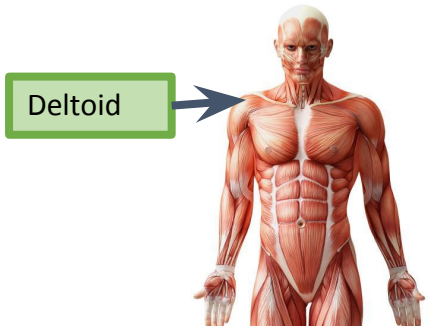
1. Synovial fluid
2. Ligaments
3. Tendons
4. Cartilage



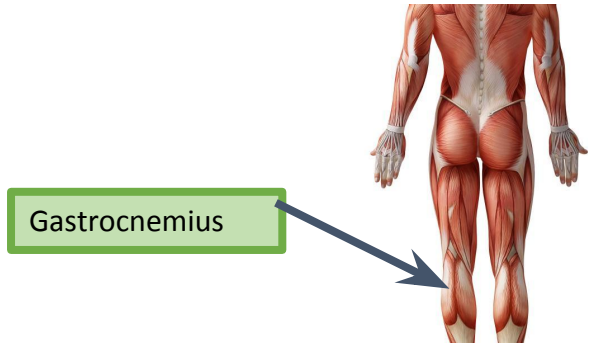
Location: *The front of the body over the stomach.*
Function: *To bend the body forwards at the hips, flexing the vertebrae.*
Sporting Example: *The abdominals are used to perform a sit up.* ***Can you think of your own?***



Location: *Top of the arm on the front*
Function: *Used to achieve flexion at the elbow.*
Sporting Example: *The biceps are used to raise the dumbbell during a bicep curl.* ***Can you think of your own?***

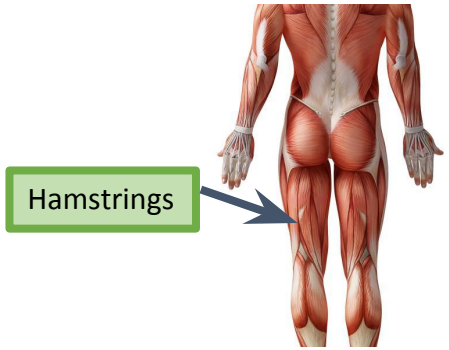


Location: *Over the shoulder*
Function: *Used in all movements of the arms. Allows abduction, adduction, flexion, extension and rotation at the shoulder.*
Sporting Example: *The deltoid is used to make a block in volleyball with arms straight over the head.* ***Can you think of your own?***

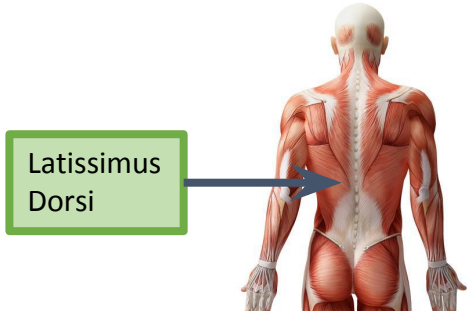


Location: The back of the lower leg.
Function: To straighten the leg at the ankle to stand on tip toes or point the toes.
Sporting Example: A gymnast will use the gastrocnemius to point their toes when performing a routine to make the moves more aesthetically pleasing. ***Can you think of your own?***

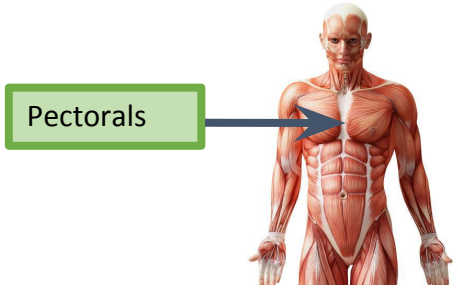
Location: *The bum.*
Function: *To flex (bend) and extend (straighten) the leg at the hip.*
Sporting Example: *A sprinter uses the gluteals in the leg action of sprinting down the track.*
Can you think of your own?



Location: *The back of the upper leg.*
Function: *To straighten the hip and cause flexion (bend) at the knee joint.*
Sporting Example: *A hockey player running across the pitch will be using their hamstrings to bend their knees during the running action.*
Can you think of your own?



Location: *The muscle running across the lower back.*
Function: *To adduct the arm at the shoulder. It swings the arm backwards and rotates it inwards.*
Sporting Example: *A swimmer uses the latissimus dorsi to bring the arms back towards the body during the butterfly stroke.*
Can you think of your own?

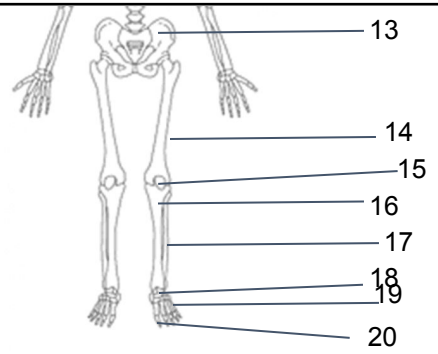


Location: *Over the front of the chest*
Function: *Used adduct the arm at the shoulder joint. Also used to rotate the arm inwards.*
Sporting Example: *The pectorals are used by a rugby player to hold onto an opponent during a tackle.* ***Can you think of your own?***

Ligament

Structure of the skeletal system

- These are found between bones and attach bone to bone.
- They are bands of connective tissue that are very tough and resilient.
- Some ligaments lie within the synovial capsule, others are outside the capsule.
- **Function:** The ligaments prevent movements that are extreme and help stop dislocation.

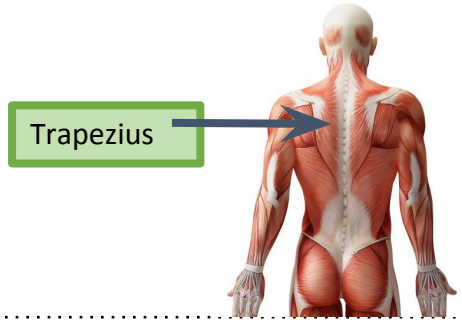


13. Pelvis
14.Femur
15.Patella
16.Tibia
17.Fibula
18. Tarsals
19.Metatarsals
20.Phalanges

Cartilage

Structure of the skeletal system

- Cartilage is a soft connective tissue.
- Cartilage may be torn with a forceful knee movement. For example, a footballer dribbling around a defender may twist their knee while their foot is still in the ground.
- **Function:** The cartilage **reduces friction** and acts as a **shock absorber** for the joint.

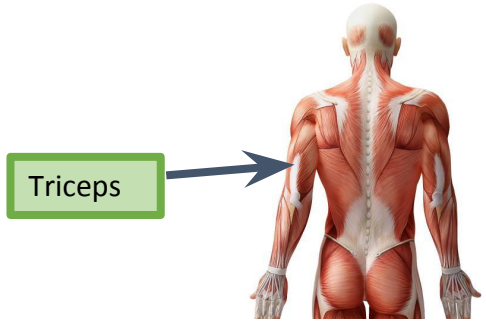


Location: *The centre of the back, just below the neck.*
Function: *To extend the neck, lifting the head upwards.*
Sporting Example: *The trapezius is used by a rugby player in the scrum when they bind (get into position).* ***Can you think of your own?***

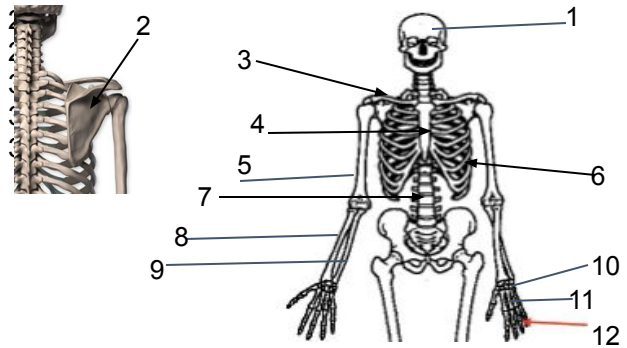
Tendons

Structure of the skeletal system

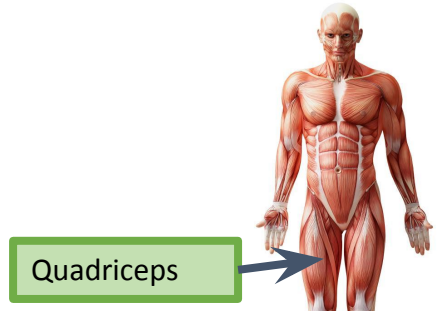
- Muscles are attached to bones via tendons.
- Tendons are strong and can be a little flexible.
- **Function:** As well as attaching muscles and bones, the tendons also help to transmit the power needed to move bones.



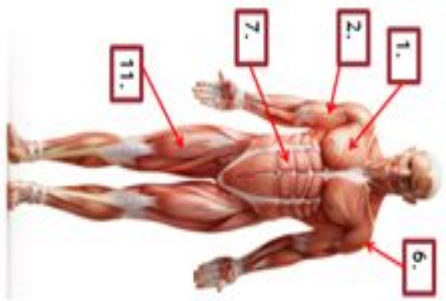
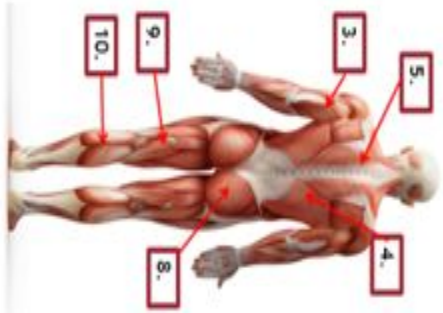
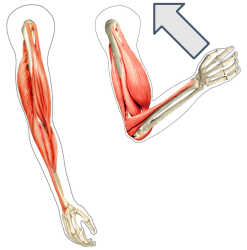
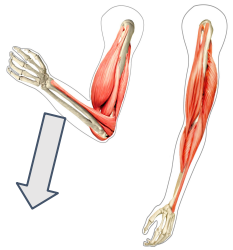
Location: *The back of the top of the arm.*
Function: *To extend (straighten) the arm at the elbow.*
Sporting Example: *The triceps is used to play a back hand shot in tennis.* ***Can you think of your own?***



1. Cranium
2. Scapula
3. Clavicle
4. Sternum
5. Humorous
6. Ribs
7. Vertebrae
8.Radius
9. Ulna
10. Carpals
11. Metacarpals
12. Phalanges

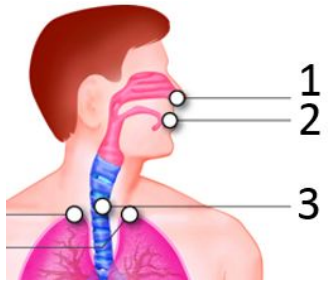


Location: *The front of the top of the leg.*
Function: *To extend (straighten) the knee joint.*
Sporting Example: *A long jumper would use their quadriceps when driving off the board to straighten their leg at take off.* ***Can you think of your own?***

Agonist	Antagonist	Fixator	Antagonistic muscle action
<u>Function of the muscular system</u>	**<u>Function of the muscular system</u>**	**<u>Function of the muscular system</u>**	**<u>Function of the muscular system</u>**
The Agonist: This is the muscle that contracts to allow the movement (the pulling muscle), this can also be known as the **prime mover.** When this muscle pulls it becomes **shorter.**	**The Antagonist:** This is the other muscle in the partnership which relaxes whilst the agonist contracts. This muscle becomes **longer.**	**The Fixator:** This is the muscle that stabilises the joint. It **does not move** but contracts to fix the muscles to the bone.	• As muscles can only **pull,** a muscle must work in partnership with another muscle to allow movement. These pairs of muscles are called **antagonistic pairs.** • When working as an antagonistic pair one muscle will contract whilst the other relaxes.
		The agonist and antagonist 	The agonist and antagonist 
1. Pectoral 2. Bicep 6. Deltoid 7. Abdominals 11. Quadriceps	3. Tricep 4. Latissimus Dorsi 5. Trapezius 8. Gluteal 9. Hamstring 10. Gastrocnemius	Agonist – Bicep (contracts to flex the elbow) Antagonist – Triceps (relaxes to allow flexion at the elbow)	Agonist – Triceps (contracts to extend the elbow) Antagonist – Bicep (relaxes to allow the elbow to extend)

The respiratory system

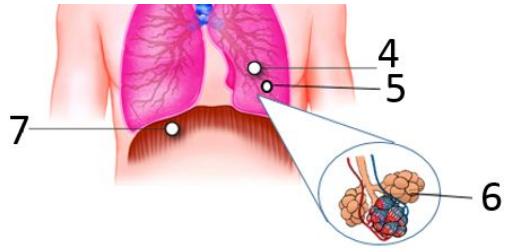
The Pathway of air



1. **Nose**
2. **Mouth**
3. **Trachea**

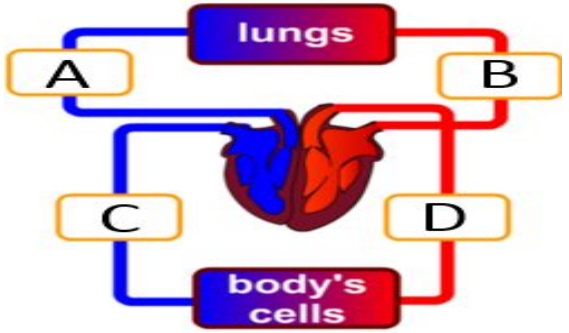
The respiratory system

The Pathway of air

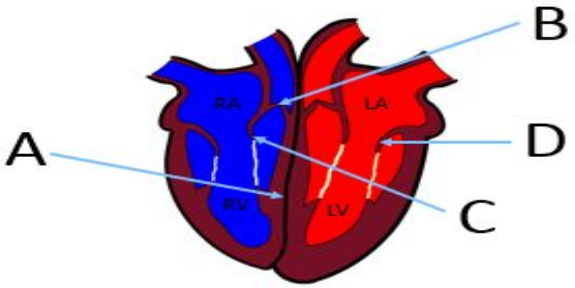


•

4. **Bronchus**
5. **Bronchioles**
6. **Alveoli**
7. **Diaphragm**

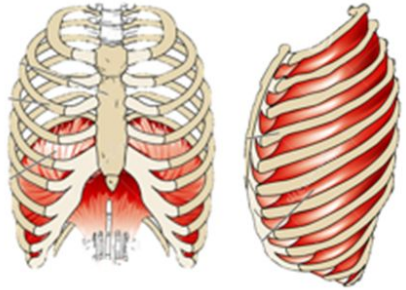


A – Pulmonary artery
B – Pulmonary Vein
C- Vena Cava
D – Aorta



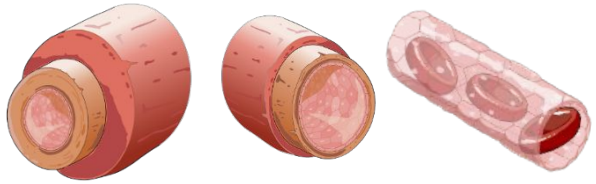
A – Septum
B – Semi-Lunar valve
C- Tricuspid valve
D – Bicuspid valve

The respiritory muscles

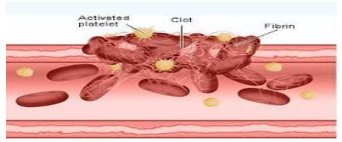


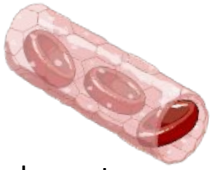
1. The **diaphragm** (beneath the rib cage)
2. The **intercostal muscles** (between the ribs)

The cardiovascular system has 3 main types of blood vessels

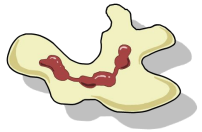


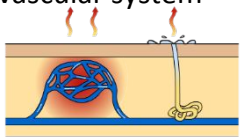
1. **A**rteries (carry blood **A**way from the heart)
2. Ve**in**s (carry blood **in**to the heart)
3. Capillaries (used for gas exchange, one cell thick)





Functions of the cardiovascular system



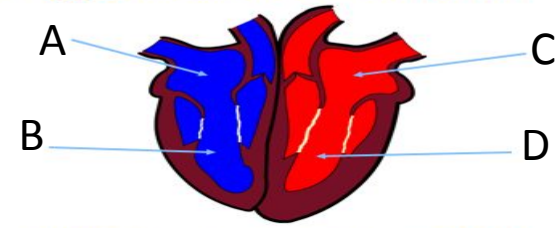


These can be broken down in to 4 roles performed by different aspects of the cardiovascular system

1. Delivery of oxygen to the body/muscles
2. Removal of waste products such as carbon dioxide
3. Fight infection
4. Regulate heat

Label the chambers of the heart

An upper chamber is called an atrium

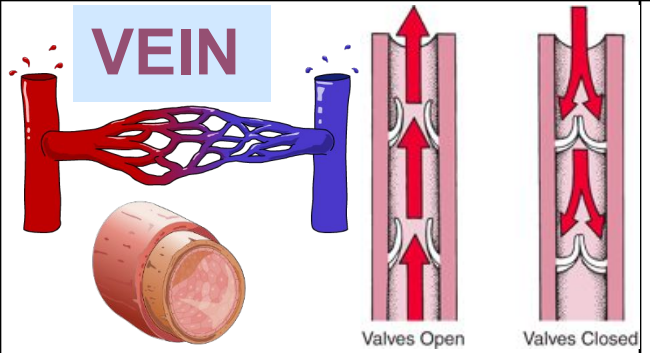


A lower chamber is called a ventricle.

A – Right atrium
B – Right vertical
C- Left atrium
D – Left vertical

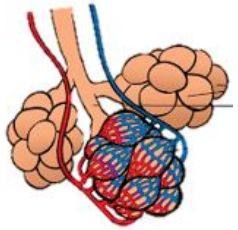
Remember you are looking at this as if the heart was in someone's chest

VEIN



- Veins have **thin walls**
- Ve**in**s carry **deoxygenated** blood **in**to the heart with one exception (pulmonary vein)
- Blood moves slowly in the veins because of the **low blood pressure.** They have many valves to stop backflow of blood in the wrong direction

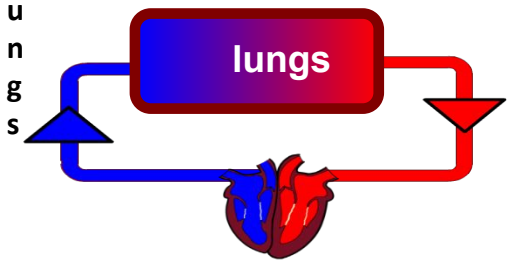
The respiratory system
The Alveoli



Alveoli = Are the sites of gas exchange.
-They are tiny air sacs
-Surrounded by capillaries

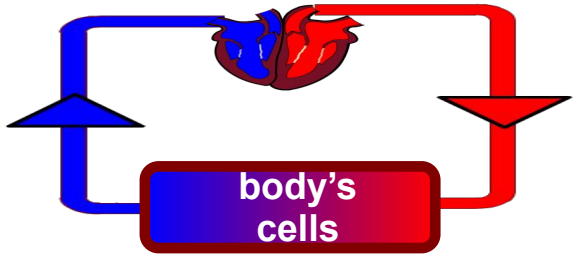
Gas exchange = The movement of carbon dioxide and oxygen between the bloodstream and alveoli

The pulmonary circulation carries



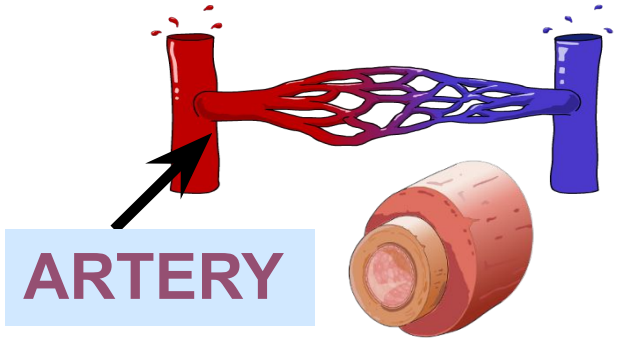
- deoxygenated blood travels from the heart to the lungs (from right ventricle)
- oxygenated blood travels back from the lungs to the heart, ready to be pumped out to the body. (into left atrium)

The systemic circulation carries:



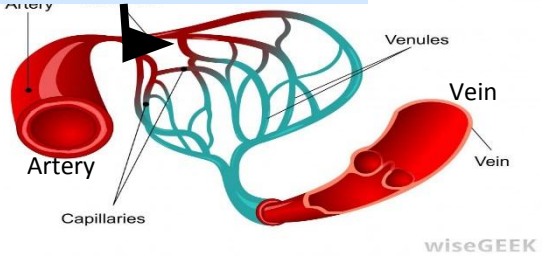
- oxygenated blood travels to the rest of the body through the arteries (aorta)
- deoxygenated blood back to the heart through the veins. (vena cava)

ARTERY



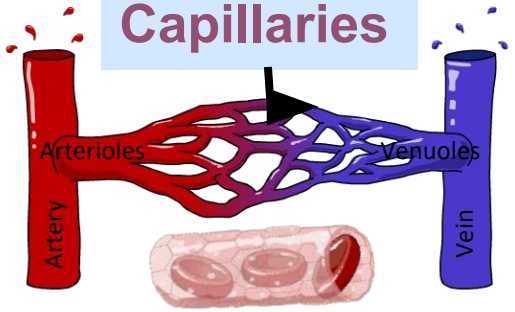
- **A**rteries carry blood **A**way from the heart with one exception (pulmonary artery)
- They have thick elastic outer walls so they can accommodate **higher blood pressure** and blood volume
- **Muscular inner walls** so they can contract to maintain blood pressure when blood volume is low.

ARTERIOLES



- Arterioles have thinner walls and inner muscular walls than arteries
- They **link arteries and capillaries** and control blood flow
- They achieve this by being able to **vasoconstrict and vasodilate**

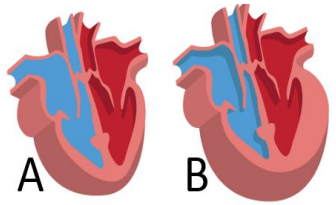
Capillaries



- Capillaries link arterioles and Venuoles
- They are only **one cell thic**k this allows the **exchange of;**
  - **Gases (Co2 & O2)**
  - **Nutrients**
  - **Waste products**
- The **pressure in capillaries is lower than arteries but higher than Veins**

Long term adaptations to regular exercise of the CV system

Cardiac Hypertrophy

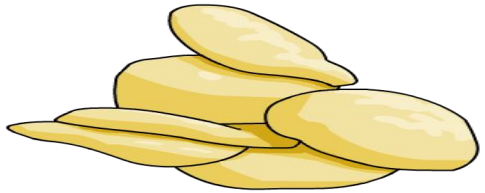


- The size of the cardiac muscles in the heart increase in thickness and strength, particularly around the left ventricle
  - Causes a lower resting HR
  - Stroke volume increase
  - Cardiac output increase during exercise
  - Reduction of resting blood pressure
  - Decreased heart rate recovery time

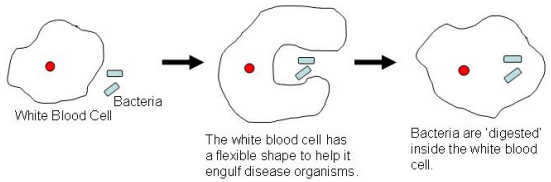
Red blood cells

- **Transport oxygen to the tissues.**
- Disc-shaped.
- Made in the bone marrow.
- Contain a red-coloured compound called haemoglobin

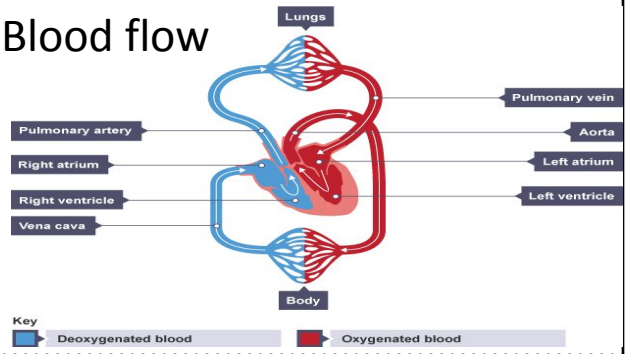
White blood cells



- **Fight infections**
- They can change shape.
- Made in the bone marrow.

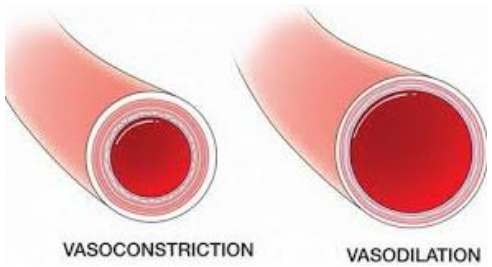


Blood flow



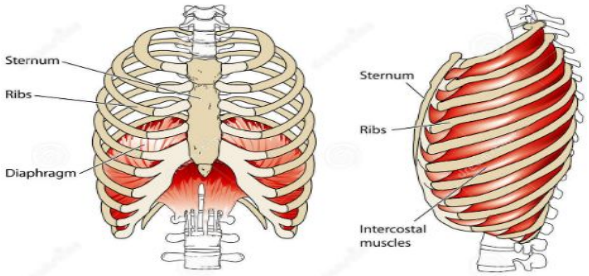
Deoxygenated blood travels from the **vena cava** into the **right atrium**. It travels through the **tricuspid valve** into the **right ventricle**. It then gets pushed through the **semi-lunar valve** into the **pulmonary artery** to the lungs.
The newly oxygenated blood passes through the **pulmonary vein** to the **left atrium**. It travels through the **bicuspid valve** into the **left ventricle**. The oxygenated blood is then forced through the **semi-lunar vales** into the **aorta** and travels to the body.

The vascular shunt



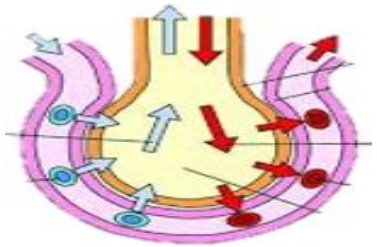
The redistribution of blood flow.
During exercise, blood flow to the working muscles increases to around 80% due to muscle blood vessel vasodilation (made bigger) and a decrease to the organs of around 20% due to vasoconstriction (made smaller) of the blood vessels around the organs.

The respiratory muscles



- **The diaphragm stretches across the bottom of the rib cage. When we breathe in, it contracts, pulling the rib cage down and creating space for air to be pulled in.**
- **The intercostal muscles are between the ribs. When we breathe in, they contract, pulling the ribs apart and creating space for air to be pulled in.**

The respiratory system
Gaseous exchange/Diffusion



Describe what is happening in this picture

-The sack in the centre is the alveoli.
The blood vessel surrounding the sack is a capillary.
-The walls of capillaries and alveoli are so thin gas can exchange between them. Carbon dioxide is moving out of the blood to the alveoli and oxygen is moving from the alveoli to the bloodstream.
-The movement of gases from an area of high concentration to and area of low concentration is called **diffusion**

Long Term responses to exercise of the Respiratory system

1. Increased aerobic capacity
2. Increased strength of respiratory muscles
3. Increase in tidal volume
4. Increase in minute ventilation

Short Term response to exercise of the muscular system

Increased muscle temperature

This benefits the performer by -

1. Increasing energy production by speeding up chemical reactions
2. Increasing muscle flexibility
3. Decreasing the chances of injury

Short Term response to exercise of the muscular system

Increase lactic acid production

This negatively affects the performer by -

1. Causes fatigue in the muscles as energy making chemical reactions are slowed down
2. Causes pain/discomfort
3. Resulting in decrease in performance

Long Term responses to exercise of the skeletal system

Healthy bone Osteoporosis

Increased Bone Density

The more you train the more calcium is absorbed into the bone.

-This makes bones stronger.

-Less likely to break

-Less likely to suffer from osteoporosis

Short Term responses to exercise of the Respiratory system

- **(f) Increase breathing frequency (how often)**
- **(TV) Increase tidal volume (how deep)**
- **(VE) Increased Minute ventilation (air breathed in or out per min)**

f x TV = VE

- **More oxygen to the working muscles**

Long Term responses to exercise of the muscular system

1. (Muscular hypertrophy) – muscle will increase in size/mass/growth
2. Increase in power/strength (including tendon strength)
3. Increase in (muscular) endurance OR increased resistance to fatigue OR go for longer
4. Increase in flexibility/range of movement/less chance of injury
5. Increase tolerance to lactic acid OR higher/delayed anaerobic threshold
6. Increased rate of removal of lactic acid
7. Increased/reduced/quicker recovery rate
8. Increased capillarisation at the muscles

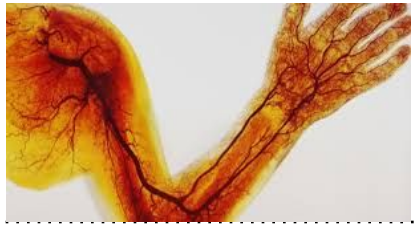
Long Term responses to exercise of the CV system

- Hypertrophy of the heart
- Decrease resting heart rate
- Increase resting stroke volume
- Increased cardiac output
- Increased speed of recovery
- capillarisation

Short Term responses to exercise of the CV system

1. Increase in heart rate/HR
2. Increase in stroke volume/SV
3. Increase in cardiac output/Q
4. Increases blood flow/oxygen to (working) muscles
5. directs blood away from other organs
6. Increase in blood pressure due to the increase in demand for oxygen (from the working muscles)
7. Increase in blood lactate/lactic acid/CO_2 because muscles are working
8. Blood temperature increases to help control of body temperature
9. Vascular shunt OR vasodilation of blood vessels to muscles OR vasoconstriction of blood vessels to other organs

Long Term response to exercise of the muscular system - Capillarization



- The more we train the more capillaries are created in the muscles. More capillaries the..

1. increase tolerance to lactic acid OR higher/delayed anaerobic threshold
2. Increased rate of removal of lactic acid
3. Increased/reduced/quicker recovery rate due to more oxygen being exchanged

Short Term responses to exercise of the Respiratory system

More oxygen to the working muscles

Due to Increase breathing frequency, Increase tidal volume and Increased Minute ventilation gas exchange in the lungs and muscles increases.

1. -This mean more oxygen availability
2. -Increased energy production
3. -increase waste product removal

Short Term responses to exercise of the CV system

Vascular Shunt

The redistribution of blood flow.
During exercise, blood flow to the working muscles increases to around 80% due to vasodilation (made bigger) of the arterioles (these are bridges between arteries and capillaries) and a decrease to the organs of around 20% due to vasoconstriction (made smaller) of the arterioles around the organs.

Long Term responses to exercise of the CV system

Lower resting heart rate

As a result of long term training your heart will beat fewer times when you are resting. **This is because your heart is bigger (hypertrophic) and stronger.** So it can beat fewer times per minute and still pump the same amount of blood per minute.

Long Term responses to exercise of the Respiratory system

Increased strength of respiratory muscles

The respiratory muscles (Diaphragm and Intercostal) become stronger.
This allows them to contract with more force to increase the volume of the chest allowing for more gas exchange.

Short Term responses to exercise of the Respiratory system

Breathing frequency (f)

The number of inspirations or expirations each minute

Simply put - breaths per minute

Long/Short Term responses to exercise of the Respiratory system

Tidal Volume (TV)

The volume of air inspirations or expirations each breath

Simply put - how deep you breath in or out

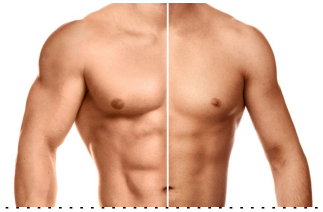
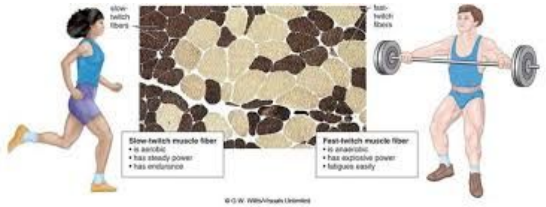
Long/Short Term responses to exercise of the Respiratory system

Minute Ventilation (VE)

The volume of air inspirations or expirations each minute

Simply put - the amount of air you breath in or out each minute

VE = f x TV

	Long/Immediate responses to exercise of the CV system **Increased SV**	**Long/**Immediate responses to exercise of the CV system **Increased cardiac output**	Immediate responses to exercise of the CV system **Changes in HR**
	• **Increased stroke volume** – the amount of blood pumped by the left ventricle in a single beat	• **Cardiac output** – the amount of blood leaving the heart per minute. It is calculated by multiplying stroke volume (Blood pumped in a single beat) by heart rate (BPM) • = SV X HR • When your heart rate and stroke volume increase during exercise so does your cardiac output	1. **Increased heart rate** – during exercise your HR increases to speed up oxygen delivery and carbon dioxide removal 2. **Increased stroke volume** – the amount of blood pumped by the left ventricle in a single beat 3. **Cardiac output** – the amount of blood leaving the heart per minute. It is calculated by multiplying stroke volume (Blood pumped in a single beat) by heart rate (BPM) = SV X HR
	Long Term responses to exercise of the muscular system - Hypertrophy 	Long Term responses to exercise of the muscular system - Slow & Fast twitch fibres 	Immediate responses to exercise of the CV system Increased HR
.	**Hypertrophy is when muscles grow in size/mass.** **-This will make them stronger and more powerful** **-More resistant to fatigue (better muscular endurance)** **-More resistant to lactic acid**	**-When you train with heavy weights your body will turn your muscles fibres into fast twitch muscle fibres. Fast twitch fibres are stronger and resistant to fatigue** **-When you do repetitive exercise such as cycling, rowing etc. your body will turn your muscles fibres into slow twitch muscle fibres. Slow switch very tolerant to lactic acid and allow you to train harder for longer**	• **Increased heart rate** – during exercise your HR increases to speed up oxygen delivery and carbon dioxide removal

Reducing the risk of Injury

***W**arm up and Cool Down*
***E**quipment for protection is used (PPE)*
***C**orrect Clothing/Footwear is worn*
***L**ift and Carry safely*
***A**ppropriate level of competition*
***S**afety Procedures must be followed*
***H**ygiene is good*

Give an example of how each of these can reduce the risk of injury (4-9)

Potential Hazards

A potential hazard is something that could cause injury.

1. **Sports hall**
2. **Fitness suites**
3. **Playing field**
4. **Artificial surface (Astro)**
5. **Swimming pool**

5 Part Warm up

1. **Pulse raiser** - increase heart rate and muscle temperature (jogging)
2. **Mobility -** move joints through the range of movement (arm circles, leg swings, open/close gate)
3. **Stretching** - Holding a stretch for 8-10 sec (e.g lunge, hamstring stretch etc)
4. **Dynamic movements** - changing speed and direction (e.g. shuttle run)
5. **Skill rehearsal** -an activity that mirrors the demands of the game (e.g passing drill)

2 Part Cool down

1. **Low intensity exercise** - a gentle activity which lowers heart, breathing rates (jogging)
2. **Stretching** - Holding a stretch for 8-10 sec (e.g lunge, hamstring stretch etc)

Components of fitness

1. **Cardiovascular endurance -** multi stage fitness test/ 12 min cooper run
2. **Reaction time -** Ruler drop test
3. **Muscular endurance** - sit/press up test
4. **Speed -** 30 m sprint
5. **Strength -** Hand grip test/1 rep max
6. **Power -** Standing broad/vertical jump test
7. **Flexibility -** Sit & reach test
8. **Agility -** Illinois agility run
9. **Balance -** Standing stork test
10. **Coordination -** wall throw test

Aerobic & Anaerobic

Aerobic exercise occurs when you combine glucose (from food) with oxygen (from the air) to create energy. The waste produces you breath out are carbon dioxide and water.

Energy is created by combining

glucose + oxygen → carbon dioxide + water

Anaerobic exercise occurs when you use glucose on its own (without oxygen) to produce a short burst of energy. The waste product is lactic acid

Energy is created by combining

glucose + a lack of oxygen → lactic acid

3 main Types of Training

1. **Continuous training**
2. **Fartlek training**
3. **Interval training - There are 4 types**

4 types of Interval training

interval training is period of exercise followed by a period of rest.

Circuit training

Weight training

Plyometrics

High-intensity interval training (HIIT)

Principals of Training

S-Specific
P– Progression
O– Overload
R– Reversibility

Principals of Training (OVERLOAD)

You can change the following to overload or progress your training

F-Frequency
I-Intensity
T– Time
T– Type

Potential Hazards

A potential hazard is something that could cause injury.

Sports hall = damaged equipment, slippery or damaged surface, walls near the playing area, doors, nets or goalposts

Fitness suites = damaged equipment, slippery or damaged surface, lack of supervision (e.g spotters) poor fitness levels or technique.

Playing field = damaged equipment, slippery or damaged surface, debris on surface, poor weather, inappropriate footwear

Artificial surface (Astro) = damaged surface, poor weather, inappropriate footwear, poor behaviour (swinging on goal posts etc)

Swimming pool = water quality, slippery surface, overcrowding, poor fitness levels

3 main Types of Training

Continuous training - Steady exercise over a **long period of time. Aerobic exercise** for **over 20 mins** e.g jogging, cycling, swimming & rowing.

Fartlek training - continuous exercise with **higher and lower intensity** exercise. Known as **'speed play'** you **work hard** doing the harder work and **recover** during the more gentle exercise. E.g Sprinting up hill and walking back down or a steady jog with 5 seconds sprints every 30 seconds

Interval training - mostly used by games players, this involves a **period of exercise** followed by a **period of rest**. Eg swimming a few laps and then having a short rest before repeating. **There are 4 types**

4 types of Interval training

interval training is period of exercise followed by a period of rest.

Circuit training - *different stations* which ***alternate muscle groups*.** Stations can be **aerobic or anaerobic** use **body weight or equipment** and there is a **short rest after each station.**

Weight training - exercises are organised into **sets and reps.** There is a **rest after each set.** To improve **strength use heavy weights with low repetitions.** To improve **muscular endurance use lighter weights with high repetitions**,

Plyometrics

High-intensity interval training (HIIT)

4 types of Interval training

interval training is period of exercise followed by a period of rest.

Circuit training -

Weight training -

Plyometrics - usually involving **hopping, jumping or bounding** these are **explosive exercises** used to **improve speed and power**

High-intensity interval straining (HIIT) - **Extremely high intensity exercise** followed by **low intensity exercise to recover**. During the intense exercise your **heart rate should be around 80% of its maximum**. During **recovery it should be around 50% of its maximum**. E.g sprint training, hill climbing in cycling.

Principals of Training (OVERLOAD)

You can change the following to overload or progress your training

F-Frequency (often)
I-Intensity (difficulty)
T– Time (how long)
T– Type (kind of training)

Explain using practical examples

Principles of Training

S-Specific
P– Progression
O– Overload
R– Reversibility

(S)Working on a clear and appropriate area of fitness or skill
(P)Gradually progressing the amount or difficulty of training each week
(O)Pushing yourself out of your comfort zone overloading the muscles
(R)When you stop training your body quickly forgets what it has learned

Warm up Benefits

- **Prevents injury and**
- **raises muscle temperature which;**

Increases speed of muscle contraction
Increases muscle flexibility
Increases range of motion at the joint
Increased pliability of muscles

- **Helps maximize training intensity and**
- **limits fatigue by;**

Increases gas exchange
Increasing blood flow
Increasing oxygen delivery
Increasing carbon dioxide removal

Cool down Benefits

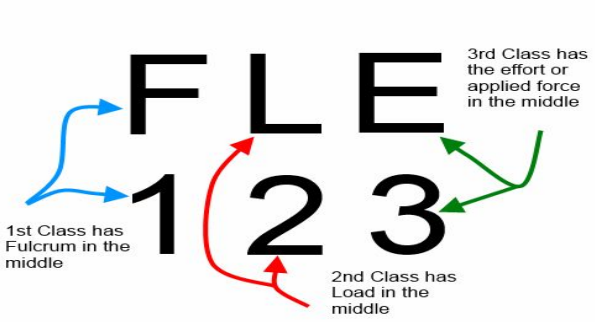
- **Returns the body to a resting state**
- **Gradually lowers heart and breathing rate which;**

Maintains oxygen transport
Maintains blood flow
Removes lactic acid
Maintains carbon dioxide removal

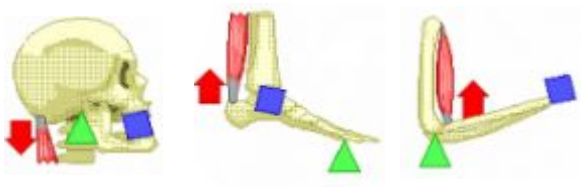
- **Stretching gradually lowers muscle temperature which;**

Removes waste products
Prevents Delayed onset muscle soreness (DOMS)

Levers



Neck **Ankle** **Knee**



Classes of Levers

- Levers can be set up in three basic ways…

Class 1 – fulcrum middle

Class 2 – load middle

Class 3 – effort middle

Remember: **FLE = 123**