Stafford Manor High School

Name:

Paper 1
Fitness and Body Systems

Written examination
1 hour and 30 minutes
36% of the qualification
90 marks

Topic 1: Applied anatomy and physiology
Topic 2: Movement analysis
Topic 3: Physical training
Topic 4: Use of data

GCSE EDEXCEL (9-1)
PHYSICAL EDUCATION

The functions of the skeleton

The five main functions of the skeleton are:

- Protection of vital organs
- Muscle attachment
- Joints for movements
- Strong calcium and phosphorus
- Red and white blood cells

How does Owen Farrell's skeleton help him to function as a rugby player? Use the above bullet points to support your answer.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Bone Growth and Development

All bones are formed from **cartilage**, except the clavicle (collarbone) and some parts of the cranium (skull).Bone growth begins in the centre of the bone so growth goes both upwards and downwards. Cartilage remains around the bone until growth is complete. The process from cartilage to bone is known as **officiation**.

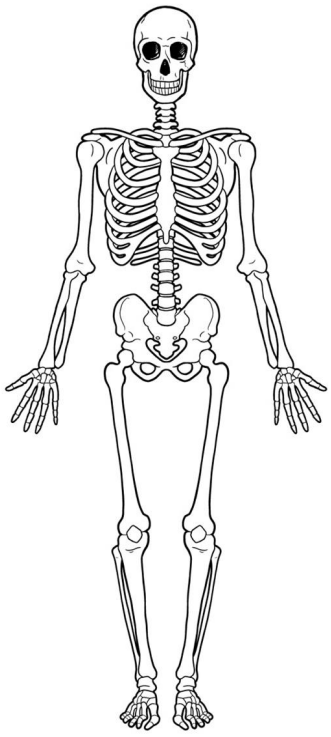
If offificiation doesn't take place effectively in a child, how might they experience weakness?

_____

_____

_____

Classification of bones



Classification of bone: highlight or colour in each of the bones on the skeleton. Each classification of bone should be a different colour.

Long bones aid movement by working as levers.

Short bones are weight bearing and provide support.

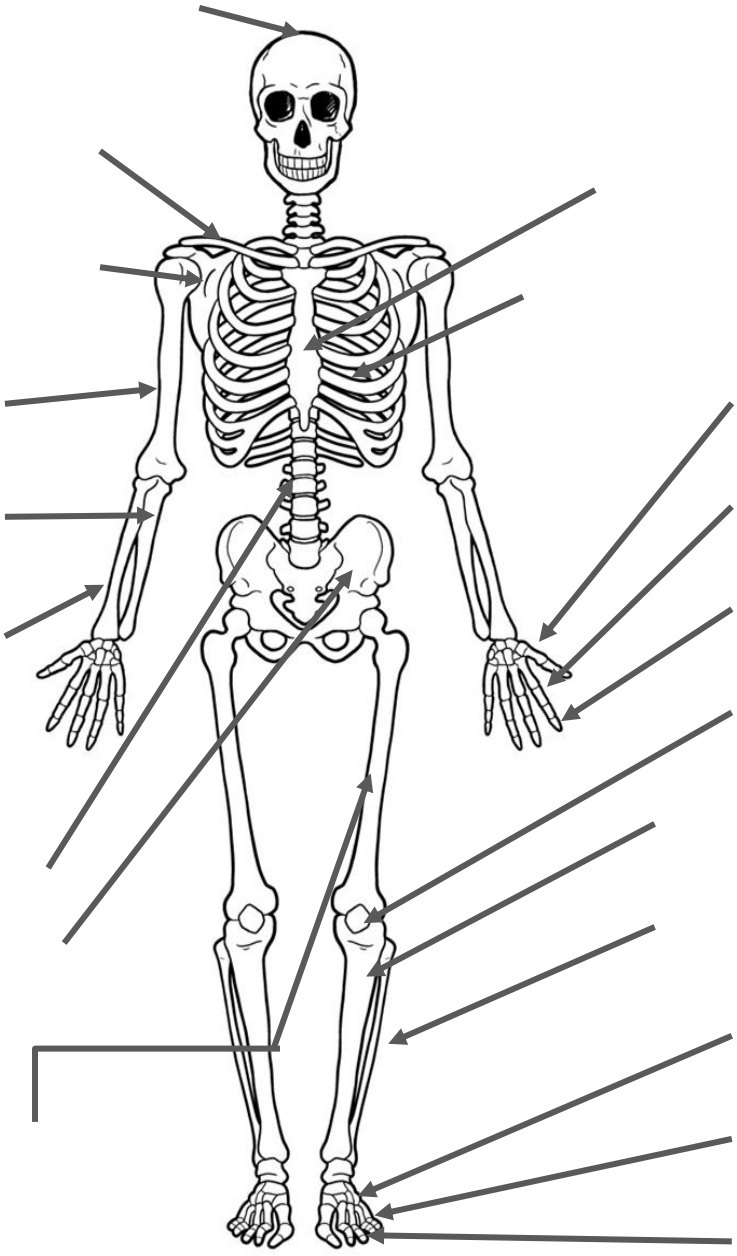
Flat bones are used for protection and a broad surface for muscle attachment.

Irregular bones are used for protection and muscle attachment

Describe how Tom Daley's classification of bones allow him to perform a dive?

Structure of the skeleton

The structure of the skeleton: can you use the word box below to help you name the bones of the skeletal system.



cranium, ulna, femur, vertebrae, radius, patella, ribs, sternum, metacarpals, fibula, clavicle, phalanges, tarsals, scapula, pelvis, metatarsals, humerus

The Vertebral column

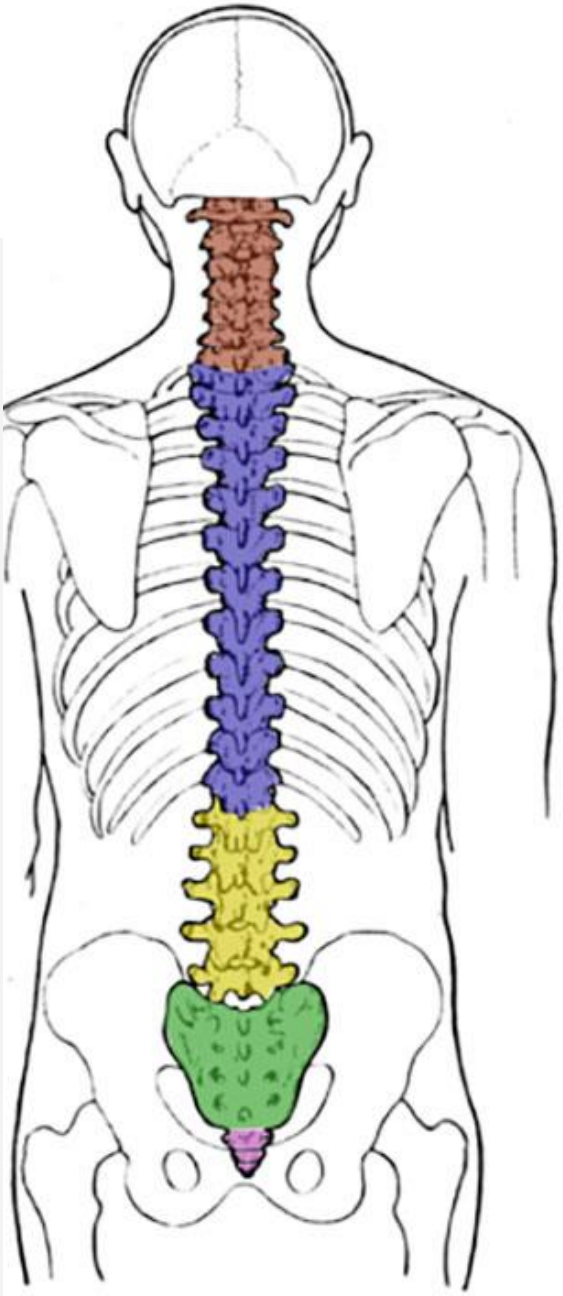
C_____

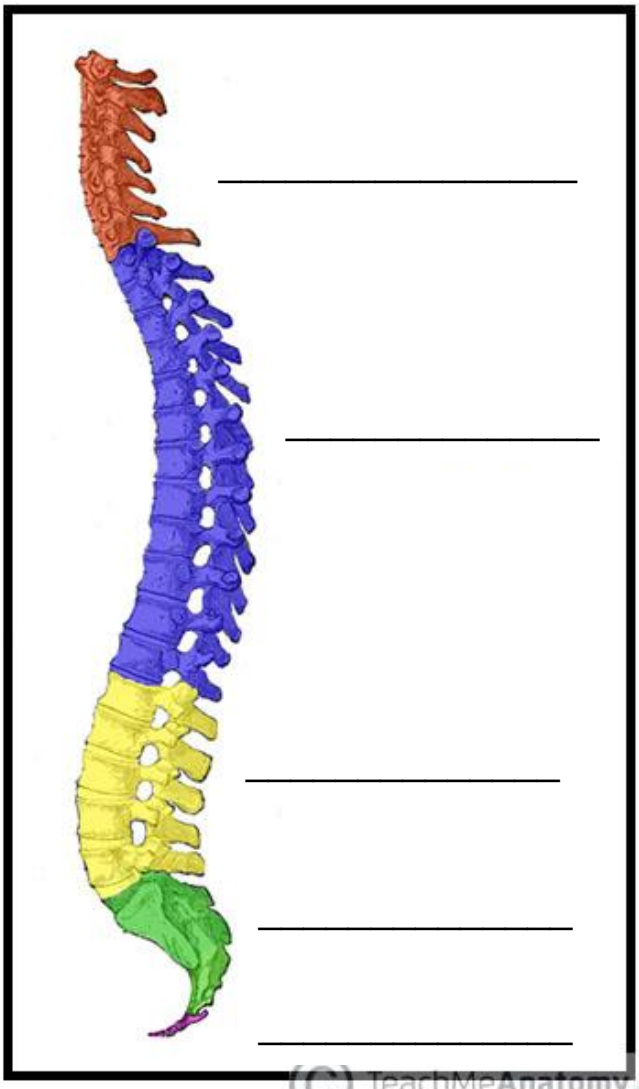
T___

L_____

S_____

C_____





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Classification of joints

Joints

A joint is a place where two or more bones meet. Joints are important for movement and rotation.

Pivot joints allow bones to rotate. You have three pivot joints in your body: in your wrist, elbow and neck.

How does a badminton player use a pivot joint during a match?

_____

_____

_____

Hinge joints allow only backward and forward motion, just like a hinge on a door. There are three hinge joints: the knee, elbow and ankle.

Provide an example of how a footballer might use a hinge joint?

_____

_____

_____

Ball and socket joints are when a long bone fit into a cup shaped hole, allowing circumduction. The shoulder and hip joints are examples.
Using a sporting example, explain how a ball and socket joint is used.

_____

_____

_____

A **condyloid joint** allows circular motion but doesn't allow full circumduction. The wrist is a condyloid joint.
How does a cricketer make use of the condyloid joint?

_____

_____

_____

Movement possibilities at joints

Joints are what make it possible to move our body in certain ways. Each type of joint allows for a different type of movement.

_____ - bending movement that decreases the angle between body parts
_____ - straightening movement that increases the angle between body parts
_____ - movement that pulls towards the midline of your body
_____ - movement that pulls away from the midline of the body
_____ - movement around a single axis or pivot joint
_____ - moving in a circular or conical shape
_____ - bending or flexing the toes up, closer to the shin
_____ - extending or pointing the toes down, away from the shin

Match each of the joint movements to a photo below.

_____

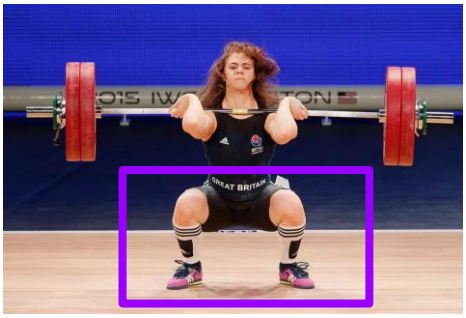
_____

_____

_____

_____

_____



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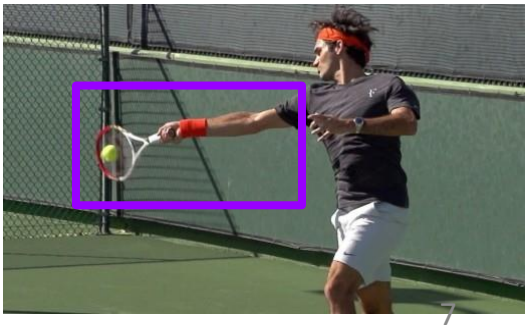


_____

The role of ligaments and tendons

Ligaments are tough elastic fibres that link

_____

Tendons connect

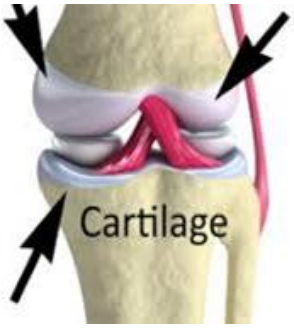
_____

_____

Cartilage

_____

bones rubbing together at joints.



Why is a ligament important in sport?

_____

_____

_____

_____

What happened to Rory?

_____

_____

_____

_____

_____

_____

State the role of a tendon.

_____

_____

_____

_____

_____

What happened to Kobe?

_____

_____

_____

_____

_____

_____

Classification and characteristics of muscle types

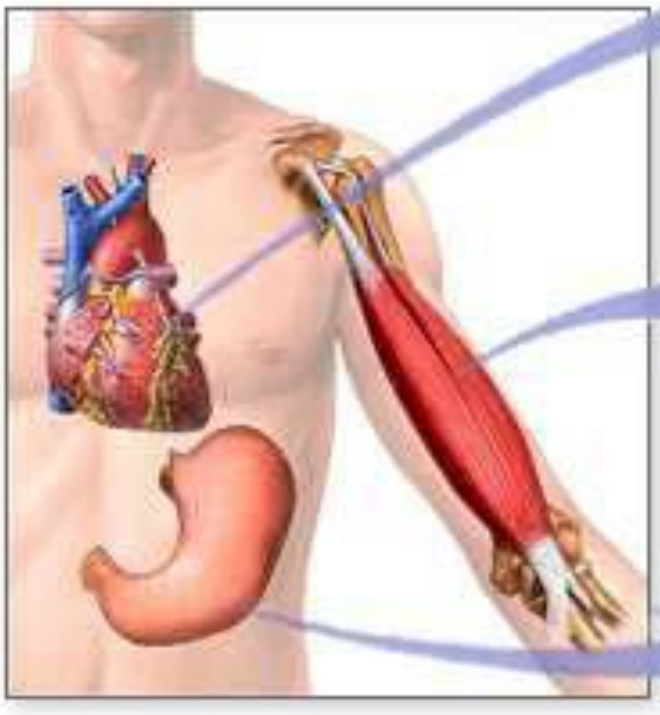
Voluntary Muscles – Muscles which are under your _____. You can choose when to contract or relax them. All of these muscles are attached to the skeleton by _____. They are therefore also known as _____ muscles

Involuntary Muscles – Are not under your _____. They _____ and _____automatically. Involuntary muscles can be found in your _____, _____ and urinary systems. The involuntary muscles in your _____ help to digest food.

Cardiac Muscle – Is only found in the wall of the _____. Cardiac muscle is a type of _____ muscle as we cannot control when it contracts or relaxes. When you _____ the cardiac muscles in your heart help to _____ blood around the body faster.

Fill the following words into the gaps left above:

Tendons	Pump	Relax	Control	Skeletal	Heart	
Involuntary	Digestive	Stomach	Circulatory	Exercise	Control	Contract



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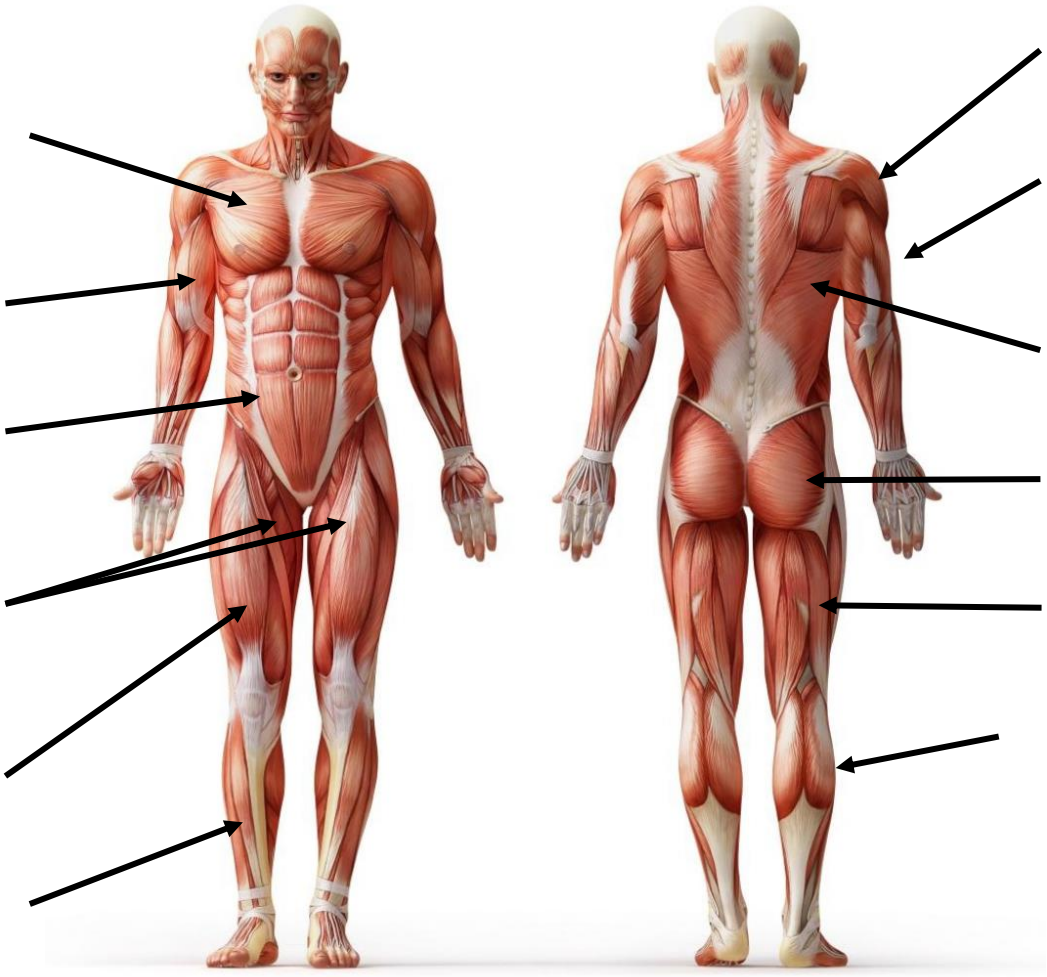
Location and role of the voluntary muscular system



What is the role of each of these muscles?

deltoid

biceps

triceps

pectoralis major

latissimus dorsi

external obliques

hip flexors

gluteus maximus

quadriceps

hamstrings

gastrocnemius

tibialis anterior

Antagonistic pairs of muscles

Antagonistic Pairs

A muscle is only capable of pulling during a contraction. Muscles cannot push. Therefore some muscles work in twos, known as **antagonistic pairs**. Whilst one muscle contracts (pulls), the other muscle in the pair will relax. The muscle contraction is known as the **agonist**, whereas the muscle relaxing is known as the **antagonist**.

Name the antagonistic pair	
Bicep	
	Hamstring
Gastrocnemius	
	Gluteus maximus

Explain how an antagonistic pair of muscles work together to perform a press up.

_____

_____

_____

_____

Explain how an antagonistic pair work together whilst performing a squat.

_____

_____

_____

_____

Explain how an antagonistic pair work together during a hurdles race?

_____

_____

_____

_____

Characteristics of fast and slow twitch muscle fibre types

Fast and Slow Twitch Muscle Fibres

All muscles are made up of individual fibres, each containing myofibrils, which are small strands which work together to make your muscles contract.

Muscle fibres can either be slow twitch (type I) or fast twitch (type IIa and type II X).

Athletes with slow twitch fibres tend to do better in endurance events such as _____ and _____. This type of muscle fibre may contract slowly but it can work for long periods of time without rest.

Athletes with fast twitch fibres tend to better in events that require a short burst of intense
exercise such as _____ and _____.

Most muscles contain both slow twitch and fast twitch muscle fibres. Name a sport where it is important to have both slow twitch and fast twitch muscle fibres. Explain why.

_____

_____

_____

_____

_____

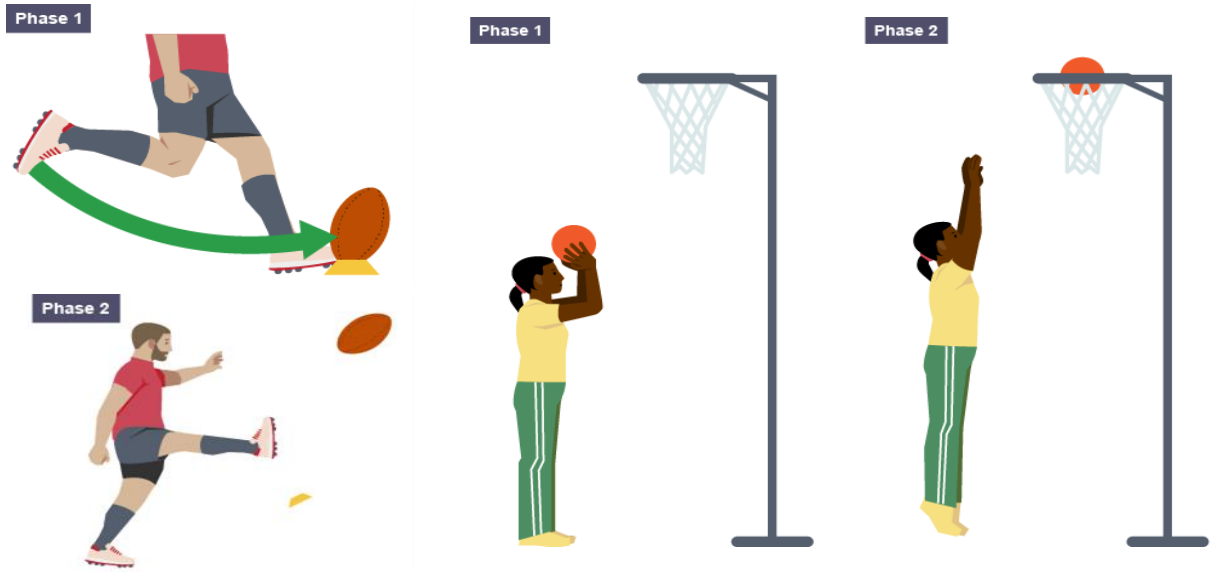
_____

_____ twitch muscle fibres are lighter in colour because they contain less oxygen

_____ twitch muscle fibres are darker in colour because they have a good oxygen supply and contain myoglobin (used to transport oxygen to muscles).

How the skeletal and muscular systems work together to allow participation in physical activity and sport

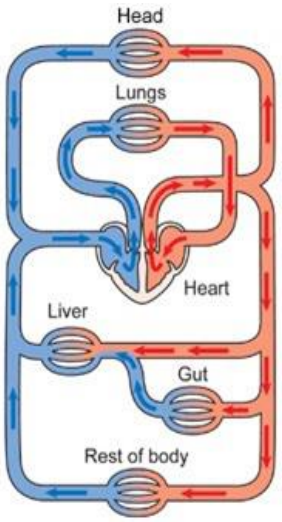
The **muscular system** works in conjunction with the skeleton to produce movement of the limbs and body.
Ligaments and tendons are two main types of connective tissues that help the muscular-skeletal system produce movements.
The muscles contract to pull on the bones to produce movements. Joints are able to move in a variety of directions to allow us to perform a range of sporting movements.
An analysis of a netball shot shows how the muscular-skeletal system works together to produce this throw.



RUGBY	JOINT	MOVEMENT	BONES	MUSCLES	CONTRACTION
PHASE 1					
PHASE 2					
NETBALL	JOINT	MOVEMENT	BONES	MUSCLES	CONTRACTION
PHASE 1					
PHASE 2					

Functions of the cardiovascular system

FUNCTION:
_____



The heart pumps oxygen around the body which releases energy stored as glucose in cells.

If the muscles need to work for longer or harder the heart works harder to increase oxygen levels.

The CV system carries away waste products and gets nutrients to the places where they are needed.

FUNCTION:_____

Blood contains _____ and when we cut ourselves, these platelets help to clot the blood forming a scab.

In some sports, such as rugby, cuts are common so this function of the cardiovascular system is crucial.

FUNCTION:_____

If your body gets too hot, the blood vessels close to your skin get bigger or dilate (_____) allowing more heat to radiate out.

If you body gets too cold, the blood vessels get smaller or constrict (_____) diverting away from the surface of the skin to hold more heat and lose less.

APPLY YOUR KNOWLEDGE: Explain the relevance of one of the functions of the cardiovascular system to physical activity. [3]

_____

_____

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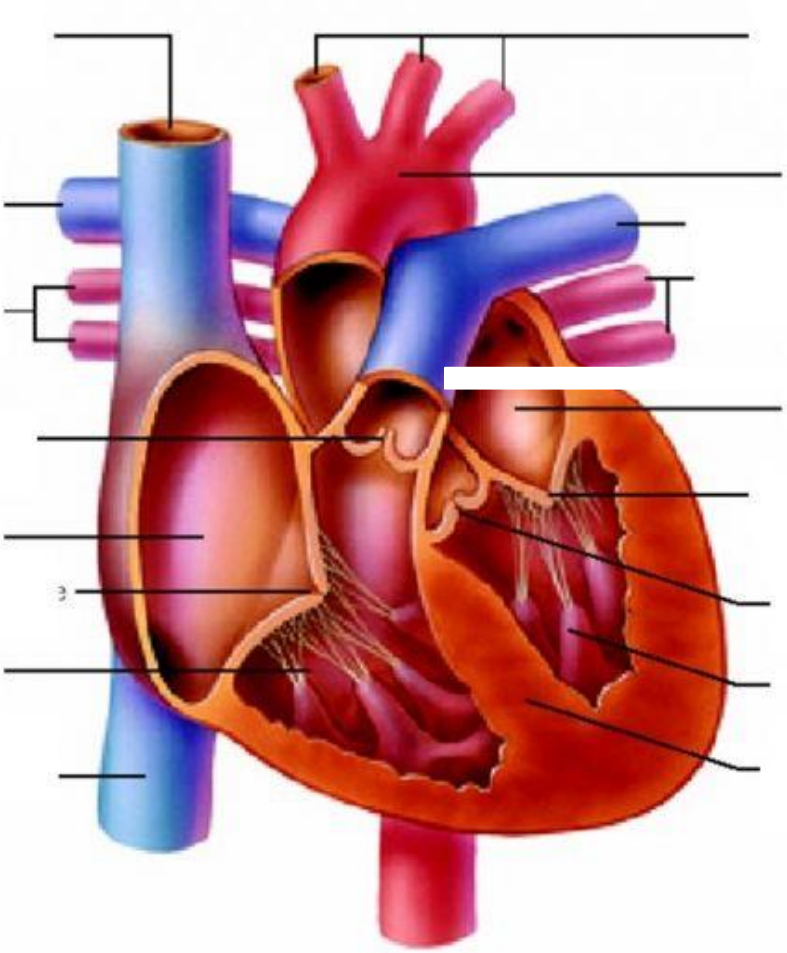
_____

Structure of the cardiovascular system



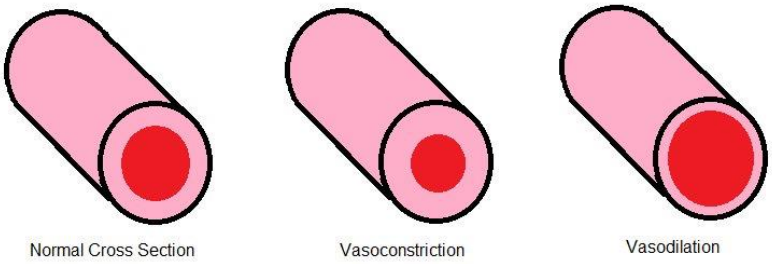
APPLY YOUR KNOWLEDGE: Describe the pathway of blood.

Structure of arteries, capillaries and veins

The structure of the blood vessels	*ARTERIES*	
	VEINS	
	CAPILLARIES	

KEY FACTS		
ARTERIES	VEINS	CAPILLARIES

The Vascular Shunt Mechanism

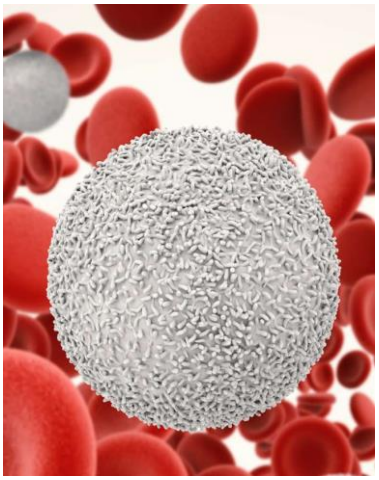


	Draw the blood vessel below	*Write a description of what is happening*
Vasodilation		
Vasoconstriction		

How does the redistribution of blood (vascular shunting) help Alex Scott to perform effectively?
Key terms: vasodilation, widening, vasoconstriction, narrowing, active and inactive areas.

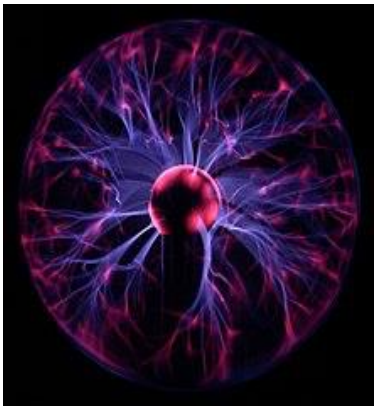
Function and importance of red and white blood cells, platelets and plasma

Red Blood Cells



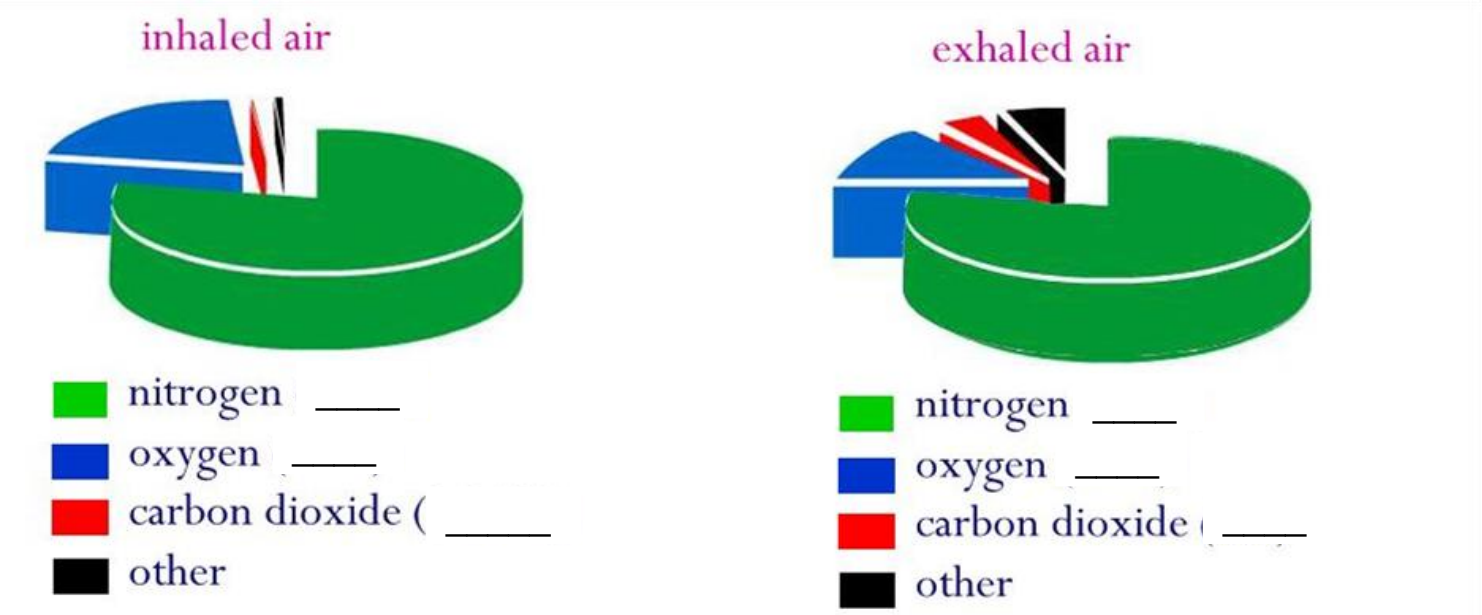
White Blood Cells

Platelets



Plasma

Composition of inhaled and exhaled air



In response to you starting to exercise, a number of changes to the respiratory system happen immediately:

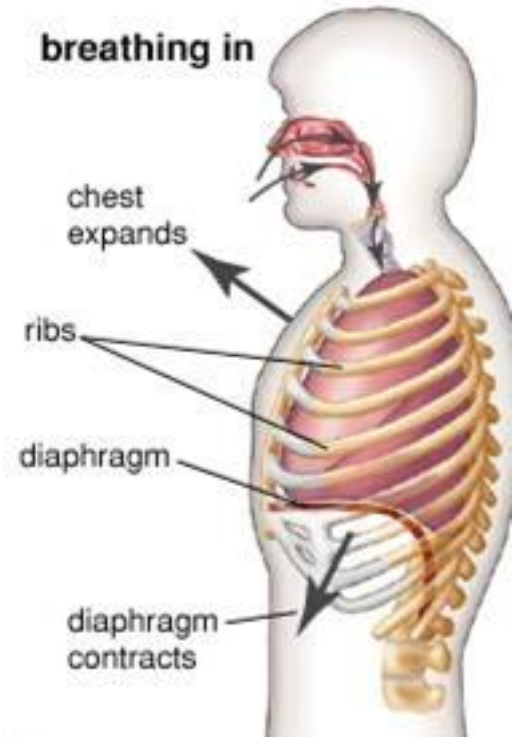
- Increase in breathing rate (faster breathing)
- Increase in depth of breathing (more air taken in with each breath)

Exercise causes an increase in demand on the respiratory system. The benefits of the immediate changes are:

- Increase in removal of carbon dioxide
- Increase in the amount of oxygen taken into the lungs in each breath

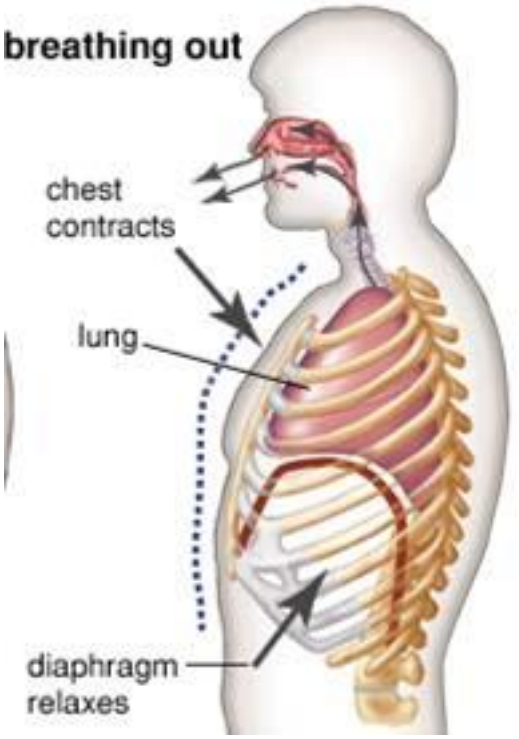
Explain why exhaled air has a different percentage of carbon dioxide than inhaled air. **[3]**

The mechanics of breathing in and out



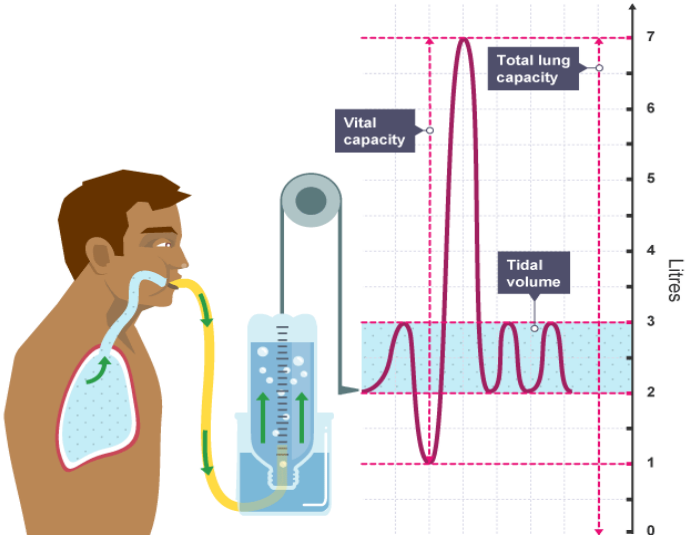
INSPIRATION (BREATHING IN)

EXPIRATION(BREATHING OUT)



Vital capacity and tidal volume

Vital capacity and tidal volume are two measures that feature in sports training and evaluation. Sports coaches and physiotherapists can use them to estimate the efficiency of a sports person's respiratory system.



These are the names given to the different parts of the respiratory cycle. You need to know them.

_____ (TLC) = the total volume of air in your lungs after your biggest breath in.

_____(TV) = during normal breathing, the total amount breathed in and out in one cycle.

_____ the maximum you can forcibly breathe in and out.

Delete the incorrect statement.

When you exercise, your tidal volume **increases / decreases** because the amount of oxygen you need goes **up / down.** Your lungs have to work harder to meet your body's demand for **oxygen / carbon dioxide**, so your cells can produce the extra energy they need.

During exercise, your body produces more **carbon dioxide / oxygen** too. Increasing tidal volume is one way for your lungs to exhale this extra carbon dioxide more rapidly.

Increasingly, studies show that exercise makes little difference to your vital capacity. The maximum amount of air you can take in and breathe stays around the same. What changes is your ability to take oxygen in and get it to where it is needed.

When participating in a game of football, explain the variations in tidal volume as the players change pace in the game. [4]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Location of main components of respiratory system

Nasal passages

↓

Pharynx → Larynx

↓

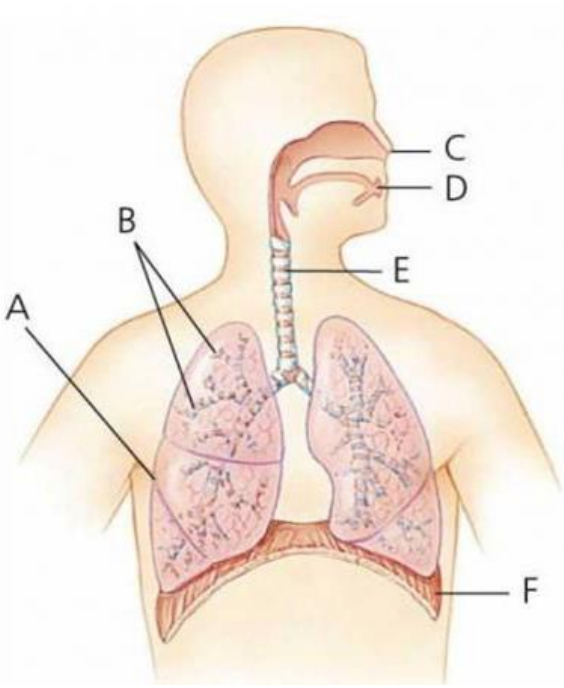
Trachea

↓

Bronchi → Bronchioles

↓

Alveoli



A.

B.

C.

D.

E.

F.

Nasal passages

The pharynx → larynx

Bronchioles → bronchi

Alveoli

Diaphragm

Structure of alveoli to enable gas exchange and the process of gas exchange to meet the demands of varying intensities of exercise

The alveoli are surrounded by _____ that carry blood. _____ inside red blood binds to oxygen, which diffuses into the blood so it can be transported around the body to be deposited in the living cells.

A series of _____ _____ (called cellular respiration) then takes place which combines glucose (from the food you eat) with the oxygen to release energy, along with carbon dioxide and water. The energy released is used to help us _____ , grow and keep warm.

While _____ is taken in, _____ _____ is given out, or exchanged, into the alveoli and is then breathed out.

This whole process is known as _____ _____. The make this process as efficient as possible, the alveoli have a very large surface area.

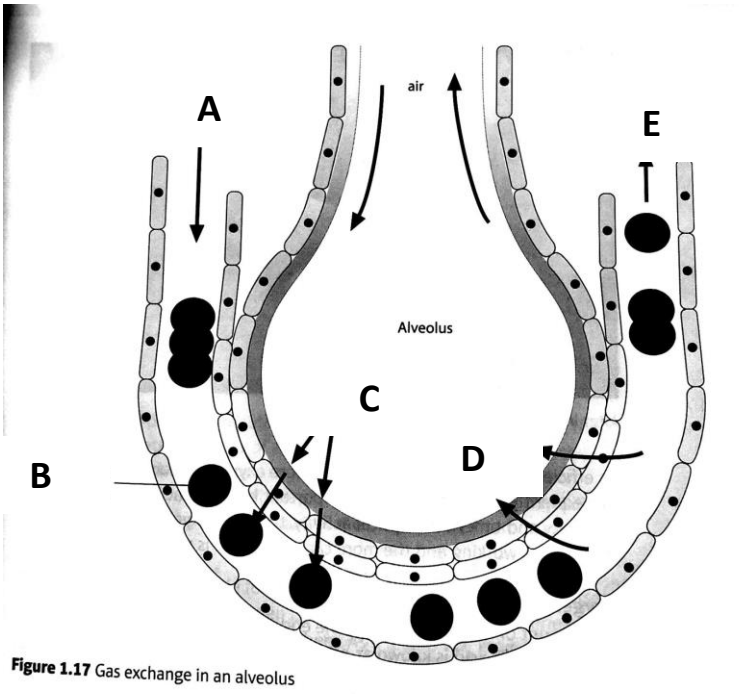


Figure 1.17 Gas exchange in an alveolus

A.

B.

C.

D.

E.

The linings of the alveoli are very thin and only work well when they are moist and clean. A healthy person has an efficient mechanism ensuring this.

When you breathe in through your nose it is:

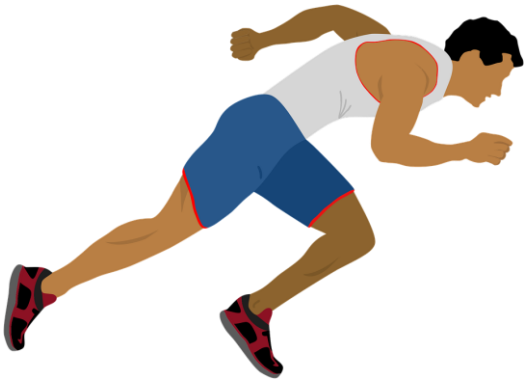
- filtered by the hairs at the entrance to your nose and by your mucus which is sticky
- warmed by blood vessels passing close to the linings of your nose
- moistened by water vapour

How the cardiovascular and respiratory systems work together to allow participation in physical activity and sport

An efficient respiratory system allows more oxygen to reach the blood and consequently the muscles. This is important because the harder and longer (intensity and time) the physical activity, the more oxygen is needed to keep the muscles working and the more carbon dioxide is produced.

Oxygen debt is the amount of _____

_____



Oxygen used during anaerobic exercise often results in oxygen debt.

Oxygen debt is repaid through deep, gasping breaths at the end of the activity. These enable as much oxygen as possible to be taken into the respiratory system, while eliminating as much as possible of waste products produced.

Oxygen debt occurs

Using a practical example, explain how the cardiovascular and respiratory system work together.

_____

_____

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_____

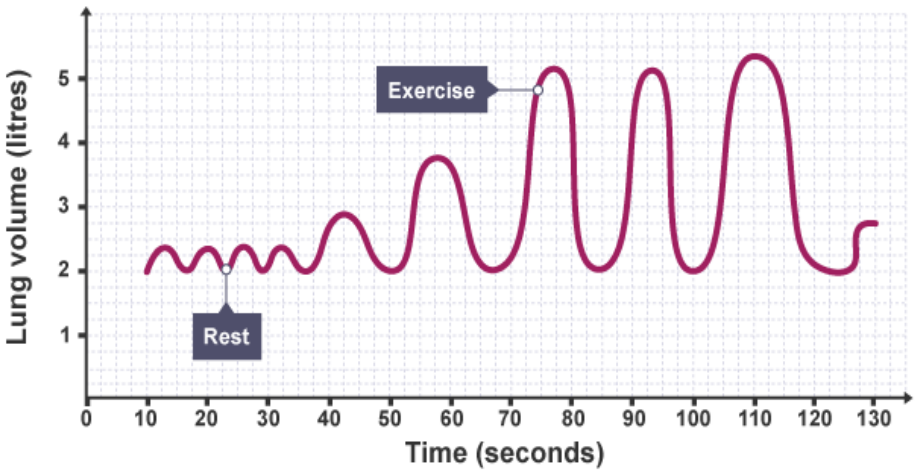
How the cardiovascular and respiratory systems work together to allow participation in physical activity and sport

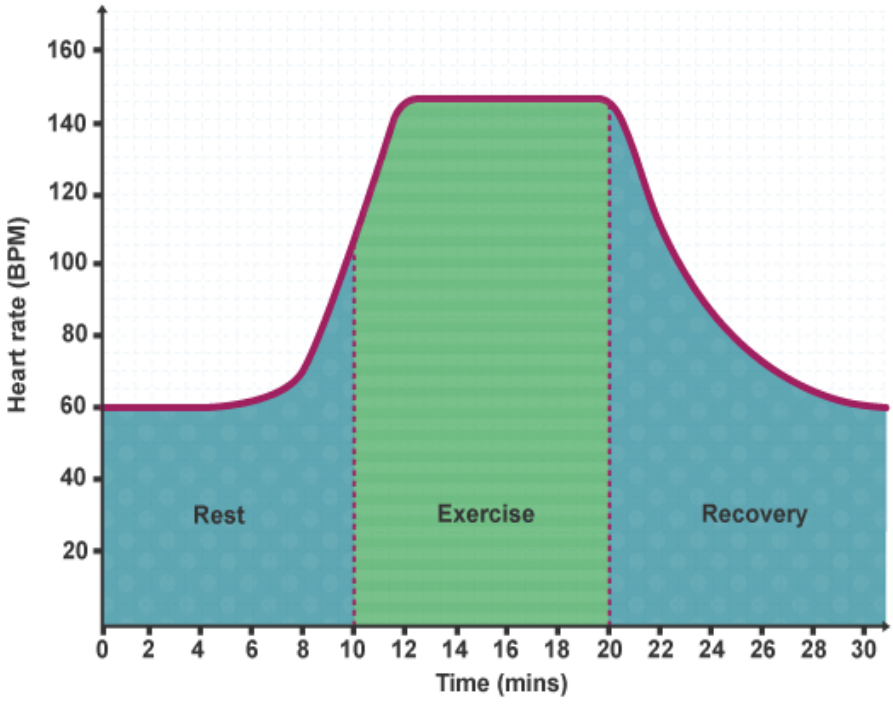
The cardio-respiratory system works together to get oxygen to the working muscles and remove carbon dioxide from the body.

During exercise the muscles need more oxygen in order to contract and they produce more carbon dioxide as a waste product. To meet this increased demand by the muscles, the following happens:

Breathing depth (T_____ V_____) and rate increase – this gets more oxygen into the lungs and removes more carbon dioxide out of the lungs.

The graph shows that as a person goes from rest to exercise, their tidal volume i_____.





Heart rate increases – this increases the rate that oxygen is transported from the blood to the working muscles and carbon dioxide is transported from the working muscles to the lungs.

This graph indicates the following:

- the person's resting heart rate is around 60 bpm
- at 8 minutes, just before taking part in exercise their heart rate increases - this is called A_____ R____.
- at 10 minutes, the person starts to take part in e_____ and there is a s_____ increase in heart rate which reaches ____ bpm at _____ minutes.
- the heart rate remain h_____ during exercise
- when the person s_____ taking part in exercise the heart rate decreases.

Energy: the use of glucose and oxygen

AEROBIC RESPIRATION

The usual process of releasing energy for your muscles is called aerobic respiration. For this sort of respiration your body's usual intake of oxygen is enough to give your muscles what they need.

Equation =

Explain……

Any exercise that increases your heart rate to a certain level - between 65 and 85 per cent of its maximum - is aerobic exercise.

Name some aerobic respiration exercises

ANAEROBIC RESPIRATION

When your muscles have to work really hard, a different process kicks in. Your muscles need more energy, but your body cannot deliver enough oxygen to them, so anaerobic respiration begins.

Equation =

Explain……

Anaerobic respiration exercise are usually activities which are short but intense; you work your muscles but then they have a break.

Name some anaerobic respiration exercises

Energy: the use of glucose and oxygen

Explain what has happened to Wayne Rooney in this picture.

_____

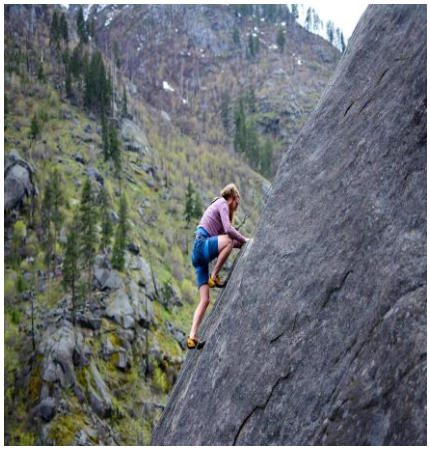
_____

_____

_____

_____

ANAEROBIC OR AEROBIC



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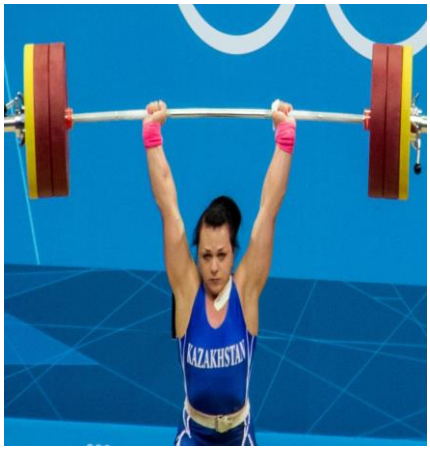

_____

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Energy sources

Energy comes from a range of different foods, including fats and carbohydrates.
Carbohydrates are the main energy source for high-intensity exercise, while fat can provide energy for low-intensity exercise for long periods.
For moderate intensity exercise, energy will come from equal amounts of carbohydrates and fat.

FATS

Fats usually provide most of the body energy needs. When you eat fat, it is broken down into fatty acids, which are absorbed into your blood and delivered to your cells.

Name some foods where fats are found

_____

_____

How much of your daily intake should be fats?

_____

_____

CARBOHYDRATES

Your body cells use this source of energy more easily than fat. Carbohydrates can only be stored in small amounts so your body tends to use them first for energy.

How are carbohydrates transported around the body?

_____

_____

Provide some examples of carbohydrates.

_____

_____

_____ **carbohydrates (starch)** are found in natural foods such as bananas, brown rice, wholemeal bread, wholemeal pasta, nuts and potatoes.

_____ **carbohydrates (glucose)** are found in their natural form in fruit and vegetables, and in their refined form in biscuits, cakes, chocolate and confectionary.

The energy you need to work and to exercise should come from complex carbohydrates

_____

_____of energy than simple carbohydrates, and can contribute to good long-term health.

Energy sources

Add a sport / physical activity below which relates to each statement

For short, high intensity exercise - ANAEROBIC EXERCISE - the energy you need will come from carbohydrates.

For longer exercise of moderate intensity - AEROBIC AND ANAEROBIC - the energy you will come from equal amounts of carbohydrates and fats

For exercise of a longer duration and lower intensity - AEROBIC EXERCISE - the amount of energy derived from your fats stores will increase.

Create a menu for each athlete thinking about the foods which will provide them with the energy they need.

	100m Sprinter	Weight lifter
Breakfast		
Lunch		
Dinner		
Snacks		

Short-term effects of physical activity and sport on lactate accumulation, muscle fatigue, and the relevance of this to the player/performer

L_____

A_____

How might this affect an athletes performance?

_____

_____

_____

_____

_____

_____

_____

_____

How might this affect an athletes performance?

_____

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_____

_____

M_____ F_____

EG - Cramp

Short-term effects of physical activity

Cardiovascular System

STROKE VOLUME is _____

_____

CARDIAC OUTPUT is _____

_____

What happens as a short term effect of physical activity on the cardiovascular system?

- _____
- _____
- _____

What is the importance of these short term effects taking place on a player? You may wish to use one of the pictures below to explain your answer.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Short-term effects of physical activity

Cardiovascular System

DEPTH OF BREATHING _____

_____

RATE OF BREATHING_____

_____

What happens as a short term effect of physical activity on the respiratory system?

- _____
- _____
- _____

What is the importance of these short term effects taking place on a player? You may wish to use one of the pictures below to explain your answer.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Long-term training effects and benefits: for performance of the muscular-skeletal system

_____

The bones are put under stress during exercise and they adapt by becoming thicker and heavier (more dense) to prevent fractures.

_____

_____

Ligaments and tendons are stretched during exercise and they adapt by becoming thicker and stronger to prevent them from tearing.

_____

When a muscle is trained, small tears are created. As they heal, they develop and become thicker. Muscle hypertrophy = increasing in size and greater strength

Long-term effects of exercise on the body systems

How does the long term effect have an impact on the athlete?

Increased bone density

Increased strength of L&T

Muscle hypertrophy

Long-term training effects and benefits: for performance of the cardio-respiratory system

Long-term effects of exercise on the body systems

There are five adaptations to the cardiorespiratory system that take place as a result of regular aerobic and anaerobic exercise.

Cardiac hypertrophy

Increase in the elasticity of the muscular walls of the arteries and veins

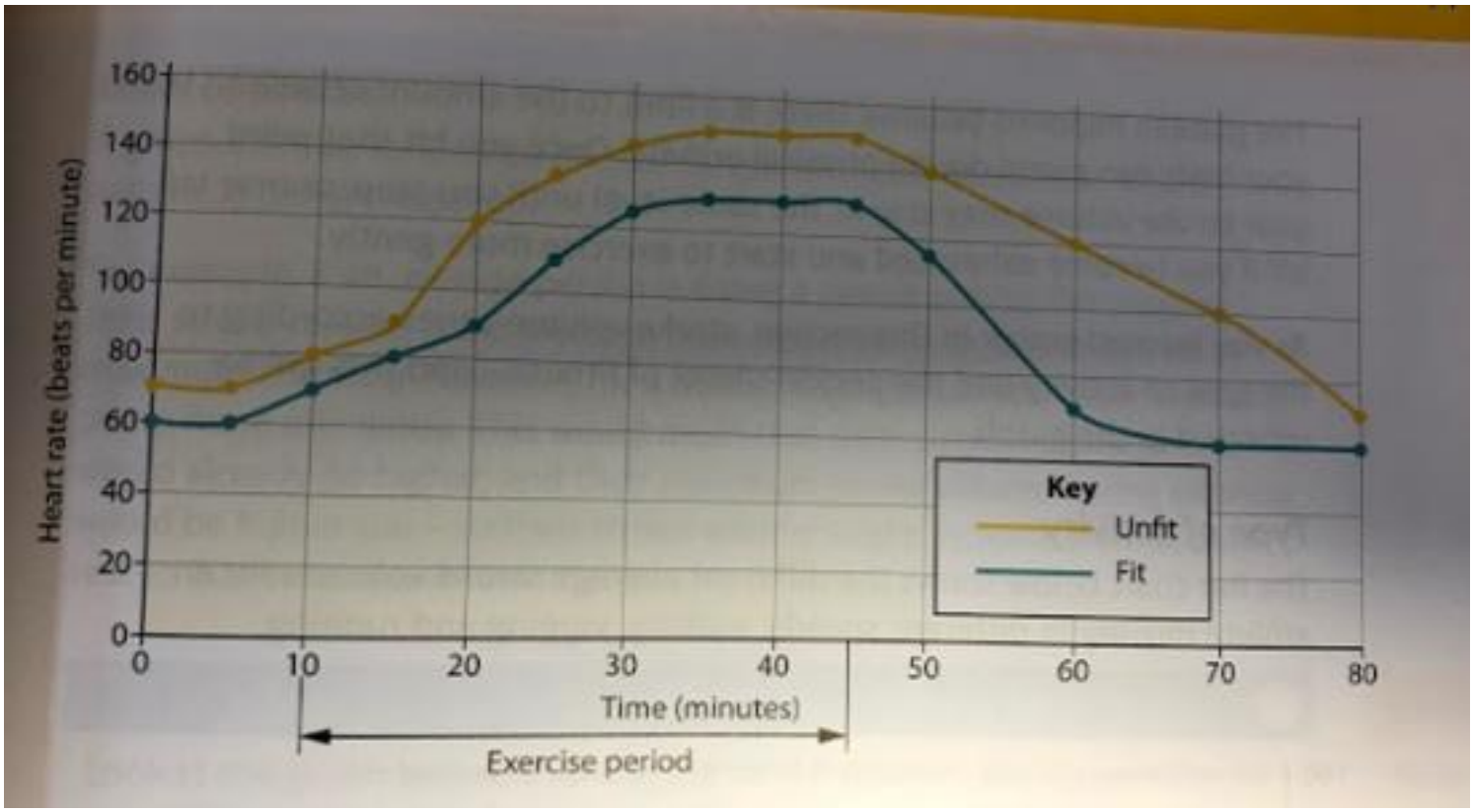
Increase in the number of red blood cells

Long-term effects of exercise on the body systems

Capilliarisation and an increase in the number of alveoli

Increased strength of the diaphragm and intercostal muscles leads to an increase in tidal volume and vital capacity

Interpretation of graphical representations of heart rate, stroke volume and cardiac output values at rest and during exercise



This graph shows heart rate patterns, before, during and after exercise for two different athletes. What are some of the key difference between the two?

Lower Resting Heart Rate

_____

_____

Rise of the heart rate

_____

_____

Maximum heart rate

_____

_____

Drop of the heart rate

_____

_____

Recovery time

_____

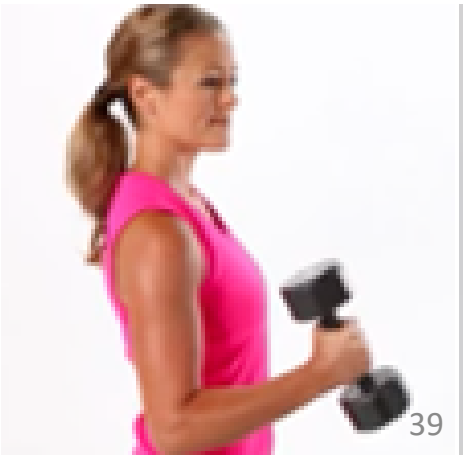
First, second and third class levers and their use in physical activity and sport

This song will help you remember the levers……..

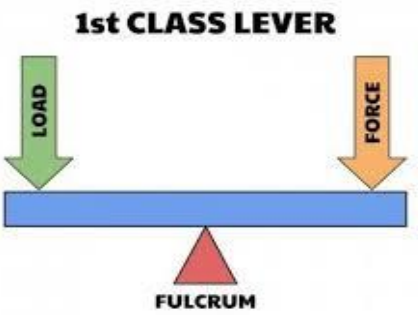
F
I
R
S
T

S
E
C
O
N
D

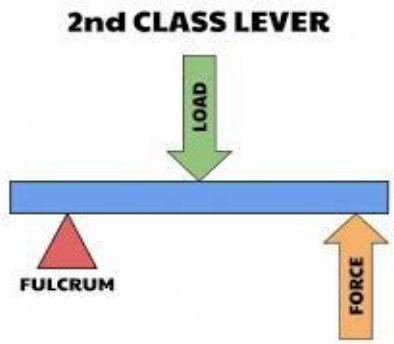
T
H
I
R
D



First, second and third class levers and their use in physical activity and sport



The fulcrum is located between the effort force and the load force of the lever arm.
First class levers can increase both the effects of the effort and the speed of a body.



_____

_____

_____

_____

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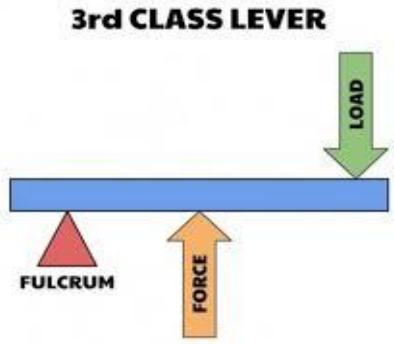


_____

_____

_____

_____

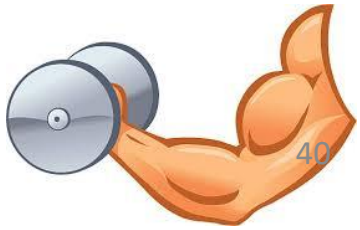
_____

Match each lever with the correct practical example

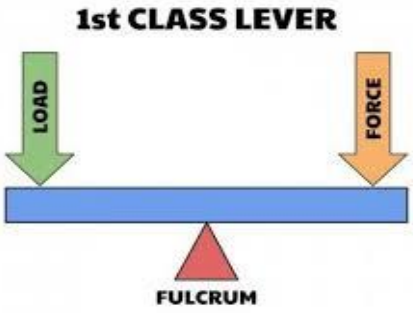
1st Class Lever

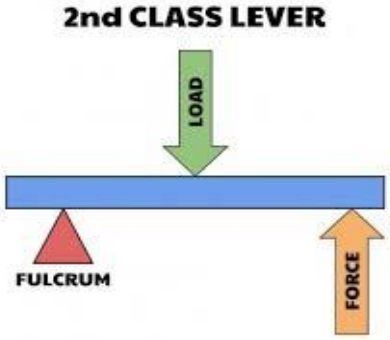
2nd Class Lever

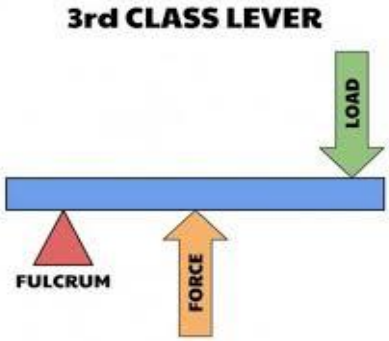
Third Class Lever



Mechanical advantage and disadvantage (in relation to loads, efforts and range of movement) of the body's lever systems and the impact on sporting performance







What is a mechanical advantage?

Analyse how the high jumper benefits from a mechanical advantage?

_____

_____

_____

_____

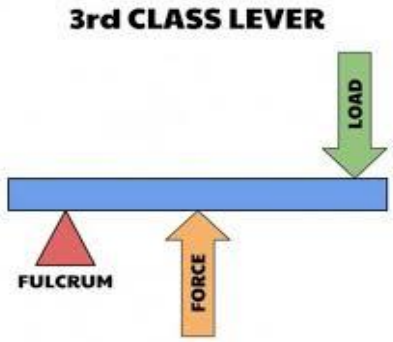
_____

_____

_____

_____

_____



The third class lever acts a a mechanical disadvantage because _____

_____

_____

_____

_____

Movement patterns using body planes and axes: sagittal, frontal and transverse plane and frontal, sagittal, vertical axes applied to physical activities and sporting actions

Movements that occur at this plane are:

_____

_____

_____

Provide a practical example of an movement that occurs within this plane.

_____

_____

_____

_____

F_____
Plane

Movements that occur at this plane are:

_____

_____

_____

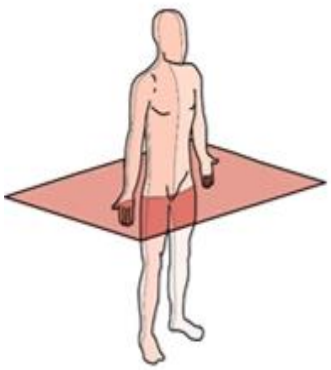
Provide a practical example of an movement that occurs within this plane.

_____

_____

_____

_____



T_____
Plane

Movements that occur at this plane are:

_____

_____

_____

Provide a practical example of an movement that occurs within this plane.

_____

_____

_____

_____

Movement patterns using body planes and axes: sagittal, frontal and transverse plane and frontal, sagittal, vertical axes applied to physical activities and sporting actions

A

V_____ Axis

This axis runs through the body from top to bottom.

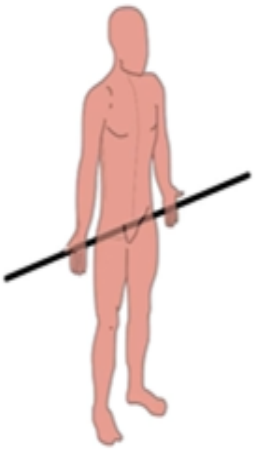
Provide a practical example of an movement that occurs within this axis

_____

_____

_____

_____



B

F_____ Axis

This axis runs through the body horizontally from left to right

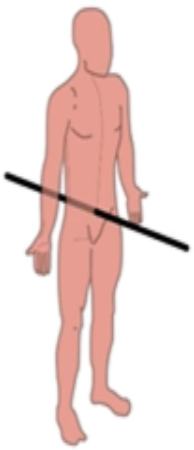
Provide a practical example of an movement that occurs within this axis.

_____

_____

_____

_____



C

S_____ Plane

This axis runs through the body horizontally from front to back.

Provide a practical example of an movement that occurs within this axis.

_____

_____

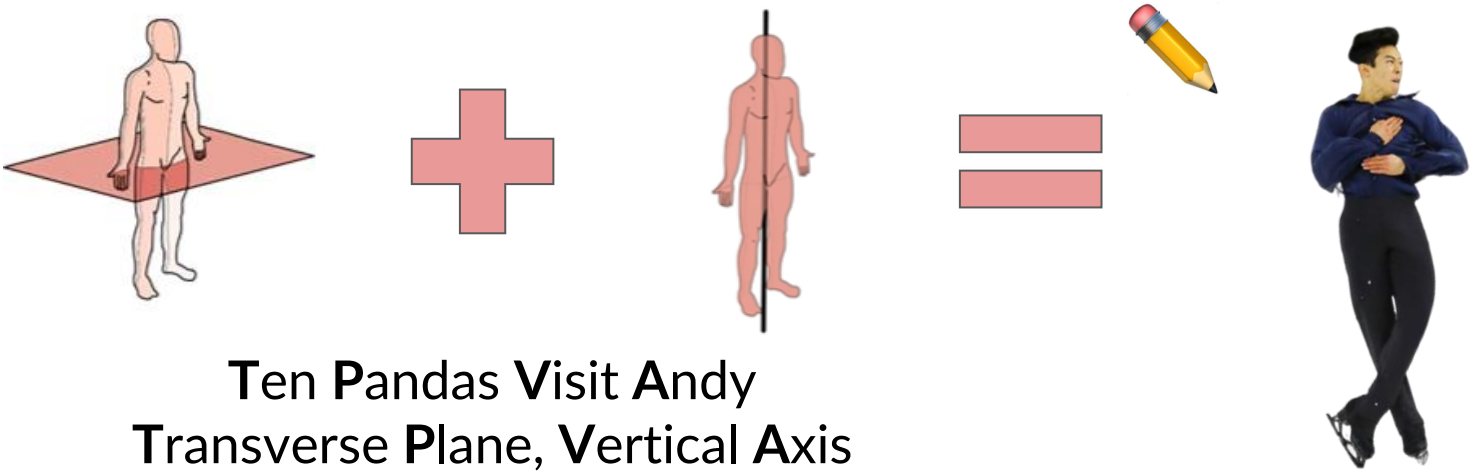
_____

_____

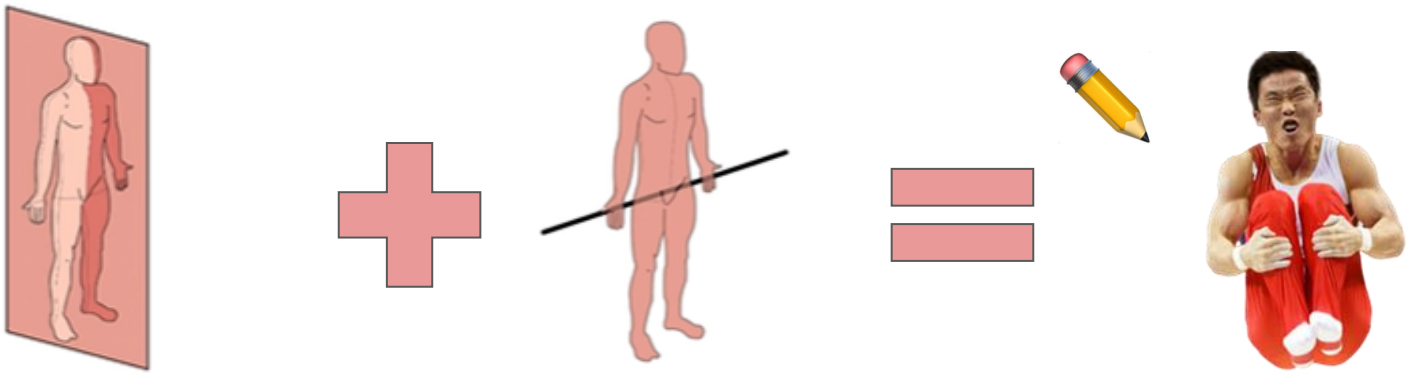
Planes and Axes combined movements

Planes and axes can be used when describing movement patterns. A plane is an imaginary line that divides the body into two. An axis is an imaginary line around which the whole body can turn.

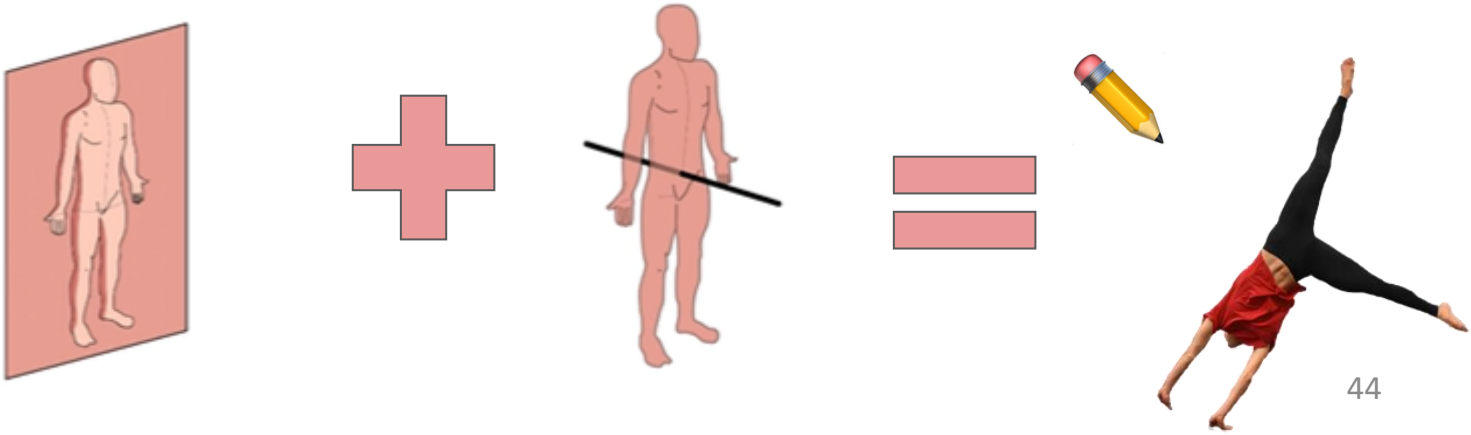
Draw the plane and axis onto each of the following examples



Ten **P**andas **V**isit **A**ndy
Transverse **P**lane, **V**ertical **A**xis



Six **P**andas **F**ight **A**ndy
Sagittal **P**lane, **F**rontal **A**xis



Definitions of fitness, health, exercise and performance and the relationship between them

Match the four terms **health, exercise, fitness** and **performance** to the correct defintion listed belov

_____ A state of complete emotional/psychological, physical and social well-being.

_____ A form of physical activity that maintains or improves health and fitness.

_____ The ability to meet the demands of the environment.

_____ How well a task is completed.

Exercise has a number of physical, emotional and social benefits.

Physical	Emotional	Social

Fitness also contributes to enhanced performance. How does fitness help Michael Jordan perform to a high level?

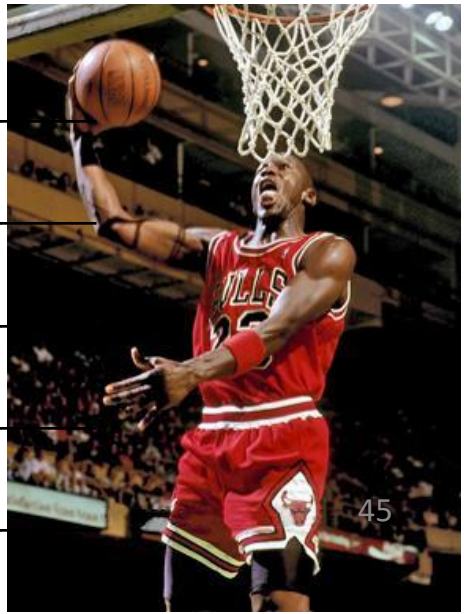
_____

_____

_____

_____

_____



Definitions of fitness, health, exercise and performance and the relationship between them

People often talk about being fit and healthy, as if the two always go together. However, it is possible to be fit but not healthy. How have each of sportsmen demonstrated the ability to be fit but not healthy.

Jonathan Trott

Lionel Messi

Steve Redgrave

Describe the links between the terms: health, fitness, performance and exercise.

Components of fitness and the relative importance of these components in physical activity and sport:

There are five basic components of fitness that help you stay physically fit: **cardiovascular endurance, muscular strength, muscular endurance, flexibility and body composition.**

Link each of the components of fitness to the definitions below.

Your ability to exercise your whole body for long periods of time, sometimes called stamina or aerobic endurance. _____

Your ability to exert force, such as when you lift a weight._____

Your ability to use voluntary muscles repeatedly without getting tired.
_____

The range of motion of your joints or the ability of your joints to move freely.
_____

The percentage of body weight that is muscle, fat or bone. _____

Add a description to each picture, stating why the performer benefits from a component of fitness.

Cardiovascular endurance

_____

_____

_____

_____

_____

Muscular Strength

_____

_____

_____

_____

_____

Components of fitness and the relative importance of these components in physical activity and sport:

Muscular endurance

Flexibility

Body composition

Components of fitness and the relative importance of these components in physical activity and sport:

There are six skill based components of fitness: **agility, balance, coordination, power, reaction time and speed.**

1. **Link each of the skill components of fitness to the definitions below.**
2. **Add a practical example for each skill component.**

The ability to change position and control the body at speed. _____

_____

_____

_____

____

The ability to use two or more body parts together. ._____

_____

_____

_____

____

The rate at which an individual can perform a movement or cover a distance.
_____

_____

_____

Components of fitness and the relative importance of these components in physical activity and sport:

There are six skill based components of fitness: **agility, balance, coordination, power, reaction time and speed.**

1. **Link each of the skill components of fitness to the definitions below.**
2. **Add a practical example for each skill component.**

The time between the presentation of a stimulus and the onset of the movement.
_____

_____

_____

_____

____

The ability to be able to keep the body stable, while at rest or in motion._____

_____

_____

_____

____

The ability to undertake strength performances quickly. _____

_____

Fitness tests: the value of fitness testing, the purpose of specific fitness tests, the test protocols, the selection of the appropriate fitness test for components of fitness and the rationale for selection

Whatever your sport or physical activity, fitness is key to success.

Different sports require different types of fitness. For example, Mo Farah and Tom Daley have very different fitness needs and completely different training programmes.

In some sports, fitness may be the difference between the success achieved by top players and those who are less successful.

You can use a single fitness test or a number of fitness tests to measure and assess your current fitness level in a specific area.

Fitness tests can be vital to the performer providing them with the following information:

Identify your strengths and weaknesses.

_____

_____

_____

___

Monitor your progress.

_____

_____

_____

___

Give yourself an incentive.

_____

_____

_____

___

Name a sport / athlete who would benefit from the following tests	
Cooper 12 minute run - a cardiovascular test	
30m sprint - a speed test	
Sit and reach test - a flexibility test	

Fitness tests: the value of fitness testing, the purpose of specific fitness tests, the test protocols, the selection of the appropriate fitness test for components of fitness and the rationale for selection

Strength is the amount of force a muscle can generate when it contracts to overcome resistance. The stronger you are, the easier it is to do everyday tasks such as lifting and carrying.

The test used to measure your strength is called

_____

Protocol

Use a hand grip dynamometer.
With your strongest hand, squeeze as tightly as possible.
Take three recordings.
Record your best score.

Gender	Excellent	Good	Average	Fair	Poor
Male	>56	51-56	45-50	39-44	<39
Female	>36	31-36	25-30	19-24	<19

This is the **normative data** for the hand grip dynamometer. Compare your results**.**

Flexibility is the range of motion of your joints or the ability of your joints to move freely.

The test used to measure your flexibility is called

_____

Protocol

Sit down with your legs straight and feet against box.
Measure how far beyond your toes you can reach.
If you cannot reach your toes you score a minus total.
If you reach your toes you score zero, which is average.

Gender	Excellent	Above average	Average	Below average	Poor
Male	>14	14.0 - 11.0	10.9 - 7.0	6.9 - 4.0	<4
Female	>15	15.0 - 12.0	11.9 - 7.0	6.9 - 4.0	<4

This is the **normative data** for the sit and reach test. Compare your results**.**

Fitness tests: the value of fitness testing, the purpose of specific fitness tests, the test protocols, the selection of the appropriate fitness test for components of fitness and the rationale for selection

Cardiovascular endurance is the ability to exercise your whole body for long periods of time, sometimes called stamina or aerobic endurance.

The test used to measure your cardiovascular endurance is called

_____

Protocol

The athlete warms up for 10 minutes.

The assistant gives the command “GO”, starts the stopwatch and the athlete commences the test.

The assistant keeps the athlete informed of the remaining time at the end of each lap (400m)

The assistant blows the whistle when the 12 minutes has elapsed and records the distance the athlete covered to the nearest 10 metres

This is the normative data for the 12 minute run. Compare your results

Age	Excellent	Above Average	Average	Below Average	Poor
13-14	>2700m	2400-2700m	2200-2399m	2100-2199m	<2100m
15-16	>2800m	2500-2800m	2300-2499m	2200-2299m	<2200m
17-19	>3000m	2700-3000m	2500-2699m	2300-2499m	<2300m
20-29	>2800m	2400-2800m	2200-2399m	1600-2199m	<1600m
30-39	>2700m	2300-2700m	1900-2299m	1500-1999m	<1500m
40-49	>2500m	2100-2500m	1700-2099m	1400-1699m	<1400m
>50	>2400m	2000-2400m	1600-1999m	1300-1599m	<1300m

Age	Excellent	Above Average	Average	Below Average	Poor
13-14	>2000m	1900-2000m	1600-1899m	1500-1599m	<1500m
15-16	>2100m	2000-2100m	1700-1999m	1600-1699m	<1600m
17-20	>2300m	2100-2300m	1800-2099m	1700-1799m	<1700m
20-29	>2700m	2200-2700m	1800-2199m	1500-1799m	<1500m
30-39	>2500m	2000-2500m	1700-1999m	1400-1699m	<1400m
40-49	>2300m	1900-2300m	1500-1899m	1200-1499m	<1200m
>50	>2200m	1700-2200m	1400-1699m	1100-1399m	<1100m

Cardiovascular endurance is the ability to exercise your whole body for long periods of time, sometimes called stamina or aerobic endurance.

The test used to measure your cardiovascular endurance is called

_____

Protocol

The athlete warms up for 10 minutes

Set the metronome at 30 beats per minute.

The assistant gives the command "GO" and starts the stopwatch

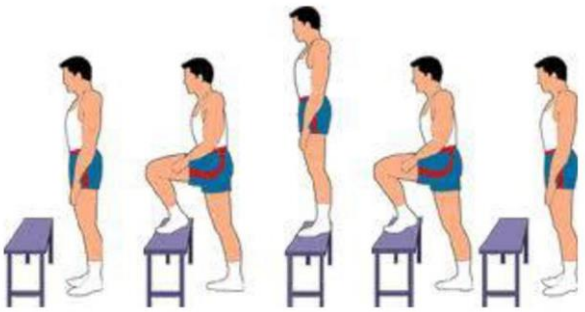
The assistant stops the test after 5 minutes or exhausted

The assistant measures the athlete's heart rate (bpm) one minute after finishing the test - Pulse 1

The assistant measures the athlete's heart rate (bpm) two minutes after finishing the test - Pulse 2

The assistant measures the athlete's heart rate (bpm) three minutes after finishing the test - Pulse 3

Harvard step test



100 x duration of test in seconds

2 x (heart beats 1 + heart beats 2 + heart beats 3)

Gender	Excellent	Above Average	Average	Below Average	Poor
Male	>90.0	80.0 - 90.0	65.0 - 79.9	55.0 - 64.9	<55
Female	>86.0	76.0 - 86.0	61.0 - 75.9	50.0 - 60.9	<50

This is the **normative data** for the harvard step test.. Compare your results**.**

Fitness tests: the value of fitness testing, the purpose of specific fitness tests, the test protocols, the selection of the appropriate fitness test for components of fitness and the rationale for selection

Muscular endurance is the ability to use voluntary muscles many times without getting tired.

The test used to measure your muscular endurance is called

_____

Age	Excellent	Good	Above Average	Average	Below Average	Poor
17 - 19	>56	47-56	35-46	19-34	11-18	<11

This is the **normative data** for the press up test (male above, female below). Compare your results**.**

Protocol

Take up the starting position (see picture)

On the command go, bend your elbows and lower your body until your shoulder drop below the level of your elbows. Then return to the starting point.

You can pause to rest but only in the starting position.

The assistant should count how many full press-ups you can complete in one minute, or up to the point where you cannot continue.

Age	Excellent	Good	Above Average	Average	Below Average	Poor
17 - 19	>35	27-35	21-26	11-20	6-10	<6

Muscular endurance is the ability to use voluntary muscles many times without getting tired.

The test used to measure your muscular endurance is called

_____

Protocol

Lie on an exercise mat with your knees bent at right angles and your feet flat on the ground. Rest your hands on your thighs.

Squeeze your stomach, push your lower back flat, and raise your upper body high enough for your hands to slide along you thighs to touch the tops of your knees.

Dont pull with your neck or head, and keep your lower back on the floor. Then return to the starting position.

Your assistant should count how many full sit-ups you can complete in one minute, or to a point where you cannot continue.

Gender	Excellent	Above Average	Average	Below Average	Poor
Male	>30	26 - 30	20 - 25	17 - 19	<17
Female	>25	21 - 25	15 - 20	9 - 14	<9

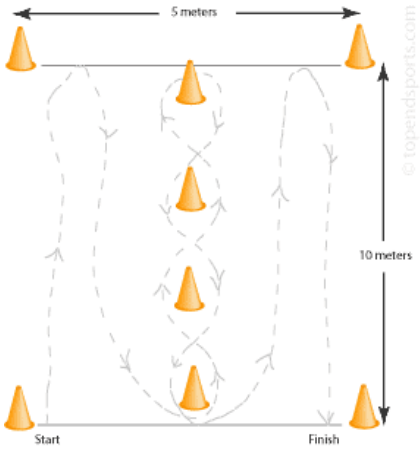
This is the **normative data** for the sit up test. Compare your results**.**

Fitness tests: the value of fitness testing, the purpose of specific fitness tests, the test protocols, the selection of the appropriate fitness test for components of fitness and the rationale for selection

Agility is the ability to control the movement of the whole body and change position quickly.

The test used to measure your agility is called

_____



Protocol

The athlete warms up for 10 minutes
The assistance sets up the course as detailed in the diagram
The athlete lies face down on the floor at the "Start" cone
The assistant gives the command "GO" and starts the stopwatch.
The athlete jumps to his/her feet and negotiates the course around the cones following the red line route as shown in the diagram to the finish
The assistant stops the stopwatch and records the time when the athlete passes the "Finish" cone

Gender	Excellent	Above Average	Average	Below Average	Poor
Male	<15.2 secs	15.2 - 16.1 secs	16.2 - 18.1 secs	18.2 - 19.3 secs	>19.3 secs
Female	<17.0 secs	17.0 - 17.9 secs	18.0 - 21.7 secs	21.8 - 23.0 secs	>23.0 secs

This is the **normative data** for the Illinois agility test. Compare your results**.**

Speed is the rate at which an individual can perform a movement or cover a distance.

The test used to measure your speed is called

_____

Protocol

Work with a partner.
Mark out a 30m distance.
When your partner signals you to start, run as fast as you can while your partner records your time.

Gender	Excellent	Above Average	Average	Below Average	Poor
Male	<4	4.0 - 4.2	4.3 - 4.4	4.5 - 4.6	>4.6
Female	<4.5	4.5 - 4.6	4.7 - 4.8	4.9 - 5.0	>5.0

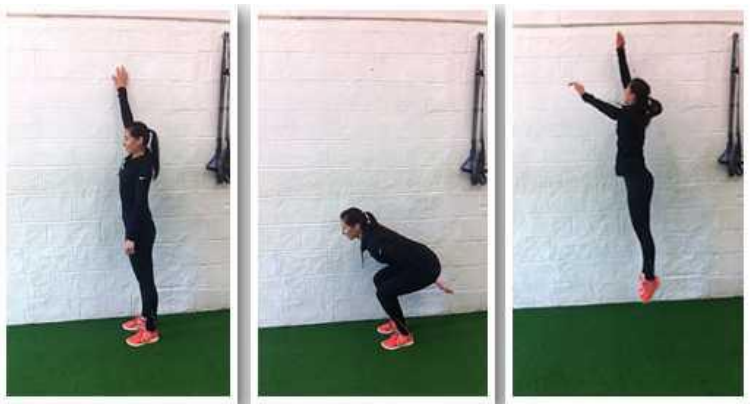
This is the **normative data** for the 30m sprint test. Compare your results**.**

Fitness tests: the value of fitness testing, the purpose of specific fitness tests, the test protocols, the selection of the appropriate fitness test for components of fitness and the rationale for selection

Power is the ability to undertake strength performances quickly.

The test used to measure your power is called

_____



Protocol

The athlete warms up for 10 minutes
The athlete chalks the end of his/her fingertips
The athlete stands side onto the wall, keeping both feet remaining on the ground, reaches up as high as possible with one hand and marks the wall with the tips of the fingers (M1)
The athlete from a static position jumps as high as possible and marks the wall with the chalk on his fingers (M2)
The assistant measures and records the distance between M1 and M2
The athlete repeats the test 3 times
The assistant calculates the average of the recorded distances and uses this value to assess the athlete's performance

Gender	Excellent	Above average	Average	Below average	Poor
Male	>65cm	50 - 65cm	40 - 49cm	30 - 39cm	<30cm
Female	>58cm	47 - 58cm	36 - 46cm	26 - 35cm	<26cm

This is the **normative data** for the vertical jump test. Compare your results**.**

Reaction time is the time between the presentation of a stimulus and the onset of movement.

The test used to measure your reaction time is called

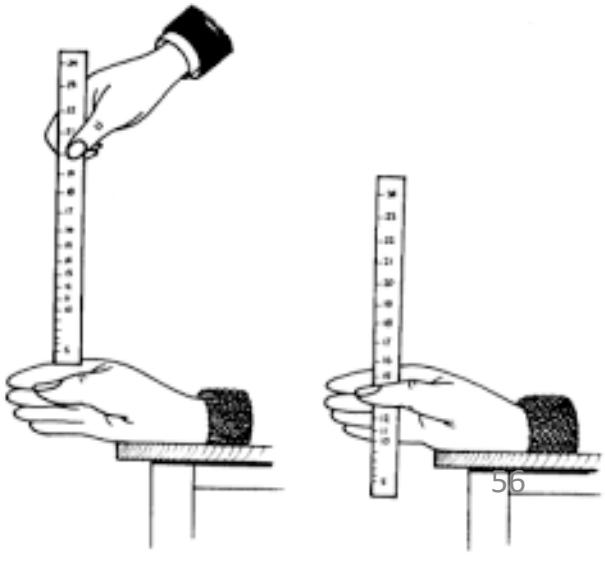
_____

Excellent	Above Average	Average	Below Average	Poor
<7.5cm	7.5 - 15.9cm	15.9 - 20.4cm	20.4 - 28cm	>28cm

This is the **normative data** for the ruler drop test. Compare your results**.**

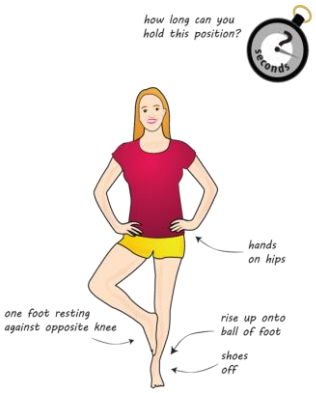
Protocol

The ruler is held by the assistant between the outstretched index finger and thumb of the athlete's dominant hand so that the top of the athlete's thumb is level with the zero-centimetre line on the ruler
The assistant instructs the athlete to catch the ruler as soon as possible after it has been released
The assistant releases the ruler and the athlete catches the ruler between their index finger and thumb as quick as possible
The assistant is to record the distance between the bottom of the ruler and the top of the athlete's thumb where the ruler has been caught.
The test is repeated 2 more times and the average value used in the assessment



Fitness tests: the value of fitness testing, the purpose of specific fitness tests, the test protocols, the selection of the appropriate fitness test for components of fitness and the rationale for selection

Balance is being able to keep the body stable, while at rest or in motion.



The test used to measure your balance is called

_____

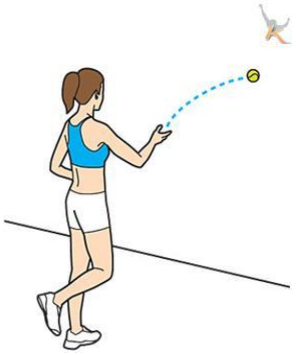
Protocol

The athlete warms up for 10 minutes
The athlete stands comfortably on both feet with their hands on their hips
The athlete lifts the right leg and places the sole of the right foot against the side of the left kneecap
The assistant gives the command “GO”, starts the stopwatch and the athlete raises the heel of the left foot to stand on their toes
The athlete is to hold this position for as long as possible
The assistant stops the stopwatch when the athlete's left heel touches the ground, or the right foot moves away from the left knee
The assistance records the time
The test is repeated on the right kneecap.

	Excellent	Above Average	Average	Below Average	Poor
Males	>50	41-50	31-40	20-30	<20
Females	>30	23-30	16-22	10-15	<10

This is the **normative data** for the standing stork test. Compare your results.

Coordination is the ability to use two or more body parts together.



The test used to measure your coordination is called

_____

Protocol

The athlete warms up for 10 minutes
The athlete stands two metres away from a smooth wall
The assistant gives the command "GO" and starts the stopwatch
The athlete throws a tennis ball with their right hand against the wall and catches it with the left hand, throws the ball with the left hand and catches it with the right hand. This cycle of throwing and catching is repeated for 30 seconds
The assistant counts the number of catches and stops the test after 30 second
The assistant records the number of catches

Age	Excellent	Above Average	Average	Below Average	Poor
15-16 years	>35	30 - 35	25 - 29	20 - 24	<20

This is the **normative data** for the wall throw test. Compare your results.

Collection and interpretation of data from fitness test results and analysis and evaluation of these against normative data tables

Look at your results from your fitness testing and fill in the following boxes.

From analysing my fitness testing my strengths are:

From analysing my fitness testing my weaknesses are:

From analysing my fitness testing my performance may be affected by:

Fitness tests for specific components of fitness

Component of fitness	Test

Planning training using the principles of training

The principles of training should be thought of as the 'golden rules' of making fitness training work for the individual participant. Following these golden rules will help to guarantee success and will carry athletes towards their training and performance goals. All training is aimed at creating long-term physical changes in the body systems. These changes are referred to as adaptations.

Individual needs

Specificity

Progressive overload

Planning training using the principles of training

F_____

_

How _____ you exercise during the week

I_____

How _____ are the sessions

T_____

How _____ the sessions, intervals or sets are

T_____

The _____ _ of training used

Rest and Recovery

Overtraining

Reversibility

Training Thresholds

To work out your **maximum heart rate** you need to do the following sum:

220 - your age = maximum heart rate

Work out your maximum heart rate below:

220 - _____ = _____

This is known as Karvonen formula

ANAEROBIC TARGET ZONES

What is your anaerobic target zone?

_____

_____

_____

_____

To work out your **anaerobic target zone** you need to do the following sum:

220 - your age = maximum heart rate

Work out your maximum heart rate below:

220 - _____ = _____

80% = 80 x _____ ÷ 100 = _____

90% = 80 x _____ ÷ 100 = _____

So your anaerobic target zone for you to aim for is a heart rate of between _____ and _____ bpm.

Training Thresholds

To work out your **maximum heart rate** you need to do the following sum:

220 - your age = maximum heart rate

Work out your maximum heart rate below:

220 - _____ = _____

This is known as Karvonen formula

AEROBIC TARGET ZONES

What is your aerobic target zone?

_____

_____

_____

_____

To work out your **aerobic target zone** you need to do the following sum:

220 - your age = maximum heart rate

Work out your maximum heart rate below:

220 - _____ = _____

60% = 60 x _____ ÷ 100 = _____

80% = 80 x _____ ÷ 100 = _____

So your aerobic target zone for you to aim for is a heart rate of between _____ and _____ bpm.

Factors to consider when deciding the most appropriate training methods and training intensities for different physical activities and sports

FACTORS TO CONSIDER WHEN DECIDING THE MOST APPROPRIATE TRAINING METHOD

Which factor to each of these pictures relate to?

The use of different training methods for specific components of fitness, physical activity and sport

All methods of training need to be specific to the individual performer, component of **fitness** and the activity.

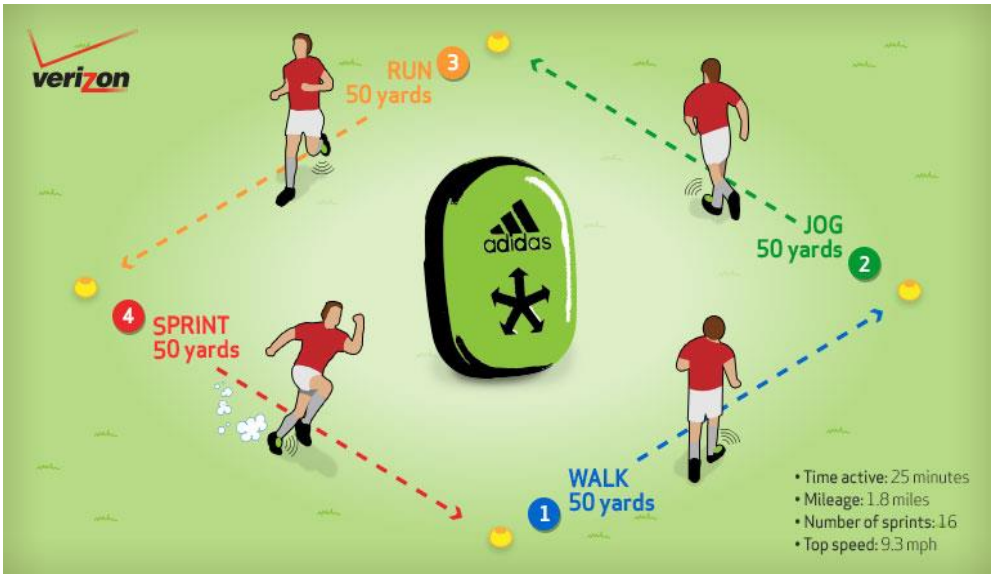
CONTINUOUS TRAINING

Continuous training develops **cardiovascular endurance.**	The disciplines that would use continuous training would be **swimming, cycling, running and walking.**	A disadvantage to continuous training would be **that some participants find longer sessions boring.**

A advantage to continuous training

FARTLEK TRAINING

This training develops	The disciplines that would use this training would be	A disadvantage to this training would be



A advantage to fartlek training

The use of different training methods for specific components of fitness, physical activity and sport

All methods of training need to be specific to the individual performer, component of **fitness** and the activity.

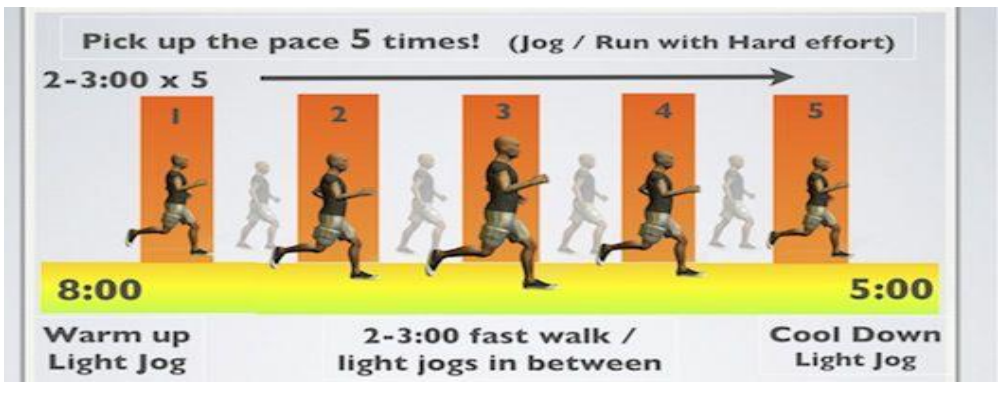
CIRCUIT TRAINING

This training develops	The disciplines that would use this training would be	A disadvantage to this training would be

A advantage to circuit training

INTERVAL TRAINING

This training develops	The disciplines that would use this training would be	A disadvantage to this training would be



A advantage to interval training

The use of different training methods for specific components of fitness, physical activity and sport

All methods of training need to be specific to the individual performer, component of **fitness** and the activity.

PLYOMETRIC TRAINING

Plyometric training develops **power.**

The disciplines that would use continuous training would be **well trained athletes such as sprinters.**

A disadvantage to plyometric training would be **that some participants can get injured if not in excellent condition.**

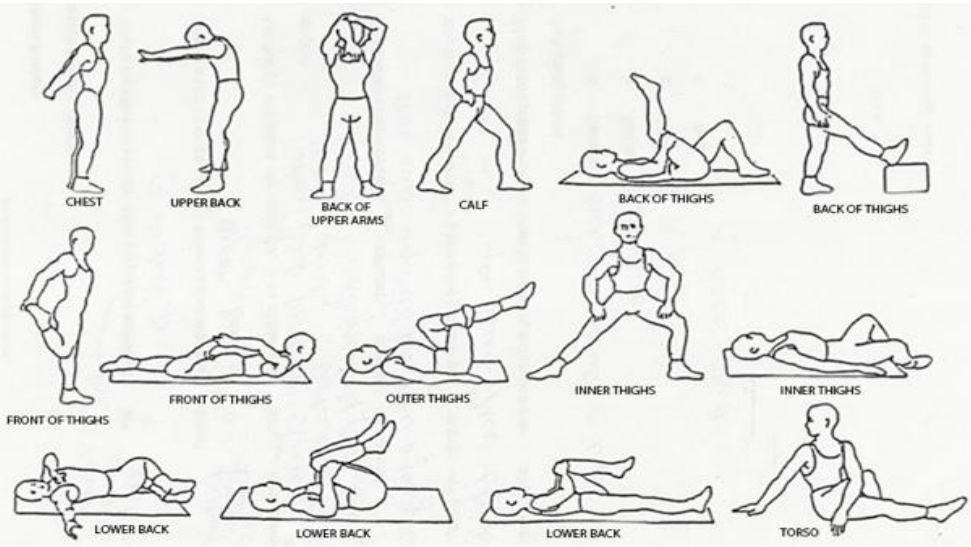
A advantage to continuous training

FLEXIBILITY TRAINING

This training develops

The disciplines that would use this training would be

A disadvantage to this training would be



A advantage to continuous training

The use of different training methods for specific components of fitness, physical activity and sport

All methods of training need to be specific to the individual performer, component of **fitness** and the activity.

FITNESS CLASSES

This training develops	The disciplines that would use this training would be	A disadvantage to this training would be

A advantage to continuous training

The use of a PARQ to assess personal readiness for training and recommendations for amendment to training based on PARQ

PARQ stands for

Why do we complete a PARQ?

You have now completed the PARQ.

What does it tell you about your fitness? You may wish to comment on the amount of exercise you do and your diet.

To improve your current fitness, what recommendations might you suggest?

Injury prevention

Q: How did Ronaldo improve his physique?

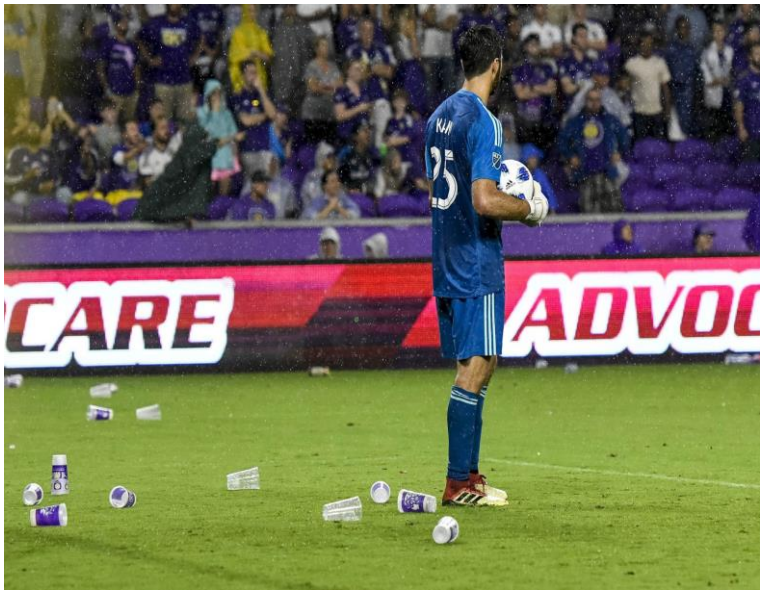
Q: Before we play this sport, what do we need to know?

Q: How can we avoid injury when playing this sport?

Injury prevention

Q: How might this hinder his performance?

Q: What hazard do we notice?



Q: What does this picture represent?

Injuries that can occur in physical activity and sport

Concussion

Symptoms

Fracture

Types of fracture

Dislocation

Symptoms

Soft tissue injuries

Types of soft tissue injuries

Injuries that can occur in physical activity and sport

Sprain

Symptoms

Torn cartilage

Types of fracture

Explain why sprains are common sports injuries in activities such as netball and football. [**3 marks].**

RICE

Many sporting injuries can be initially treated following the RICE method.

This method is most effective with soft tissues injuries or injuries where swelling is likely to occur.

R — **Rest**

Immobilise the injured part

I — **Ice**

Apply an ice pack or other cold object direct to the affected area

C — **Compression**

Ensure that the ice pack or compress is firmly pressed against the affected area

E — **Elevation**

Raise the injured limb above the level of the heart

Performance-enhancing drugs (PEDs)

Negatives	Type of drug	Positives
	Anabolic steroids	
	Growth hormone	
	Erythropoietin (EPO)	
	Blood doping	

Performance-enhancing drugs (PEDs)

Negatives	Type of drug	Positives
	Diuretics	
	Stimulants	
	Beta blockers	
	Narcotic analgesics	

Which PED would each of these athletes take? State why.

The performancing enhancing drg that would benefit this performer would be _____ because _____ _____ _____ ___

The performancing enhancing drg that would benefit this performer would be _____ because _____ _____ _____ ___

The performancing enhancing drg that would benefit this performer would be _____ because _____ _____ _____ ___

The performancing enhancing drg that would benefit this performer would be _____ because _____ _____ _____ ___

The performancing enhancing drg that would benefit this performer would be _____ because _____ _____ _____ ___

The purpose and importance of warm-ups and cool downs to effective training sessions and physical activity and sport

A training session, match or competition should always be split into three sections, performed in the same logical order:

- w_____ u__
- m_____ a_____
- c_____ d_____

What is the role of the warm up?

Why is a warm up essential?

Why does a warm up provide?

What is the role of a cool down?

Why is a cool down essential?

Phases of a warm-up and their significance in preparation for physical activity and sport

Role	P R	Example/s
		

Role	S	Example/s
		

Role	S S D	Example/s
		

Stage 4: Psychological warm up - The athlete will be totally focused on the performance following the three stages.

Phases of a cool down

Role	P L	Example/s
		

Role	S S	Example/s
		

Role	D S	Example/s