

## Knowledge Organiser – GCSE PE: Paper 1 – Physical training

| Components of fitness and fitness tests |   |  |
|---|---|--|
| Component                               | Definition  | Fitness test   |
| Cardiovascular Endurance                | The ability of the heart, <u>blood</u> and blood vessels to deliver oxygen to working muscles | Multistage fitness test; <u>12 minute</u> cooper run |
| Muscular Endurance                      | The ability of a muscle or muscle group to repeatedly contract without fatiguing              | Press up test; sit up test                           |
| Strength                                | The ability of a muscle to apply force against resistance                                     | Grip strength dynamometer                            |
| Speed                                   | The ability to move the body or parts of the body quickly                                     | 30m sprint test                                      |
| Coordination                            | The ability to use two or more body parts together  | Wall throw test                                      |
| Agility                                 | The ability to change direction at speed  | Illinois agility run                                 |
| Power                                   | The ability to use strength at speed  | Standing long jump; standing vertical jump           |
| Reaction Time                           | The time taken to respond to a stimulus   | <u>Ruler</u> drop test                               |
| Balance                                 | The ability to keep your centre of mass over a base of support                                | Standing stork test                                  |
| Flexibility                             | The range of movement at a joint  | Sit and reach test                                   |

| Principles of training |  |
|------------------------|--|
| Specificity            | Training is <b>suited</b> to the sport or the individual |
| Progression            | Making the training <b>gradually harder</b>              |
| Overload               | Working the body <b>harder than it is used to</b>        |
| Reversibility          | When training stops, <b>gains can be lost</b>            |
| Frequency              | How <b>often</b> you train                               |
| Intensity              | How <b>hard</b> you train                                |
| Time                   | How <b>long</b> you train for                            |
| Type                   | <b>What</b> training method you use                      |

| Methods of training |  |
|---------------------|--|
| Interval            | Periods of <b>work</b> combined with periods of <b>rest</b>                                  |
| Circuit             | A <b>series</b> of exercises in a <b>specific order</b> with <b>rest</b> between             |
| Plyometrics         | Exercise that <u>involve</u> <b>rapid and repeated stretching and contraction</b> of muscles |
| Continuous          | Training <b>non-stop</b> with <b>no rest</b> for at least <b>20 minutes</b>                  |
| Fartlek             | <b>Continuous</b> training that involves <b>changing speed or gradient</b>                   |
| Weight              | Training that involves using <b>force against resistance</b>                                 |
| HIIT                | <b>Periods of high intensity work</b> followed by <b>rest</b> then <b>repeated</b> .         |

# Knowledge Organiser- GCSE PE: Paper 1 – The Skeletal System

## Functions of the skeleton

|                       |  |
|-----------------------|--|
| Protection            | Flat bones protect the vital organs e.g. cranium protects the brain  |
| Movement              | Where two or more bones meet is a joint. Bones attach to muscles via tendons to create movement              |
| Support               | The skeleton allows the body to stand upright and provides a framework for muscle attachment.                |
| Blood cell production | Blood cells are produced in the bone marrow of long bones  |
| Posture               | Provides a framework for the body and gives the body the right shape   |
| Mineral Storage       | Bones store minerals such as calcium and phosphorous for strong bones and iron to aid oxygen transportation. |

## Types of bone

|                 |   |                         |
|-----------------|---|-------------------------|
| Long bones      | Usually long in length. Contains bone marrow.     | E.g. Humerus, femur     |
| Short bones     | Compact spongy bones found in the hands and feet. | E.g. Tarsals, phalanges |
| Flat bones      | Protect the vital organs.                         | E.g. Vertebrae          |
| Irregular bones | Do not have a fixed shape.                        | E.g. Coccyx, Sacrum     |

## Long term effects of exercise on the skeletal system

|                                 |   |
|---------------------------------|---|
| Increased bone density          | Bones become stronger and denser and are less likely to break.  |
| Increased strength of tendons   | Ligament strength increases enabling the joint to become stronger and is less likely to become injured. |
| Increased strength of ligaments | Tendon strength increases enabling the joint to become stronger and is less likely to become injured.   |

## Features of a joint

|                |   |
|----------------|---|
| Ligaments      | Connect bone to bone and help to keep the joint stable                  |
| Tendons        | Connect muscle to bone and let muscles pull bones which causes movement |
| Cartilage      | This stops bones rubbing together                                       |
| Synovial fluid | This lubricates/ oils the joint to allow easy fluid movement.           |

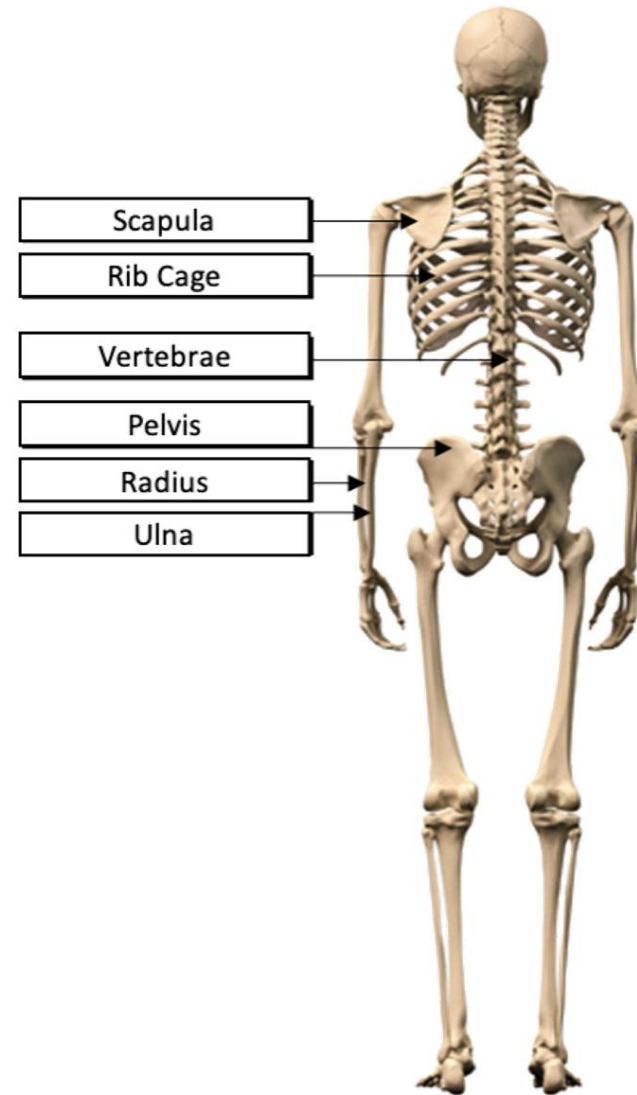
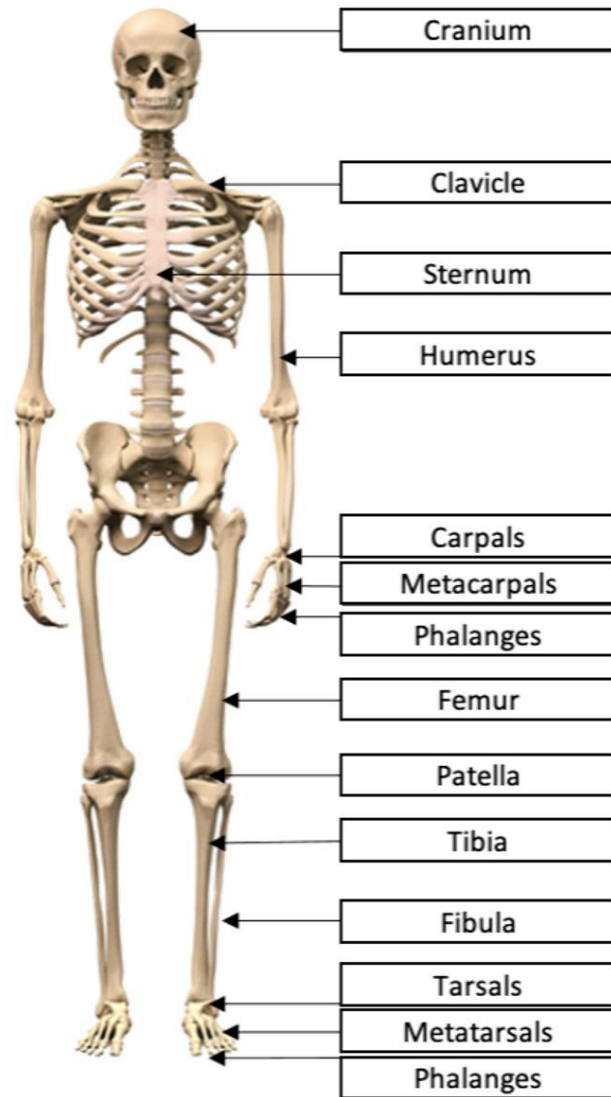
## Types of joints

|                 |  |
|-----------------|--|
| Ball and socket | Found in the hip and shoulder and allows all ranges of movement.   |
| Hinge           | Found in the knee and elbow and only allows flexion and extension. |

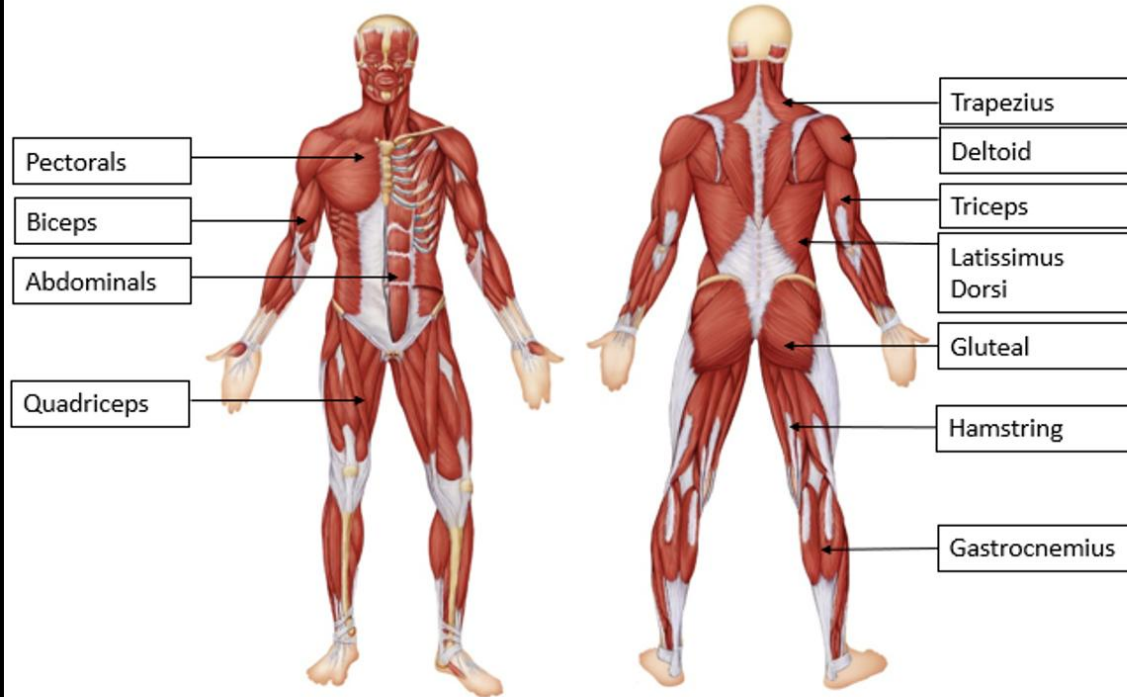
## Movement at a joint

|               |   |
|---------------|---|
| Flexion       | Decreasing the angle at a joint             |
| Extension     | Increasing the angle at a joint             |
| Abduction     | Movement away from the midline of the body  |
| Adduction     | Movement towards the midline of the body    |
| Rotation      | Turning of a body part about its axis       |
| Circumduction | The circular 360 degree movement at a joint |

## The structure of the skeletal system



## Knowledge Organiser – GCSE PE: Paper 1 –The Muscular system



### Type of muscle movement

|                   |  |
|-------------------|--|
| <b>Agonist</b>    | The <b>muscle</b> that <b>contracts</b>                                  |
| <b>Antagonist</b> | The <b>muscle</b> that <b>relaxes</b>                                    |
| <b>Fixator</b>    | The <b>muscle</b> that <b>stabilises another pair of muscles working</b> |

### Short term effects of exercise on the muscular system

|                                     |  |
|-------------------------------------|--|
| <b>Increased muscle temperature</b> | <b>Blood flows to the muscle</b> causing an increase in muscle temperature                                       |
| <b>Increased muscle elasticity</b>  | One muscle temperature increases <b>muscles become more pliable and flexible</b> which helps to reduce injury    |
| <b>Increased muscle fatigue</b>     | As muscles are <u>used</u> they begin to <b>tire</b> and a poison known as <b>lactic acid</b> begins to build up |

### The structure and function of the muscular system

|                         |   |
|-------------------------|---|
| <b>Skeletal muscles</b> | Often <b>attached to bone</b> . <b>Voluntary muscles</b> that require <b>conscious control</b> to move. <u>E.g.</u> Bicep       |
| <b>Smooth muscles</b>   | Muscle that is <b>controlled by the nervous system</b> . Found in the walls of the <b>digestive system</b> or <b>arteries</b> . |
| <b>Cardiac muscle</b>   | Found in the <b>wall of the heart</b> . Works <b>involuntarily continuously</b> .   |

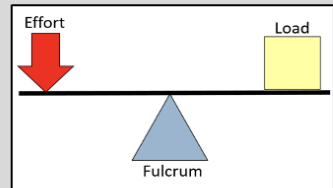
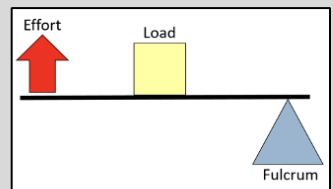
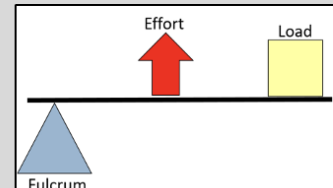
### Long term effects of exercise on the muscular system

|                                    |  |
|------------------------------------|--|
| <b>Muscle hypertrophy</b>          | The <b>muscle fibres</b> grow <b>larger and stronger</b>         |
| <b>Improved muscular strength</b>  | <b>Muscles become stronger.</b>                                  |
| <b>Improved muscular endurance</b> | <b>Muscles can work for longer</b> without becoming <b>tired</b> |

## Knowledge Organiser – GCSE PE: Paper 1 – Movement Analysis

| Lever features   |   |
|------------------|---|
| <b>Fulcrum</b>   | A <b>fixed point</b> , usually the <b>joint</b>                 |
| <b>Load</b>      | The <b>resistance</b> usually the <b>weight</b> being moved     |
| <b>Effort</b>    | The <b>force</b> acting upon a joint, usually the <b>muscle</b> |
| <b>Lever Arm</b> | A <b>rigid</b> structure, usually the <b>bone</b>               |

| Mechanical advantage        |   |
|-----------------------------|---|
| <b>Mechanical Advantage</b> | A lever can overcome a load with <b>little effort</b> . If the <b>effort arm</b> is <b>longer</b> than the <b>load arm</b> there will be <b>higher mechanical advantage</b> . |

| Lever types                |  |   |
|----------------------------|--|---|
| <b>First Class Levers</b>  | Has the <b>fulcrum</b> in the <b>middle</b> , an example is in the <b>neck</b>                                     |  |
| <b>Second Class Levers</b> | Has the <b>load</b> in the <b>middle</b> , an example is the <b>ankle</b> and <b>extension</b> at the <b>elbow</b> |  |
| <b>Third Class Levers</b>  | Has the <b>effort</b> in the <b>middle</b> , an example is the <b>knee</b> and <b>flexion</b> at the <b>elbow</b>  |  |

| Planes of movement      |  |
|-------------------------|--|
| <b>Frontal Plane</b>    | <b>Splits</b> the body in to <b>front to back</b>  |
| <b>Sagittal Plane</b>   | <b>Splits</b> the body in to <b>left and right</b> |
| <b>Transverse Plane</b> | <b>Splits</b> the body in to <b>top and bottom</b> |

| Axis of rotation         |  |
|--------------------------|--|
| <b>Frontal Axis</b>      | Goes <b>through</b> the body from <b>front to back</b> |
| <b>Transverse Axis</b>   | Goes <b>through</b> the body from <b>left to right</b> |
| <b>Longitudinal Axis</b> | Goes <b>through</b> the body from <b>top to bottom</b> |



# Knowledge Organiser – GCSE PE: Paper 1 –The Cardiovascular system

| The heart        |   |
|------------------|---|
| Atria            | Where the <b>blood</b> collects when it <b>enters</b> the heart   |
| Ventricles       | <b>Pumps</b> the <b>blood</b> out of the heart  |
| Septum           | <b>Separates</b> the <b>right hand</b> and <b>left hand</b> of the heart  |
| Tricuspid Valve  | <b>Separates</b> the <b>right atrium</b> and <b>right ventricle</b>   |
| Bicuspid Valve   | <b>Separates</b> the <b>left atrium</b> and <b>left ventricle</b>   |
| Blood vessels    |   |
| Vena Cava        | Carries <b>deoxygenated bloody</b> back to the heart  |
| Aorta            | Carries <b>oxygenated blood</b> to the <b>body</b>  |
| Pulmonary Vein   | Carries <b>oxygenated blood</b> back to the heart   |
| Pulmonary Artery | Carries <b>deoxygenated blood</b> to the <b>lungs</b>   |
| Capillaries      | <b>One cell thick</b> allows for <b>gaseous exchange</b>  |
| Veins            | Carry blood <b>towards</b> the heart, have a <b>large lumen</b> , carry blood at <b>low pressure</b> , have <b>valves</b> |
| Arteries         | Carry blood <b>away</b> from the heart, have a <b>small lumen</b> , carry blood at <b>high pressure</b>                   |
| Cardiac output   |   |
| Heart Rate       | Is measured in <b>BPM</b> and is the <b>number of times</b> the heart <b>beats per minute</b>                             |
| Stroke Volume    | Is the <b>amount of blood ejected</b> from the heart in <b>one beat</b> , measured in <b>ml</b>                           |
| Cardiac Output   | Is the amount of <b>blood ejected</b> from the heart in <b>one minute</b> , measured in <b>l/min</b>                      |

| Short term effects of exercise |   |
|--------------------------------|---|
| Increased heart rate           | The heart <b>beats faster</b> to pump <b>more blood</b> around the body                                     |
| Stroke volume increases        | The heart <b>ejects <u>more blood</u></b> per beat to get <b>more blood</b> around the body                 |
| Cardiac output increases       | As <b>stroke volume</b> and <b>heart rate</b> have <b>increased</b> as will cardiac output                  |
| Blood pressure increases       | The heart <b>works harder</b> to <b>pump more blood</b> around the body                                     |
| Redistribution of blood flow   | During exercise <b><u>blood flows</u></b> to <b>where it is needed</b><br>E.g. The working <b>muscles</b> . |

| Long term effects of exercise         |   |
|---------------------------------------|---|
| Red blood cells increase              | <b>More red blood cells</b> are produced to <b>carry oxygen</b> around the body   |
| Blood becomes less viscous            | Blood produces more <b>plasma</b> making <b>blood thinner</b> and able to <b>transport oxygen quicker</b> around the body |
| Cardiac hypertrophy                   | The heart becomes <b>bigger</b> and <b>stronger</b>   |
| <u>Drop in resting heart rate</u>     | Due to cardiac hypertrophy the heart can pump <b>more blood per beat</b>  |
| <u>Drop in resting blood pressure</u> | Due to <b>cardiac hypertrophy</b> the heart is not under pressure <b>to pump as hard</b>                                  |
| Increased stroke volume               | Due to cardiac hypertrophy the heart can <b>pump more blood per beat</b>  |
| Quicker recovery rate                 | The heart rate gets <b>back to resting heart rate quicker</b> after exercise  |
| Increased cardiac output              | Due to an <b>increased stroke volume</b> cardiac output <b>increases</b>  |
| Capillarisation                       | <b>New capillaries</b> are formed at the <b>alveoli</b> to enhance <b>gaseous exchange</b>                                |

## Knowledge Organiser – GCSE PE: Paper 1 –The Respiratory system

| The lungs           |   |
|---------------------|---|
| Nasal cavity        | Where the <b>air enters</b> the respiratory system  |
| Epiglottis          | Small piece of <b>cartilage</b> at the back of the <b>mouth</b> that <b>prevents food</b> from going down the <b>trachea</b> .  |
| Trachea             | Known as the <b>windpipe</b> , <b>connects</b> the nasal cavity and bronchi   |
| Bronchi             | <b>Splits</b> in to two to serve the <b>left</b> and <b>right lung</b> with <b>air</b>  |
| Bronchioles         | <b>Distributes air</b> across all the <b>lung</b> to the <b>alveoli</b>   |
| Alveoli             | <b>Air sacs</b> that allow <b>carbon dioxide</b> to <b>diffuse out</b> from blood and <b>oxygen</b> to <b>diffuse in</b> , known as <b>gaseous exchange</b>   |
| Intercostal muscles | <b>Muscles between</b> the <b>ribs</b> that allow for the <b>chest cavity</b> to <b>expand</b> when <b>breathing</b> .  |
| Diaphragm           | A sheet of <b>muscle</b> that separates the respiratory system from the digestive system. It <b>contracts</b> and <b>relaxes</b> to allow air to be <b>inhaled</b> and <b>exhaled</b> from the lungs. |

| Mechanics of breathing |   |
|------------------------|---|
| Inspiration            | Diaphragm and intercostals contract, chest cavity increases, pressure decreases, air flows in           |
| Expiration             | Diaphragm and intercostals relax, chest cavity <u>decreases</u> , pressure increases, air is pushed out |

| Minute ventilation |  |
|--------------------|--|
| Tidal volume       | The <b>amount</b> of <b>air</b> breathed in and out in <b>one breath</b> |
| Breathing rate     | The number of <b>breaths</b> taken <b>per minute</b>                     |
| Minute ventilation | The <b>amount</b> of <b>air</b> breathed in and out in <b>one minute</b> |

| Aerobic and anaerobic respiration |  |
|-----------------------------------|--|
| Aerobic Exercise                  | Exercise <b>with oxygen</b> , moderate intensity, long duration<br><b>Glucose + Oxygen = Energy + Carbon dioxide + Water</b> |
| Anaerobic Exercise                | Exercise <b>without oxygen</b> , high intensity, short duration<br><b>Glucose = Energy + Lactic acid</b>                     |

| Short term effects of exercise |  |
|--------------------------------|--|
| Increased breathing rate       | Breathing rate becomes <b>deeper</b> and <b>quicker</b>            |
| Increased tidal volume         | <b>More air</b> is <b>breathed in</b> and out in <b>one breath</b> |
| Increased minute ventilation   | <b>More air</b> is <b>breathed in</b> and out in <b>one minute</b> |

| Long term effects of exercise                 |   |
|---|---|
| Lung capacity increases                       | The lungs can <b>take in more air</b>   |
| Respiratory muscles become stronger           | The <b>intercoastal muscles</b> and <b>diaphragm</b> become <b>stronger</b> allowing more <b>space</b> in the <b>chest cavity</b> |
| Tidal volume and minute ventilation increases | <b>More air</b> can be <b>inspired</b> and <b>expired</b>   |
| Increased functioning alveoli                 | <b>Capillarisation</b> takes place at the <b>alveoli</b> allowing more <b>efficient gaseous exchange</b>                          |

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## Knowledge organiser – Prevention of injuries

| Components of a <u>warm up</u> |   |
|--------------------------------|---|
| Pulse raiser                   | Designed to <b>gradually increase the heart rate</b>              |
| Stretching                     | Designed to <b>increase range of movement at a joint</b>          |
| Mobilisation                   | Designed to <b>move the joint through a full range of motion</b>  |
| Dynamic movements              | An <b>increase in intensity and change of direction and speed</b> |
| Skill rehearsal                | <b>Practicing the skills to be used in the game</b>               |

| Benefits of a <u>warm up</u>               |  |
|--|--|
| Increase body temperature                  | <b>Increases flexibility of joints</b>     |
| Warms ligaments and joints                 | <b>Reduces change of strains</b>           |
| Increases blood flow and oxygen to muscles | <b>Increased heart rate and blood flow</b> |
| Increased speed of contractions            | <b>To prepare for the game intensity</b>   |

| Components of a cool down |   |
|---------------------------|---|
| Low intensity exercise    | <b>Gradually decreases HR &amp; temperature</b> |
| Stretching                | <b>Mainly static stretches are used</b>         |

| Benefits of a cool down |   |
|-------------------------|---|
| Return to natural state | <b>Returns the body to its resting state</b>              |
| Reduce heart rate       | <b>Returns the heart to its resting rate</b>              |
| Reduce lactic acid      | <b>Helps to remove lactic acid and minimise stiffness</b> |
| Remove waste products   | <b>Helps to remove waste such as water</b>                |
| Increase flexibility    | <b>Increases range of motion at the joint</b>             |
| Decrease blood pressure | <b>Reduces risks of blood pooling</b>                     |

| Hazards in sport |   |
|------------------|---|
| Fitness Centre   | Examples include <b>free weights on the floor</b> and <b>tripping over mats</b> |
| Sports Hall      | Examples including <b>walls</b> and <b>slipping on floors</b>                   |
| Swimming pool    | Examples include <b>chemicals</b> and <b>slipping on floors</b>                 |
| Playing field    | Examples include <b>debris</b> and <b>goals posts</b>                           |
| Astroturf        | Examples include <b>carpet burns</b> and <b>moveable equipment</b>              |

| Reducing risks in sport   |   |
|---------------------------|---|
| PPE                       | Examples such as <b>helmet in cricket</b> and <b>shin pads in football</b>              |
| Correct clothing          | Examples such as <b>studs in football</b> and <b>tight clothes in cycling</b>           |
| Appropriate competition   | Examples such as <b>age and skill level groups</b>                                      |
| Carrying equipment safely | Examples include <b>using the knees to lift</b> and <b>don't move trampolines alone</b> |
| Using warm up             | <b>Use the full 5 stage warm up</b>   |