

# BTEC Level 1/2 Tech Award in Sport, Activity and Fitness

First teaching September 2018



## Sample Marked Learner Work

**Subject: Sport, Activity and Fitness**

**Component 1** - Understand the Body and the Supporting Technology for Sport and Activity

**Learning Aim A** - Investigate the impact of sport and activity on the body systems

**Level 1/Level 2**

**Distinction level**

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You will need to refer to the appropriate specification alongside these sample materials.

Component 1 from the Level 1/ Level 2 BTEC Tech Awards in Sport, Activity and Fitness can be found by typing the following into your web browser (Google Chrome).

<https://qualifications.pearson.com/en/qualifications/btec-tech-awards/sport-activity-and-fitness.html>

### Note:

- The Authorised Assignment Brief (AAB) used for generating this learner work is the same as the one provided by Pearson. Centres are expected to get the AAB fully internally verified prior to being issued to the learners.
- The learner work generated is an exemplar of standard for a particular Learning Aim(s) and grade(s), and **NOT** a response to the entire task detailed in the Authorised Assignment Briefs. We therefore expect centres to use this resource to exemplify how to structure a response to a task. We also encourage centres to use this work to standardise their Assessment teams and demonstrate to learners the level of work expected to achieve the different targeted grades outcome.

**In preparation for the first teaching from September 2017 and as a part of the on-going support that we offer to our centres, we have been developing support materials to help you better understand the application of BTEC Tech Awards Level 1 Level 2 qualification.**

**The following learner work has been prepared to demonstrate indicative standards at Pass and Distinction level across a component.**

**Did you know?...**

We've worked closely with over 5,000 employers, universities, teaching professionals and trainers to develop the new BTEC Tech Awards.. That means teacher and tutors can be confident their new BTEC courses contain the knowledge and employability skills students need to succeed at higher level study and in their chosen career.

BTEC Tech Awards provide work-related learning across a range of sectors. Delivering the knowledge, skills and under need to preparor their chosen career, BTEC Tech Awards offer progression to higher education, employment or further study.

BTEC Tech Awards use a combination of assessment styles to give your students confidence they can apply their knowledge to succeed in the workplace – and have the study skills to continue learning on higher education courses and throughout their career. This range of vocational assessments, both practical and written, mean students can showcase their learning and achievements to best effect when they take their next step, whether that's supporting applications to higher education courses or potential employers.

On successful completion of a BTEC Tech Award qualification, learners can progress to or within employment or continue their learning within the same or related areas of study programmes.

They provide a more practical, real-world way of learning and their value is widely recognised by teaching professionals, employers, and learners and can be studied full- or part-time.

Each programme of study covers a number of components, for which students must present evidence based on their work and studies to demonstrate the knowledge and skills they've developed on the course.

## BTEC Assignment Brief

<b>Qualification</b>	Pearson BTEC Level 1/Level 2 Tech Award in Sport, Activity and Fitness
<b>Component number and title</b>	1: Understand the Body and the Supporting Technology for Sport and Activity
<b>Learning aim(s)</b> (For NQF only)	<b>A</b> Investigate the impact of sport and activity on the body systems
<b>Assignment title</b>	The impact of sport and activity on the body systems.
<b>Assessor</b>	Miss Bennett
<b>Issue date</b>	9 <sup>th</sup> October 2017
<b>Hand in deadline</b>	27 <sup>th</sup> October 2017

<b>Vocational Scenario or Context</b>	You have secured a voluntary work placement at a local sports club who are looking to run some sessions with children in the local community to improve their understanding of the impact that sport and physical activity have on the body systems. You have been asked to assist by producing and delivering a presentation to a community group as well as providing a written handout/leaflet containing relevant information for all to take away with them.
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<b>Task 1a</b>	To allow you to successfully complete this task you should first carry out some research into;  The cardiorespiratory system (cardiovascular and respiratory):
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- structures of the cardiovascular system – atria, ventricles, septum, tricuspid, bicuspid and semi-lunar valves, aorta, vena cava, pulmonary artery, pulmonary vein
- structures of the respiratory system – lungs, bronchi, bronchioles, alveoli, diaphragm
- functions of the cardiorespiratory system

The musculoskeletal system (muscular and skeletal):

- location of the major muscles – deltoid, biceps, triceps, pectoralis major, latissimus dorsi, external obliques, hip flexors, gluteus maximus, quadriceps, hamstrings, gastrocnemius and tibialis anterior
- location of the major bones – cranium, clavicle, scapula, five regions of the vertebral column (cervical, thoracic, lumbar, sacrum, coccyx), ribs, sternum, humerus, radius, ulna, carpals, metacarpals, phalanges (in the hand), pelvis, femur, patella, tibia, fibula, tarsals, metatarsals, phalanges (in the foot).
- functions of the musculoskeletal system

Once completed you should produce a leaflet that can be handed to the children that will;

- Explain the structures of the cardiovascular system locating the key parts - atria, ventricles, septum, tricuspid, bicuspid and semi-lunar valves, aorta, vena cava, pulmonary artery, pulmonary vein
- Explain the functions of the cardiovascular system
- Explain the structures of the respiratory system locating the key parts - lungs, bronchi, bronchioles, alveoli, diaphragm
- Explain the functions of the respiratory system
- Explain how the respiratory and cardiovascular systems work together
- Explain the structures of the muscular system locating the major muscles - deltoid, biceps, triceps, pectoralis major, latissimus dorsi, external obliques, hip flexors, gluteus maximus, quadriceps, hamstrings, gastrocnemius and tibialis anterior
- Explain the structures of the skeletal system locating major bones - cranium, clavicle, scapula, five regions of the vertebral column (cervical, thoracic, lumbar, sacrum, coccyx), ribs, sternum, humerus, radius, ulna, carpals, metacarpals, phalanges (in the hand),

	<p>pelvis, femur, patella, tibia, fibula, tarsals, metatarsals, phalanges (in the foot).</p> <ul style="list-style-type: none"> <li>• Explain the functions of the musculoskeletal system</li> <li>• Explain how the muscular and skeletal systems work together</li> </ul> <p>Make sure your leaflet is eye catching and informative.</p>
<p><b>Checklist of evidence required</b></p>	<ul style="list-style-type: none"> <li>• Leaflet</li> </ul>
<p><b>Task 1b</b></p>	<p>You now need to consider your research and how long-term participation can impact on sports and activity performance to create a presentation for the children.</p> <p>You should ensure the presentation is informative and includes the following;</p> <ul style="list-style-type: none"> <li>• The effects of regular participation on components of fitness e.g. how can regular aerobic exercise improve cardiovascular fitness or muscular endurance or body composition.</li> <li>• Explains the long-term effects of exercise on the cardiorespiratory system; <ul style="list-style-type: none"> <li>o cardiac hypertrophy</li> <li>o drop in resting heart rate</li> <li>o drop in resting blood pressure</li> <li>o increase in red blood cells</li> <li>o drop in blood viscosity (thickness of the blood)</li> <li>o increased vital capacity</li> <li>o improved efficiency of gaseous exchange.</li> </ul> </li> <li>• Explains the long-term effects of exercise on the musculoskeletal system; <ul style="list-style-type: none"> <li>o increased bone density</li> <li>o increased joint strength of tendons and ligaments</li> <li>o muscle hypertrophy</li> <li>o strengthening of core muscles.</li> </ul> </li> </ul> <p>You should go on to analyse how regular participation leads to long-term physical benefits in the body systems.</p> <p>Finally, you should select three sporting activities and evaluate the extent to which each of these would</p>

	benefit from adaptations to the musculoskeletal and cardiorespiratory systems.
<b>Checklist of evidence required</b>	<ul style="list-style-type: none"> <li>• Presentation</li> <li>• Record of Activity (provided by your tutor)</li> </ul>
<b>Criteria covered by this task:</b>	
Component/ Criteria reference	To achieve the criteria you must show that you are able to:
A.2P1	Explain the structure and functions of the muscular, skeletal, respiratory and cardiovascular systems.
A.2P2	Explain the long-term adaptations to body systems caused by regular participation in sport and activity
A.2M1	Analyse how regular sports participation leads to long-term physical benefits in the body systems.
A.2D1	Evaluate the extent to which different sports activities benefit from adaptations to the musculoskeletal and cardiorespiratory systems.

<b>Sources of information to support you with this Assignment</b>	<p><b>Websites</b></p> <p><b>Free resources for Physical Education and sports coaching</b></p> <p><a href="http://www.teachpe.com">www.teachpe.com</a></p> <p><a href="http://www.brianmac.co.uk/trainprog">www.brianmac.co.uk/trainprog</a></p> <p><a href="http://www.livestrong.com/fitness">www.livestrong.com/fitness</a></p> <p><a href="http://www.sport-fitness-advisor.com">www.sport-fitness-advisor.com</a></p> <p><a href="http://www.thinqfitness.com/video.asp">www.thinqfitness.com/video.asp</a></p>
<b>Other assessment materials attached to this Assignment Brief</b>	<i>eg, work sheets, risk assessments, case study</i>

**FOR NQF LEVEL 2 ONLY: If you have not achieved the Level 2 criteria, your work will be assessed to determine if the following Level 1 criteria have been met.**

To achieve the criteria you must show that you are able to:	Component	Criterion reference
Identify the structures of the muscular, skeletal, respiratory and cardiovascular systems.	1	A.1P1
Identify some of the long-term adaptations to body systems caused by regular participation in sport and activity.	1	A.1P2
Outline the structures and functions of the musculoskeletal and cardiorespiratory systems.	1	A.1M1
Outline some of the long-term adaptations to body systems caused by regular participation in sport and activity	1	A.1M2

## Introduction to Learner work

The learner work that follows has been assessed accurately to national standards. This is one example of **distinction** grade achievement for **Learning Aim A** on an internally assessed component.

The learner is in Year 12 and is completing the Pearson BTEC level 1/ Level 2 Tech Award in **Sport, Activity and Fitness** alongside other qualifications.

The learner has submitted Assignment **1**, Learning Aim **A** and it has been assessed as **Distinction** standard.

## Commentary

The learner has submitted Assignment **1** to cover **Learning Aim A**: Investigate the impact of sport and activity on the body systems

The learner has achieved assessment criteria **A.1P1, A.1P2, A.1M1, A.1M2, A.2P1, A.2P2, A.2M1 and A.2D1**.

It is important when assessing or internally verifying to look holistically at the evidence using the assessment criteria and 'Essential information for assessment decisions' section of the specification.

The learner has chosen to complete their assignment by creating a detailed leaflet and referring to this during a presentation. They have utilised word as well as handwritten diagrams that have been scanned in to support the evidence.

The learner has [met the level 2 distinction](#) criteria as they have provided outlines of the different structures of the muscular, skeletal, cardiovascular and respiratory systems as well as identifying each of the structures.

They have then gone on to provide explanations of the structure and functions of the muscular, skeletal, cardiovascular and respiratory systems ensuring that the information from the specification is incorporated.

The long term adaptations of the body systems as a result of regular exercise have been explained and analysed with evaluations of the extent to which different sports activities benefit from the adaptations.

The learner has included several sporting examples in order to support their evidence providing clear information as to why they have selected each sport included. They have included clear benefits to the sports from the adaptations to the cardiorespiratory and musculoskeletal systems. The use of different sports ensures that the distinction criteria is achieved as this demonstrates the learners ability to apply their knowledge to different areas of sport.

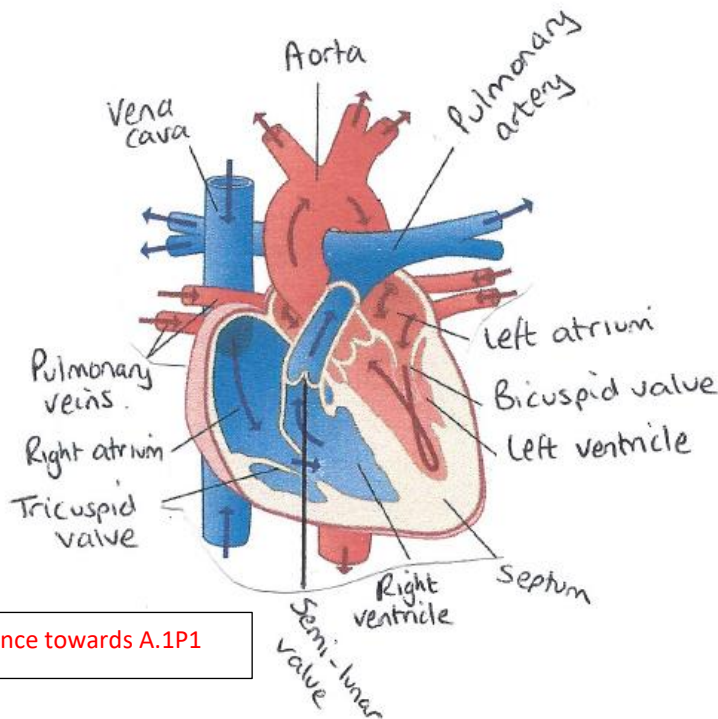
The learner has been able to present their evidence and answer questions posed to them by the audience. This has been supported with an observation record as well as the learner evidence provided by the detailed leaflet.

## Learner work

Amy Davies

# The Impact of Sport and Activity on the Body Systems

## The cardiovascular system



Evidence towards A.1P1

The cardiovascular system is made up of the heart, blood and blood vessels. These all work together in order to transport oxygenated blood to working muscles and deoxygenated blood to the lungs. Evidence towards A.1P1

The key part of the cardiovascular system is the heart. The main parts of the heart are: left and right atrium, left and right ventricles, septum, aorta, vena cava, pulmonary vein, pulmonary artery, tricuspid valve, bicuspid valve and semi-lunar valves. Each of these work

together in order to pump the blood effectively. The fitter the heart is the fewer pumps that are required in order to move the blood around the body.

The heart works as a pump and completes the same process in every beat. Firstly, deoxygenated blood will enter the heart through the vena cava and pass into the right atrium and onto the right ventricle. When it is there it is pumped through the pulmonary valve, to the pulmonary artery and then to the lungs where it collects oxygen that can be used and is vital for the body to create energy. Oxygenated blood then re-enters the heart by moving through the pulmonary veins, to the left atrium, then the right ventricle and through the aortic valve to leave the heart via the aorta and transport the oxygen to the body.

When blood travels around the body it flows through arteries, veins and capillaries. The arteries are designed to carry oxygenated blood away from the heart and have thick, strong, elastic walls. This is because the blood travels through these at high pressure to get the oxygen to the areas of the body that require this. The veins are designed to carry deoxygenated blood back to the heart. As the blood isn't oxygenated and it is only travelling back to the heart the walls are thinner due to lower pressure. The veins have valves to prevent a backflow of blood and to make sure it travels in the correct direction. The capillaries are very thin and have very thin walls. Their job is to carry oxygen directly to the tissues where it can be used effectively and to take the waste away from them for the body to dispose of this.

Evidence towards A.1P1, A.1P2, A.2P1

## The respiratory system

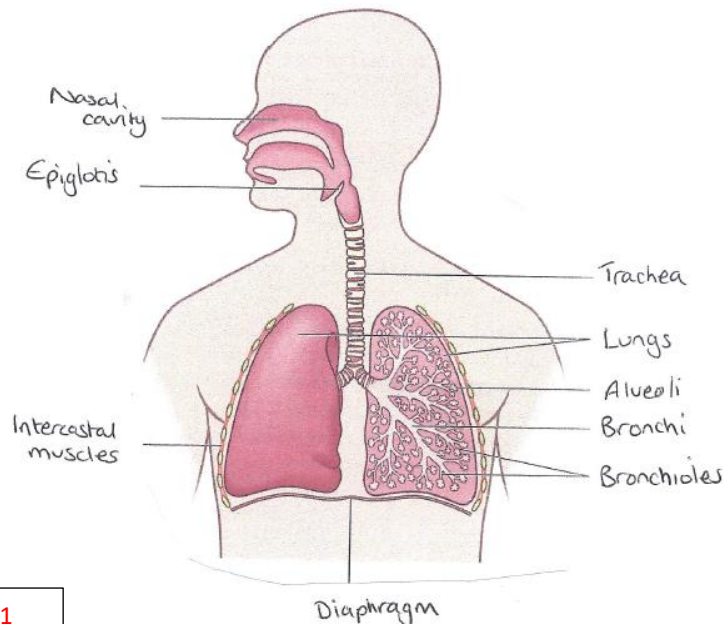
The respiratory system is responsible for our breathing and is made up of the lungs, bronchi, bronchioles, alveoli and diaphragm.

The purpose of the respiratory system is to allow us to breath. It works very closely with the cardiovascular system in order to transport the oxygen that is breathed in to the blood that can then be transported to the heart and around the body in order for movement to occur successfully.

When we breathe in, we take in oxygen and when we breathe out we get rid of carbon dioxide which is a waste product produced when breathing.

Evidence towards A.1P1, A.1P2, A.2P1

### The Respiratory System



Evidence towards A.1P1

## Functions of the cardiorespiratory (cardiovascular and respiratory) system

Function	Explanation
Transports carbon dioxide	The cardiorespiratory system transports carbon dioxide out of the body – carbon dioxide is a waste product produced when we breathe. The carbon dioxide is transported by the cardiovascular system away from the tissues and the muscles. It works with the respiratory system to allow gaseous exchange to take place and the carbon dioxide to be removed from the body in each breath we take. The quicker we breathe the faster this process occurs as we need our body to remove the carbon dioxide to allow our muscles and body tissues to function effectively. Therefore, our breathing rate increases and our heart beats faster to complete the process at a greater speed.
Transports platelets	The cardiovascular system transports platelets around our body to clot any open wounds that we may have. If we were to fall in a game of hockey and cut our knee, the cardiovascular system would send the platelets that are being transferred by the cardiovascular system would clot this and stop the bleeding from being excessive. If an athlete was a haemophiliac, this clotting would not occur without a clotting injection to help support the process.
Reduces the build-up of lactic acid	The cardiovascular system removes waste products from muscles and this reduces the build-up of lactic acid in the muscles which can be responsible for painful muscles after exercise. Lactic acid builds up during anaerobic respiration. This involves the incomplete breakdown of glucose causing lactic acid to be produced instead of carbon dioxide and water.
Regulates temperature	The cardiovascular system regulates the temperature of the body through vasodilation and vasoconstriction. During exercise, the body will heat up and the cardiovascular system will tell the blood vessels that supply the skin with blood to dilate – get bigger. This is called vasodilation. They do this to let heat out of the body. When we start to cool after exercise, often sweat cools on our skin and it wet which makes cooling quicker, the cardiovascular system will tell the blood vessels to narrow. This is called vasoconstriction and stops heat escaping quickly from the body.
Taking in oxygen	The respiratory system takes in oxygen as we breathe in and work closely with the cardiovascular system to allow gaseous exchange to take place and the oxygen that has been taken in when breathing to be transferred to the blood. Once the oxygen is transferred to the blood it is pumped by the heart around the body to the different tissues and working muscles. This allows the muscles and tissues to create the energy needed to complete the demands placed upon them.
Gaseous exchange	Gaseous exchange takes place in the alveoli and is when the gases between the blood and alveoli are exchanged. The carbon dioxide that has been produced as a waste product and needs to be breathed out is transferred to the alveoli and moves through the lungs to leave the body

	whilst the oxygen is transferred to the blood and transported to the heart and around the body to the different tissues and muscles.
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Evidence towards A.1P1, A.1P2, A.2P1

## Long-term effects of exercise on the cardiorespiratory system

Regular participation in sport and activity can lead to several long-term adaptations to the cardiorespiratory system. These include cardiac hypertrophy, drop in resting heart rate, drop in resting blood pressure, increase in red blood cells, drop in blood viscosity, increased vital capacity and improved efficiency of gaseous exchange.

The more we exercise the bigger our muscles become. As the heart is a muscle, this will also increase in size and is known as cardiac hypertrophy. Cardiac hypertrophy leads to a more efficient heart as it increases in both size and volume. The fitter we are the more blood our heart can pump out in one beat (stroke volume), therefore placing less demand on the heart to reach the same outcome as before. With cardiac hypertrophy, the ventricles get bigger allowing more blood to be pushed out in one contractions – contractions become more powerful. This is extremely important in sport as athletes want to be the best they can be and therefore require their heart to do more per beat. If we train regularly, cardiac hypertrophy will also allow the heart to work for longer at a time before getting too tired and the athlete needing to stop and rest. A marathon runner would benefit greatly from cardiac hypertrophy as with the athlete would need to run for a sustained period of time – well over 2 hours. In order for the body to cope with this, the heart needs to be very strong and efficient pumping as much oxygenated blood as possible to the working muscles and deoxygenated blood to the lungs for gaseous exchange to occur. A netball player would also benefit from cardiac hypertrophy as they would need to play for up to an hour at varying intensity. The demands placed on their body are different, however, if they are not very fit and their heart not very strong they will struggle to keep up with play, may miss interceptions and perform to a standard that is below the team requirements. Netball players and players of team sports need cardiac hypertrophy so they are able to meet the demands of their sport when they are called upon.

The resting heart rate of someone who exercises regularly will drop. This is due to having an increased stroke volume – the amount of blood pumped out of the heart in one beat. The higher the stroke volume, the less beats are required by the heart to pump the blood around the body. This would also lead to a drop in resting blood pressure as the arteries will be placed under less stress and the blood passing through these will do so easier. When an athlete is resting they are likely to have a resting heart rate that is lower than average – it can be seen as abnormally low. A normal resting heart rate would be between 60 and 80 beats per minute. However, a marathon runner may have a resting heart rate of 40 beats per minute. This is because their heart has a high stroke volume and can push more blood out in one beat than a non-athlete. A team sports player may have a slightly higher resting heart rate at 50 beats per minute –but still lower than average. Again, this is because their stroke volume is high and they can cope with the demands of their environment and the task they are completing easier.

The red blood cells within the body can increase as a result of long-term exercise as they carry oxygen and carbon dioxide through the blood stream. This increase would usually be seen as a result of endurance training e.g. continuous training where the athlete runs for at least 30 minutes without

stopping. Red blood cells contain haemoglobin which binds oxygen and carbon dioxide. If someone was new to exercise – maybe they were training for a long-distance cycle, their blood volume would increase in the first 3 or 4 weeks as a result of an increase in blood plasma which is then followed by an increase in red blood cells after 4 weeks of training. However, endurance athlete's red blood cells may only live for 70 days whereas in non-athletes 120 days would be expected. This is due to higher body temperatures when exercising.

Blood viscosity – which is the thickness of the blood – would decrease as a result of exercise as the body temperature would increase helping the blood to thin and flow more easily and rapidly through the heart, lungs and the working muscles. In all sports, a warm up is necessary. A good warm up will increase the body temperature to ensure the body is fully prepared for the exercise that is to follow. In doing a successful warm up, the increase in temperature will lead to the blood becoming thinner. A football player would always warm up fully first. By doing this their body is fully prepared at kick-off and able to perform well immediately. However, if the football player does not warm up, it is likely when they step onto the pitch at kick-off that they feel out of breath very quickly, get cramps and possibly sustain an injury. This can be as a direct result of the blood still being as thick as when at rest and not being able to flow well enough around the body to the working muscles.

Vital capacity will increase as a result of long-term exercise as the muscles which control breathing become stronger and therefore the lungs are able to inflate and deflate more forcefully. Vital capacity is the maximum amount of air that the lungs can expel. The stronger the surrounding muscles the more air can be taken in and forced out. This therefore allows more oxygen to be inhaled whilst more carbon dioxide is exhaled in one breath. This is vital to allow the oxygen supplied to muscles to be increased allowing an athlete to perform to a high standard for longer without fatigue. A boxer would require a good vital capacity as they would need to be able to supply their muscles with a good oxygen supply over a long and intense period of time. When boxing the muscles are asked to perform to a high standard with a repetitive stance being undertaken including movement within this stance and the upper body working to throw punches and avoid punches. A 1500m runner would require a larger vital capacity than a 100m runner as they would need to continue to run for a longer period of time and would need oxygen delivered to their muscles for the duration of their race.

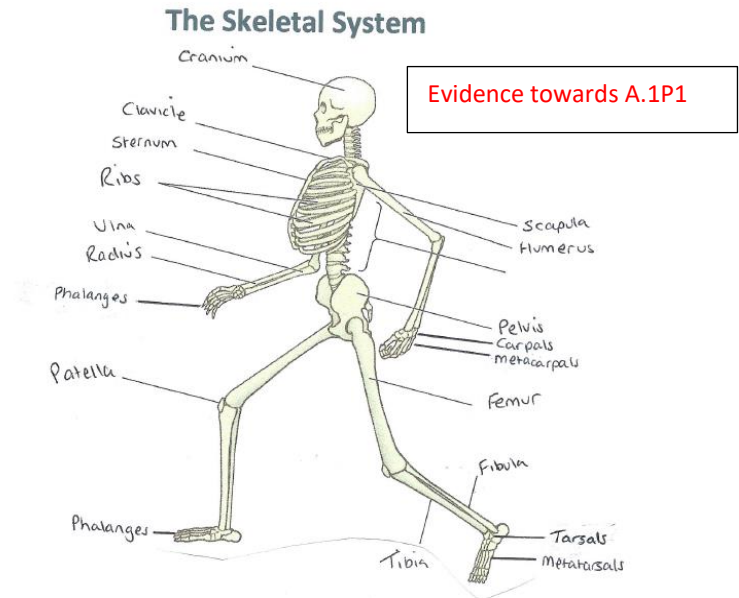
As the lungs become more efficient through long-term exercise gaseous exchange will also become more efficient. This is due to long-term exercise leading to an increase in the number of alveoli in the lungs and an increase in capillarisation. The greater the number of alveoli, the more air can be swapped between these and the capillaries. Oxygen can be transferred to the blood more efficiently and carbon dioxide transferred back to the lungs to be expelled from the body more efficiently. A football player would require more efficient gaseous exchange so that they are able to perform to a high standard for the entire 90 minutes without getting out of breath! They require the oxygen into their lungs to be transferred to the blood then back to the heart and around to the working muscles at different rates when playing a game as this can be stop start – low and high intensity. Whereas a cross-country runner would require efficient gaseous exchange from the outset of their race through to the end although at times they may require even more from their body due to a variation in terrain or speed.

## The skeletal system

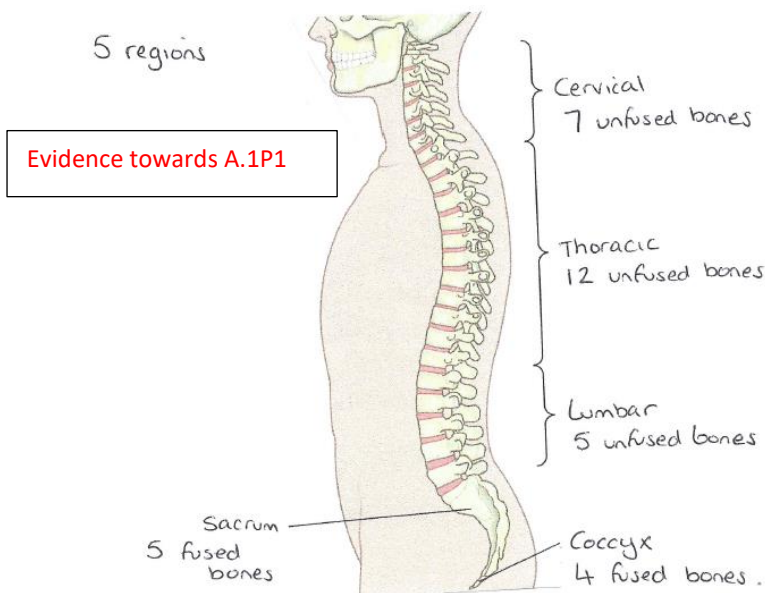
The skeletal system is made up of our bones, joints and ligaments and is designed to give us shape, support, protection, blood cell production and calcium storage.

The key bones of the skeletal system are: cranium, clavicle, scapula, vertebral column, ribs, sternum, humerus, radius, ulna, carpals, metacarpals, phalanges (hand), pelvis, femur, patella, tibia, fibula, tarsals, metatarsals and phalanges (foot).

There are five main categories of bones. These are: long bones, short bones, flat bones, irregular bones and sesamoid bones. The bones have different purposes. Long bones are responsible for large movements such as walking or running. These bones are found in our arms, legs, hands and feet. Long bones are long and cylindrical with epiphyses at each end which is covered in hyaline cartilage. The outside of long bones is hard and compact whilst the inside is spongy and called cancellous bone. The short bones are responsible for small, complex movements.



## The Vertebral Column



These are cub shape and are found in the wrist and ankle. Flat bones are designed to protect our internal organs from serious damage. For example: the sternum and ribs helps to protect our heart and lungs. Irregular bones are not a normal shape and are also designed for protection. The vertebrae are irregular bones as each bone is of a non-uniform shape and designed to protect the spinal column from any serious damage. The vertebral column is made up of five sections and a total of 33 bones. The five sections are: cervical (7), thoracic (12), lumbar (5), Sacrum (5) and Coccyx (4).

The skeleton is split into two sections – the axial and appendicular skeletons. The axial skeleton includes the majority of bones that make up our main body e.g. cranium, sternum, ribs and vertebrae whereas the appendicular skeleton are

those bones that work to allow movement (scapula, pelvis, humerus, ulna, radius, femur, fibia, tibia etc).

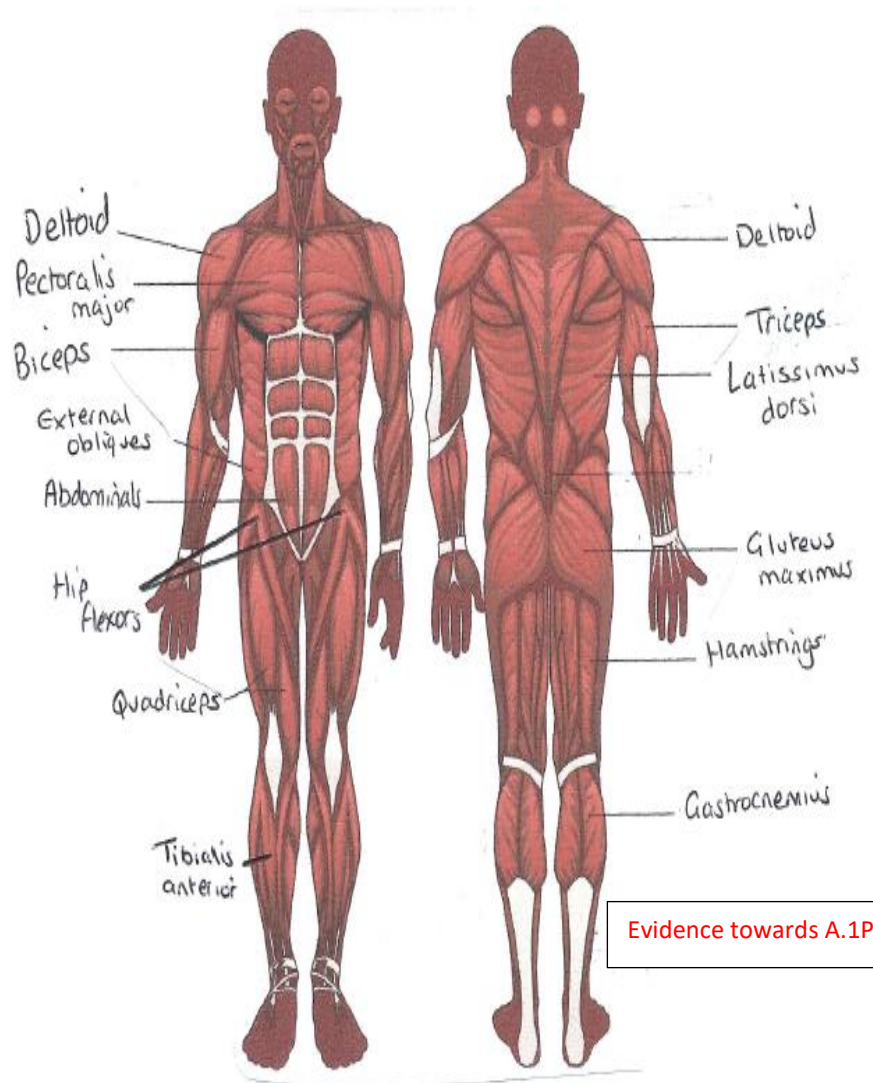
Evidence towards A.1P1, A.1P2, A.2P1

## The muscular system

The muscular system is designed to allow movement of the body. The muscles are also able to turn energy into movement.

The key muscles of the muscular system are: deltoid, biceps, triceps, pectoralis major, latissimus dorsi, external oblique's, hip flexors, gluteus maximum, quadriceps and hamstrings.

There are three types of muscles in the body and these are voluntary, involuntary and cardiac. Voluntary muscles are those that we choose to move ourselves for example we tell our quadriceps and hamstrings to contract and relax when we walk. Involuntary muscles are those that we cannot control and work without us telling them too. For example; the intestines. The cardiac muscle is the heart and is also involuntary. We cannot select when our heart beats or how often.



Evidence towards A.1P1

All our voluntary muscles work in groups to allow our body to move in a coordinated fashion. Some muscles work in pairs to produce movement. This is where the one muscle may contract whilst its opposite relaxes e.g. the bicep contracts whilst the triceps relax. Pairs of muscles like this are called antagonistic pairs. This means that one muscle is the agonist and one the antagonist. The agonist is the muscle that contracts as this is the prime mover. Therefore, when lifting a dumbbell to complete a bicep curl, the bicep contracts and is therefore the agonist whilst the triceps relax and is the antagonist.

Evidence towards A.1P1, A.1P2, A.2P1

## Functions of the musculoskeletal system

Function	Explanation
Protection	The musculoskeletal system protects all of our vital organs. Flat bones protect major organs such as the heart, lungs and brain whilst irregular bones protect the spinal cord that sends all vital messages around our body. Sesamoid bones, such as the patella, protect our knee joint from damage. If bones did not protect our organs, these could get seriously damaged when playing sport. For example: if playing football a player was to head the ball, without a cranium the ball would simply crush the brain and lead to major issues!
Movement	The musculoskeletal system allows movement to occur. The muscles are connected to the skeleton via tendons and muscles to muscles via ligaments. All of these work together with the joints of the body to allow the human body to move. Bones then act as levers to use the force created by the muscles and produce movement. When running, the Achilles tendon connects the heel to the gastrocnemius and tells the foot to push as the running action occurs. This is vital for all sports!
Joint stability	Bones meet at joints and are held together with the surrounding tendons, ligaments and muscles. The stronger the tendons, ligaments and muscles, the stronger the joint will be and the more impact it will be able to withstand. For example: if a basketball player jumps for the ball and lands, if their knee joint isn't strong it may move excessively causing damage to the tissues around it e.g. the anterior cruciate ligament.
Produce platelets	The long bones contain bone marrow which produces blood cells. These blood cells create platelets within the blood which are then used to clot blood where required. Platelets are cell fragments. In sport, platelets would clot an open wound such as a graze or cut but would also prevent internal bleeding when a bruise occurs from the impact of an object hitting the athlete. For example: if a lacrosse ball struck a player, the platelets would help to clot the internal bleeding.

Evidence towards A.1P1, A.1P2, A.2P1

## Long-term effects of exercise on the musculoskeletal system

Regular participation in sport and activity can lead to several long-term adaptations to the musculoskeletal system. These include increased bone density, increased joint strength of tendons and ligaments, muscle hypertrophy and strengthening of core muscles.

Bone density will increase as a result of long-term exercise as repeated stress placed upon the skeleton leads to new bone being formed. The stress placed on the bones can come from increased weight or from running further than normal or possibly on a different terrain/incline. When a bone is placed under stress bone cells rush to the area and lay new bone cells. These then release protein – especially collagen – in between the cells to increase the strength of the bone in that area. A weight lifter would have a greater bone density than a gymnast as the stress placed upon the weight lifters bones by the weight being lifted will be significantly greater than that being placed upon the bones of the gymnast. A football player will have relatively dense bones as they run a lot which is classed as a high impact activity. However, they may not have arms bones as strong or as dense as their leg bones unless they spend time in the gym lifting weights to increase their upper body strength. It would be highly beneficial for a footballer to have a high level of upper body strength in order to hold an opponent off the ball as well as a lot of lower body strength to sprint quickly, hold their position and strike a ball with power. An increase in bone density can also lead to a decrease in osteoporosis in later life.

The joint strength of an individual will increase with long-term exercise. The more exercise that is undertaken the stronger the ligaments and tendons will become. An athlete should be careful not to push themselves too quickly so as long as they take their time and build up their exercise the ligaments and tendons will increase in strength. As they increase in strength they will add more stability to the joint. The muscles will also gradually increase in strength so when the tendons pull between the bone and muscle to ask a joint to complete a set action this will be more efficient and effective. A netball player would require very strong knee and ankle joints in order to cope well with the amount of jumping, turning and stopping that they endure in a game. If the player had weak joints or a weakness in a tendon or ligament then the movement is likely to lead to a serious injury. Whereas if they build up their exercise and maintain this for a sustained period of time, they would have increased strength in their tendons and ligaments to make their joints more than capable of dealing with the stresses and pressures placed upon them. A swimmer would not need to focus on their joint strength as this is a non-weight bearing sport. Therefore, the pressure placed upon their joints is minimal with their body supported by the water that they are in.

Muscle hypertrophy will occur over time with sustained exercise as the muscles are continually put under stress creating micro-tears which will be repaired after each bout of exercise. As micro-tears occur the body will realise that changes are required and when repairing the muscle fibres they will also be made a little stronger and bigger. Long-term exercise will allow this process to occur regularly and therefore the muscle growing bigger and stronger – muscle hypertrophy. Different sports will see muscle hypertrophy in different muscle fibres. Slow-twitch muscle fibres will undergo muscle hypertrophy during aerobic training. Therefore a marathon runner will develop and improve their slow-twitch muscle fibres to give them sufficient muscular endurance to continue to perform to a high standard for a long period of time. However, anaerobic training will see muscle hypertrophy of fast-twitch muscle fibres. A 100m sprinter will work on their fast-twitch muscle fibres in order to

make them bigger and stronger. Therefore, in training they will focus on lots of sprints – maybe using interval training – in order to cause muscle hypertrophy of the fast-twitch muscle fibres. There would be little purpose to a 100m sprinter focusing on creating muscle hypertrophy of the slow-twitch muscle fibres and therefore they would not be regularly running for 30 minutes at a time – although they will want to improve their overall fitness.

Core muscles are strengthened during long-term exercise. This occurs as a result of hard work and muscle hypertrophy. Core muscles strengthening will lead to benefits including better posture. This is important for a dancer and gymnast who require their body to be strong yet relaxed and upright.

Evidence towards A.1P2, A.1M2, A.2P2, A.2M1 & A.2D1

## RECORD OF ACTIVITY

<b>Observation Record</b>			
<b>Learner name:</b>	Amy Davies		
<b>Qualification:</b>	BTEC Level 1/2 Tech Award in Sport, Activity and Fitness		
<b>Component number &amp; title:</b>	Component 1: Understand the body and the supporting technology for sport and activity.		
<b>Name of *Observer</b>	Miss Bennett		
<b>Date of Activity:</b>	25 <sup>th</sup> October 2017		
<b>Assessment criteria targeted :</b>			
A.2P1	Explain the structure and functions of the muscular, skeletal, respiratory and cardiovascular systems.		
A.2P2	Explain the long-term adaptations to body systems caused by regular participation in sport and activity		
A.2M1	Analyse how regular sports participation leads to long-term physical benefits in the body systems.		
A.2D1	Evaluate the extent to which different sports activities benefit from adaptations to the musculoskeletal and cardiorespiratory systems.		
<b>Description of activity undertaken (what the learner did) and the evidence provided/questions asked and answers given:</b>			
<p>Amy produced her evidence for this unit and then presented this to myself and her peers. She was able to utilise her work as a detailed leaflet that was distributed to everyone in the audience. Ay then presented her work referring to her detailed leaflet and each system. She was able to answer questions asked of her and gave lots of sporting examples as she progressed through the presentation time.</p> <p>Amy was confident in her approach and demonstrated a good level of knowledge and understanding. She has clearly completed research in order to complete this to the standard achieved.</p> <p>Well done Amy.</p>			
<b>I confirm this is an accurate record of the activity undertaken</b>			
<b>Learner signature:</b>	<i>Amy Davies</i>	<b>Date:</b>	26 <sup>th</sup> October 2017
<b>*Assessor signature: *please delete as applicable</b>		<i>Miss Bennett</i>	

## Learner Assessment Submission and Declaration

**This sheet must be completed by the learner and provided for work submitted for assessment.**

<b>Learner name:</b> Amy Davies		<b>Assessor name:</b> Miss Bennett	
<b>Date issued:</b> 9/10/17	<b>Completion date:</b> 27/10/17	<b>Submitted on:</b> 27/10/17	
<b>Qualification:</b> BTEC Level 1/2 Tech Award in Sport, Activity and Fitness			
<b>Assessment reference and title:</b> Assignment 1 – The impact of sport and activity on body systems.			

Please list the evidence submitted for each task. Indicate the page numbers where the evidence can be found or describe the nature of the evidence (e.g. video, illustration).

Task ref.	Evidence submitted	Page numbers or description
1	Detailed leaflet	1-9
1	Observation record	10
Comments for note by the Assessor:		

### Learner declaration

I certify that the work submitted for this assignment is my own. I have clearly referenced any sources used in the work. I understand that false declaration is a form of malpractice.

**Learner signature:** *Amy Davies*

**Date:** 27/10/17

ASSESSMENT RECORD SHEET				
<b>Programme</b>		BTEC Level 1/2 Tech Award in Sport, Activity and Fitness	<b>Learner name</b>	Amy Davies
<b>Assignment title</b>		Assignment 1: The impact of sport and activity on the body systems	<b>Assessor name</b>	Miss Bennett
<b>Component no. &amp; title</b>		1: Understand the body and the supporting technology for sport and activity	<b>Targeted assessment criteria</b>	A.2P1, A.2P2, A.2M1, A.2D1
<b>Issue date</b>		9/10/17	<b>Submission deadline</b>	27/10/17
<b>First submission / resubmission?*</b>		First submission	<b>Date submitted</b>	27/10/17
<b>Resubmission authorisation</b> by Lead Internal Verifier*			<b>Date</b>	
<b>Targeted criteria</b>	<b>Criteria achieved?</b> (Yes / No)	<b>Assessment comments</b>		
A.2P1	Yes	You have clearly explained the structure and functions of the muscular, skeletal, respiratory and cardiovascular systems providing diagrams to locate key parts of each system.		
A.2P2	Yes	You have explained the long-term adaptations to body systems caused by regular participation in sport and activity		
A.2M1	Yes	You have analysed how regular sports participation leads to long-term physical benefits in the body systems.		
A.2D1	Yes	You have evaluated the extent to which different sports activities benefit from adaptations to the musculoskeletal and cardiorespiratory systems.		
<b>General comments</b>				

Well done Amy, you have provided lots of very good detail in your evidence and have been able to provide lots of sporting examples.			
<b>Assessor declaration</b>			
<b>Assessor signature</b>	<i>Miss Bennett</i>	<b>Date</b>	29/10/17
<b>Learner comments</b>	I am really pleased with my achievements for this unit so far and hope I can continue with this.		
<b>Learner signature</b>	<i>Amy Davies</i>	<b>Date</b>	6/11/17