BTEC

L3 Lead Examiner Report 2001

January 2020

L3 Qualification in Sport

Unit 1: Anatomy and Physiology (31524H)

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31524H- Unit 1 Anatomy and Physiology

Grade	Unclassified	Level 3		
		P	M	D
Boundary Mark	0	19	36	54

Introduction

Centres and candidates should be congratulated on their preparation for this assessment format. Overall, candidates performed in line with previous series and it was obvious that they prepared for many of the specification topics covered in this assessment, to which they need congratulating for.

The question paper followed the format identified in the sample assessment materials and previous series. The paper was split into six sections. Each section was based on a sport or exercise scenario and required candidates to demonstrate knowledge and understanding of a range of specification topics and apply this knowledge to the specific question scenario. Each section is weighted in accordance to the specification design.

The extended response questions were marked using a 'levels based' approach to assessment where the overall quality of the response was considered rather than the specific number of facts stated from the indicative content, although this obviously had a bearing on the quality of the response. The remainder of the questions on the paper were assessed using a traditional points-based approach, where a mark was given for each appropriate point. More detail can be found below in the individual question section of the report.

Introduction to the Overall Performance of the Unit

This report has been written to help you understand how candidates have performed overall in the exam. For each question there is a brief analysis of candidate responses. You will also find examples of candidate responses to the questions that have been well answered. These should help to provide additional guidance. We hope this will help you to prepare your candidates for future examination series.

Candidate performance varied throughout the paper. Whilst the extended response questions still provided the greatest challenge, most candidates gained some marks for these questions. The style of the assessment is challenging due to the depth and breadth of knowledge required to fully address the demands of the paper. The extended writing questions account for just over 30% of the paper, each question demanding depth of knowledge, but across the paper this also requires breadth as each of these questions examines different areas of the specification.

The assessment is also challenging due to the need to apply knowledge not only in the extended answer questions but also the 'points-based' questions.

It was clear that some candidates did not make full use of the stimulus material provided in the question, but this continues to get better series by series. To reiterate with explain command verb questions there is an expectation that knowledge and understanding tested is applied to the situation in context and expansion marks are awarded accordingly.

As always, the emphasis in this paper is on candidate's application of their knowledge to a variety of practical sports related situations. The higher marks, particularly in levelled response questions (Sections C-F), will always focus on the ability to demonstrate application rather than the ability to recall theory. It will be important for candidates to have the opportunity to practice this in their preparation for the assessment. Candidates that were able to access higher marks for these questions were able to apply their knowledge and understanding to the stimulus and provide realistic and appropriate responses.

As this is a vocational sports related subject, the external assessment seeks to put the candidates in applied sporting related situations and asks them to respond to these: this method of questioning will continue in the future. It is therefore essential that centre's stress to candidates the need to read the stimulus information carefully before

they answer questions and be prepared to use this information within their responses, this also applies when graphical or statistical data is supplied.

Where candidates are unable to apply the stimulus in their answer it will significantly restrict the number of marks candidates can receive. Generic responses will only gain limited credit.

Where the stimulus material uses a particular sport, it is not necessary for candidates to have an in-depth knowledge of this type of sport in order to answer the questions well, however, an awareness of the basic requirements of sports are expected which will have been covered in core curriculum PE lessons throughout KS3 and KS4.

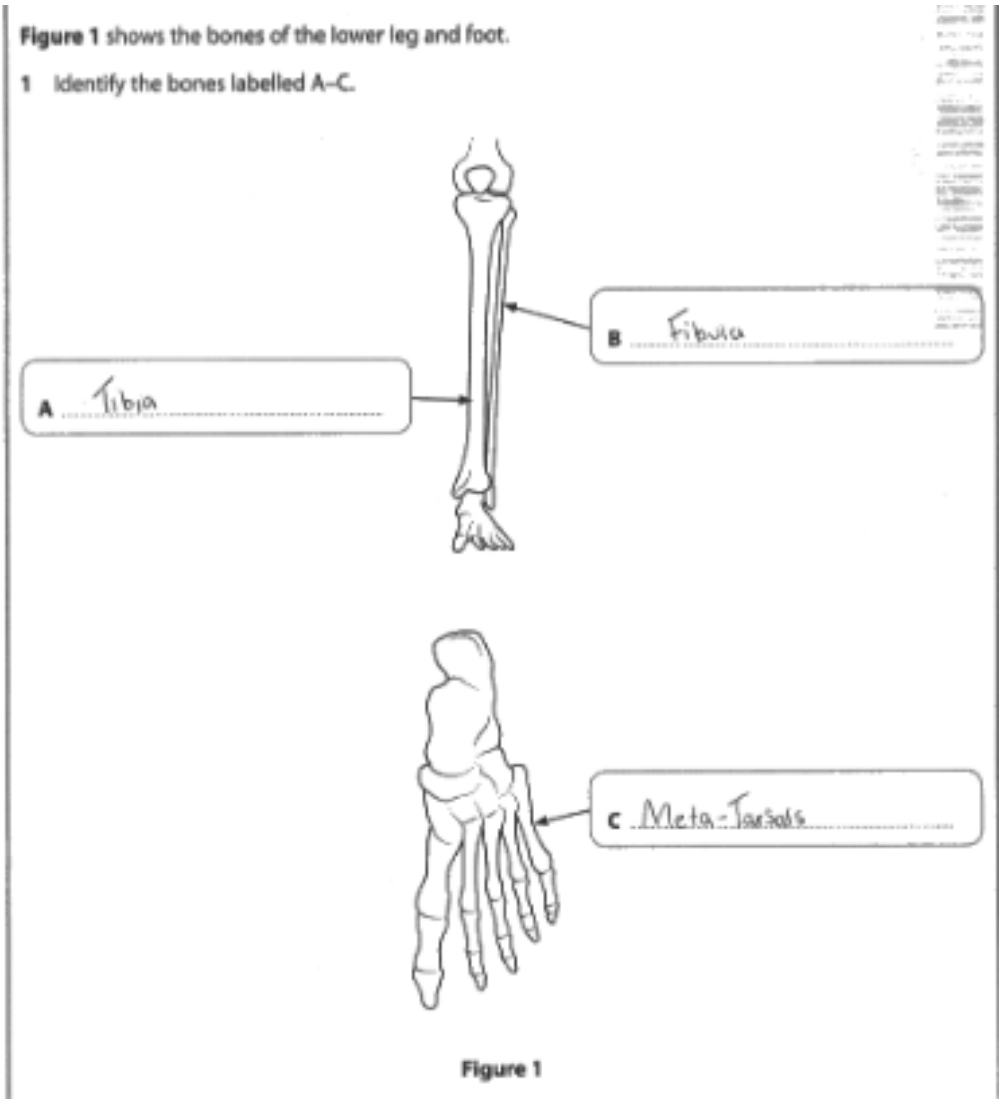
Individual Questions

The following section considers each question on the paper, providing examples of popular candidate responses and a brief commentary of why the responses gained the marks they did. This section should be considered with the live external assessment and corresponding mark scheme.

Q1

The majority of candidates performed as anticipated on this question, with many identifying the tibia, fibula and meta-tarsals as correct answers. It is important that technical terminology is used, and phonetic spelling was credited. Common errors were labelling as tibula and fibia. Also, some candidates put the bones of the arm and had clearly not read the question.

This response gained 3 marks



Q2a and Q2b

Candidates were required to the joint type and the movement taking place when performing a squat. On the whole candidates performed well on these and answered both of these questions effectively. Common errors made were giving an example of other synovial joints or including both flexion and extension in the same box and therefore the mark could be awarded, for question types like this it is important for centres to ensure that candidates only write in the movement that is happening, rather than movements possible at that joint.

This response gained 4 marks

Figure 2 shows Claire performing a squat.

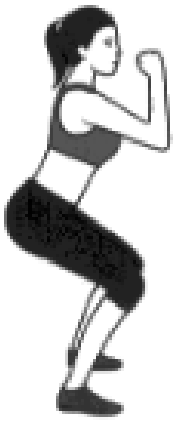


Figure 2

2 Complete **Table 1** by:

(a) identifying the joint type at the knee and hip

(2)

(b) identifying the movement from standing to the position shown in **Figure 2**.

(2)

	(a) Joint type	(b) Movement
Knee	Hinge joint (synovial)	flexion
Hip	Ball and socket (synovial)	flexion

Q3

Candidates were required to describe the movement of the ankle. Many identified the correct movements being plantarflexion and dorsiflexion. If other movements were included these were discounted and did not affect the score if plantarflexion and dorsiflexion were included.

This response gained 0 marks.

3 Describe the range of movement at the ankle.

The ankle is a condyloid joint which allows her to move it d up and down but also side to side.

This response gained 2 marks.

3 Describe the range of movement at the ankle.

The movement in the ankle is caused from tendon in the achilise hill wiech allows movement of plantarflexion and dorsflexion, causing there to be a wide range of movement, as the joint in the ankle is saddle joint

(Total for Question 3 = 2 marks)

Q4

The majority of candidates struggled to articulate the role of the synovial membrane. The rubrics of the question require candidates to get the first mark point to enable them to access the second mark point, otherwise the second mark point to be awarded alone is regarding synovial fluid. Common errors that were made by candidates was to describe the role of synovial fluid on its own.

This response gained 2 marks.

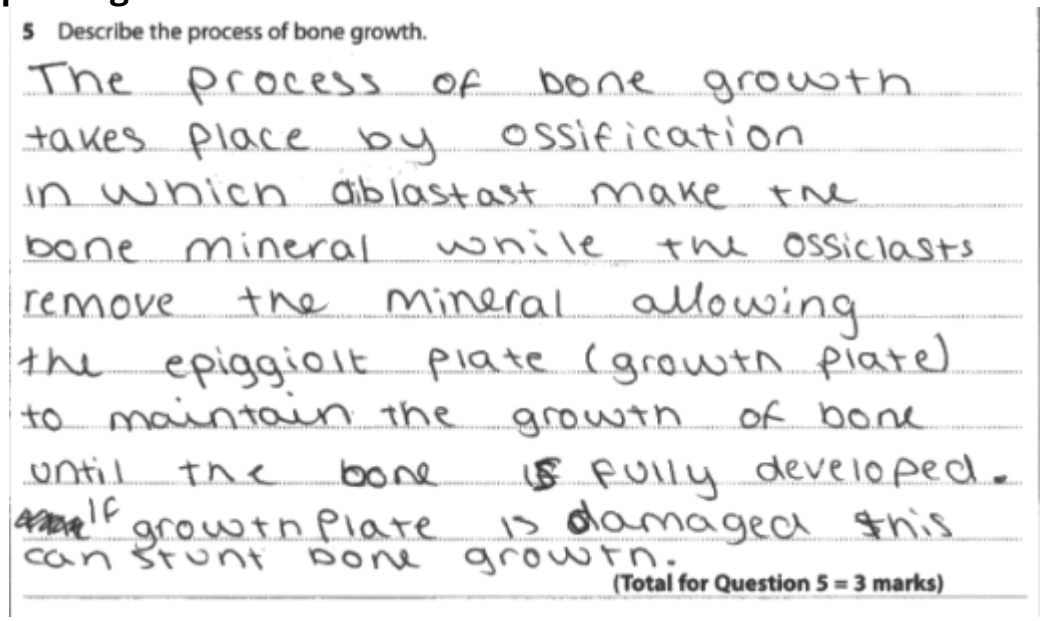
4 Describe the function of the synovial membrane.

It is the lining that secretes synoural fluid to lubricate the joint.

Q5

The majority of candidates performed as anticipated on this question, with many identifying ossification and the role of osteoblasts and osteoclasts. Common errors were confusing the role of osteoblasts and osteoclasts.

This response gained 3 marks



5 Describe the process of bone growth.

The process of bone growth takes place by ossification in which oblastast make the bone mineral while the ossiclasts remove the mineral allowing the epiggiolt plate (growth plate) to maintain the growth of bone until the bone is fully developed. If growth plate is damaged this can stunt bone growth.

(Total for Question 5 = 3 marks)

Q6a and 6b

This question was presented in a similar way to question 2a and b and required the learners to identify the agonist and contraction types in the position shown jumping over a hurdle. It is important that full technical terminology is used, candidates who wrote quads/hams did not receive the mark, as always phonetic spelling was credited. It is important for centres to only teach the muscles on the specification and use the names provided rather than shortened versions. Other common errors were confusing the type of contraction and putting concentric instead of eccentric. It seemed that a number of learners also followed the arrows (to indicate lead/trail leg) and not use the information provided in the table.

Figure 3 shows an athlete jumping over a hurdle.

Figure 3

6 Complete **Table 2** by

(a) identifying the agonist muscles

(2)

(b) identifying the type of contraction of the agonist for each movement.

(2)

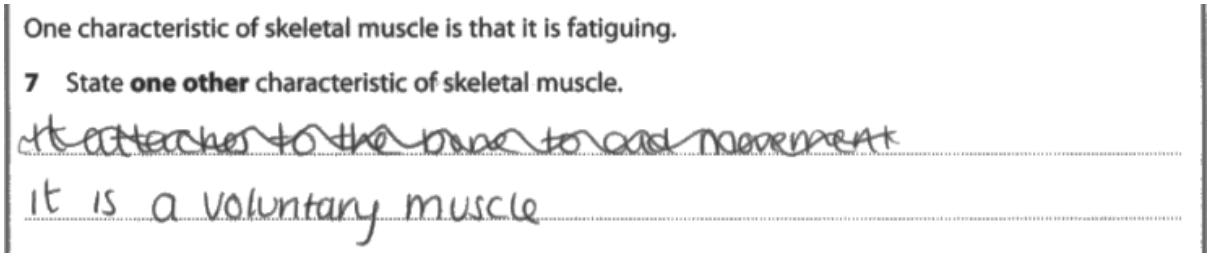
Joint movement	(a) Agonist	(b) Type of contraction
Knee extension (lead leg)	Quadriceps group (i.e. rectus femoris)	(isotonic) concentric
Knee flexion (trail leg)	Hamstring group (i.e. semimembranosus)	(isotonic) concentric

Table 2

Q7

The majority of candidates gained the mark for saying that skeletal muscle is voluntary, common errors made were giving the functions as opposed to the characteristics. I urge centres when teaching different types of muscle that they teach both characteristics and functions (Specification point B).

This response gained 1 mark


One characteristic of skeletal muscle is that it is fatiguing.

7 State **one other** characteristic of skeletal muscle.

it attaches to the bone to aid movement

it is a voluntary muscle

Q8a

The majority of candidates found this question challenging, a significant number correctly identified that the agonist/contracting muscle was the abdominals. Significantly fewer identified the erector spinae as the antagonist muscle. Candidates didn't grasp the extension marks from the identification of the agonist and antagonist, however these have remained consistent when asked in previous series, when the bicep curl and push up as the stimulus. Common errors were mixing up the antagonist muscle and putting other muscles instead.

This response gained 1 mark

Gareth is a basketball player.

Figure 4 shows Gareth performing a sit-up as part of his training regime.

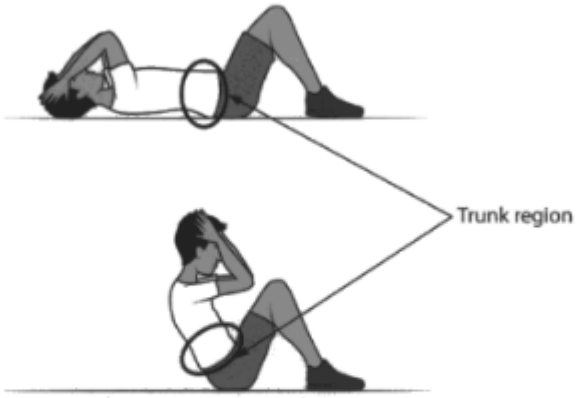


Figure 4

8 (a) Describe the action of the antagonistic muscle pair at the trunk that allows Gareth to complete the upwards phase of the sit-up shown in **Figure 4**.

(4)

The abdominal contract in order to lift Gareth's torso up. In order for this to happen, the muscles in his lower back need to relax.

This response gained 3 marks

Gareth is a basketball player.

Figure 4 shows Gareth performing a sit-up as part of his training regime.

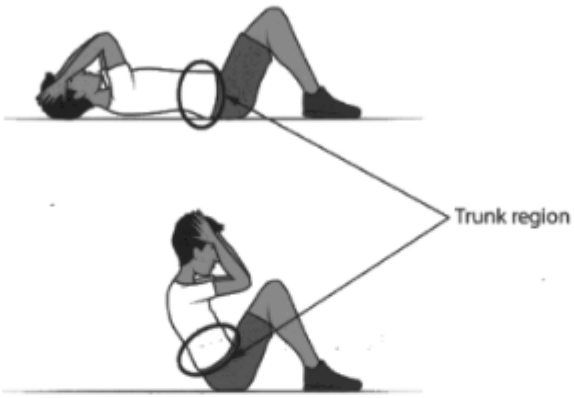


Figure 4

8 (a) Describe the action of the antagonistic muscle pair at the trunk that allows Gareth to complete the upwards phase of the sit-up shown in **Figure 4**.

(4)

During the upwards (flexion) phase of the sit-up, there is the antagonistic pair of the erector spinae and the abdominals. The agonist provides the pure/concentric contraction for the flexion, and is anterior to the vertebrae. This is measured/controlled by the antagonist, which relaxes/contracts eccentrically to provide a 'braking' movement; this is the erector spinae, posterior to the vertebrae. As part of the pair, the muscles [illegible] origin is the pelvis to the and the insertion is to provide movement, the Vertebrae (Thoracic, Sacral, Lumbar). The [illegible]

Q8b

Although a clear specification point, candidates struggled to articulate a clear response to this question. Common errors saying that cramp is caused by lactic acid build up (which is incorrect), as opposed to describing what is it. The extension mark was awarded for the implication that he had to 'stop playing', as opposed to 'slowing down' or 'not playing at his best'.

This response gained 2 marks

During the game Gareth experiences cramp.

(b) Describe cramp **and** the impact it has on Gareth's basketball performance.

(2)

Cramp is the concentric contraction of a muscle that involuntary contraces, as this could essece him but not being able to run due to the sornes it has caused

This response gained 0 marks

During the game Gareth experiences cramp.

(b) Describe cramp **and** the impact it has on Gareth's basketball performance.

(2)

Cramp is a sudden muscle contraction that can last for variable amounts of time. it can hamper his performance, as it causes pain.

Q8c

Many candidates achieved the mark for identification of they are a fast twitch fibre. However, they struggled to articulate within their exemplification that it is high intensity but sustained/over a longer period. Common errors made were that the example given was for Type IIx (Slam dunk/sprint), as well as getting these fibre types confused with Type I. If candidates are making a direct comparison (3rd mark point), then it is important that they include the other fibre type (e.g. They fatigue faster that Type I).

This response gained 3 marks

Throughout the basketball game Gareth will use all three muscle fibre types.

(c) Explain why type IIa muscle fibres will be used during the game.

(3)

type IIa, or fast oxidative muscle fibres, are used in basketball due to it's stop-start nature, & they enable explosive movements over a longer period without fatigue, meaning skills such as dribbling are possible.

Q9

This question proved to be a good differentiator, evident through the spread of marks. It was clear that those candidates who understood the correct order of the respiratory structures, scored highly.

This response gained 4 marks

Figure 5 is an incomplete flow diagram of the route that air passes through when travelling from the nasal cavity to the alveoli.

9 Identify the **four** structures needed to complete the flow diagram shown in **Figure 5.**

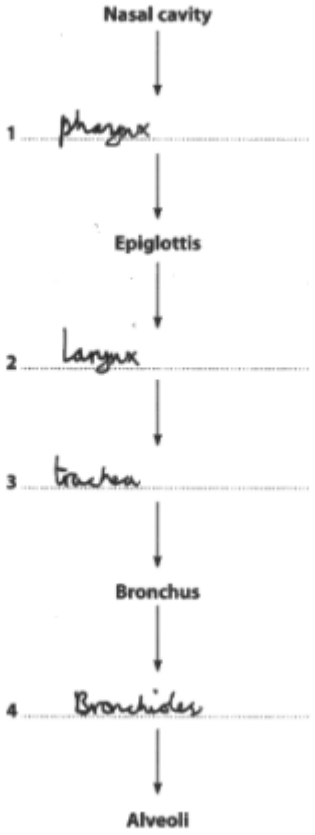
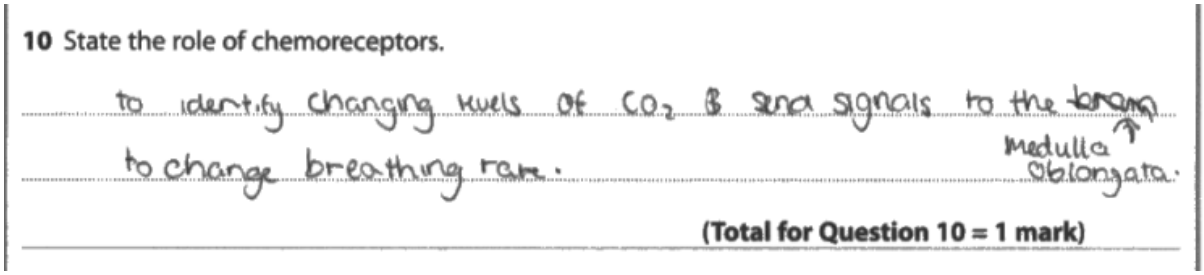


Figure 5

Q10

The following was a recall question looking at role of a chemoreceptor. Common errors were no reference to detecting changes.

This response gained 1 mark


10 State the role of chemoreceptors.

to identify changing levels of CO_2 & send signals to the brain to change breathing rate.

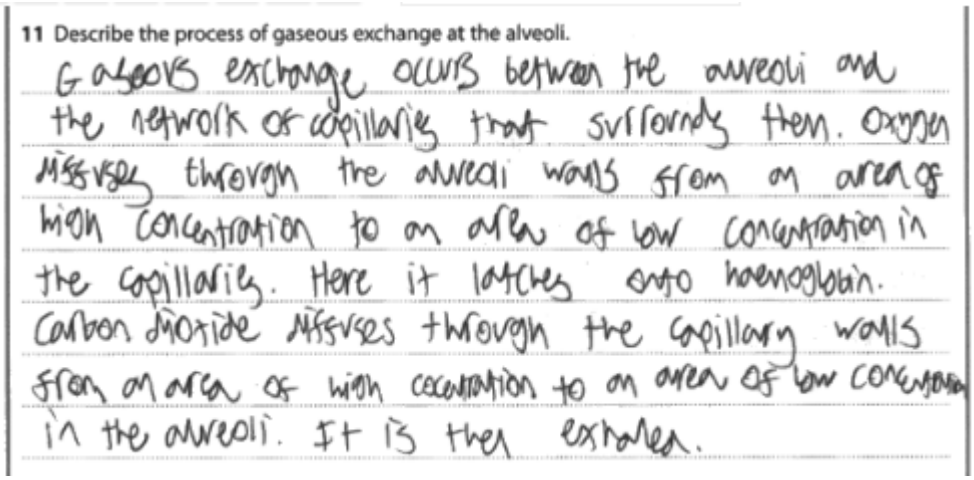
Medulla Oblongata.

(Total for Question 10 = 1 mark)

Q11

Candidates were required to describe the process of gas exchange. The majority of candidates correctly identified that that oxygen diffused from the alveoli in to the blood and carbon dioxide from the blood to the alveoli. Common errors were having the concentration of gases incorrect or the movement of gases incorrect.

This response gained 4 marks.


11 Describe the process of gaseous exchange at the alveoli.

Gaseous exchange occurs between the alveoli and the network of capillaries that surrounds them. Oxygen diffuses through the alveoli walls from an area of high concentration to an area of low concentration in the capillaries. Here it latches onto haemoglobin. Carbon dioxide diffuses through the capillary walls from an area of high concentration to an area of low concentration in the alveoli. It is then exhaled.

Q12

This was the first extended response question of the paper and focused on the impact of an increased vital capacity and increased strength of respiratory muscles on football performance. Responses for the question required focus on the effects of an increased vital capacity and increased strength of respiratory muscles and the indicative content was written accordingly to encompass this knowledge and application.

Like all the extended response questions, the quality of candidates' responses varied. Some candidates were clearly very knowledgeable about increased neural and chemical control of breathing. Other candidates were unable to address the question fully due to confusion between the cardiovascular system and respiratory system.

Level 1 responses tended to focus on one area or provided a list with no development of the points within the indicative content or gave generalistic responses 'more oxygen to the working muscles', which is true for any respiratory adaptation. At level 3 candidates' responses provided accurate knowledge of the effects on performance of an increased vital capacity and increased strength of respiratory muscles, used technical terminology with clear development of the point.

Overall this was a challenging question and it was obvious from a number of responses that this knowledge was lacking, although a clear specification point.
Some candidates also discussed the impacts on the cardiovascular system, when it was in the respiratory section.

This response was placed at Level 3 and given 5 marks.
The answer clearly assesses a number of points from the indicative content, focusing on the impact of increased vital capacity and increased strength of respiratory muscles, with appropriate development in reference to the question.

Becky is a footballer. Throughout the season her respiratory system has adapted. Two of these adaptations are an increase in her vital capacity and increased strength of her respiratory muscles.

12 Analyse how increased vital capacity **and** increased strength of her respiratory muscles will impact on Becky's football performance.

Football players need to be able to run for long periods of time. The increased strength of Becky's respiratory ~~muscles~~ muscles will aid this. By strengthening her diaphragm and her intercostal muscles, Becky will be able to endure long distances because ~~#~~ her respiratory muscles can expand and contract further which lowers the pressure in the lungs, therefore allowing more air to be inhaled. Vital capacity is how much air you can inspire with the greatest amount of force. If this increases too, Becky will be getting more oxygen into her lungs which would be carried by the red blood cells to her working muscles. ~~This would~~ The presence of oxygen would also delay the production of lactic acid, allowing Becky to work for longer.

This response was placed at Level 1 and given 2 marks.
The answer provides basic information true to any respiratory adaptation (more oxygen inhaled and transported to working muscles), with limited application on performance.

Becky is a footballer. Throughout the season her respiratory system has adapted. Two of these adaptations are an increase in her vital capacity and increased strength of her respiratory muscles.

12 Analyse how increased vital capacity **and** increased strength of her respiratory muscles will impact on Becky's football performance.

Becks football performance will increase due to her increased vital capacity as becky is now able to inhale more oxygen as her vital capacity has improved this means she is able to gain more O2 to her working Muscles in a shorter time there reduceing the risk of lactic acid build up. By increasing the strenogth of her respiratory muscles she is improving her football performance as her respiratory muscles have improved therefore allow her to pump O2 around the body with more pressure in order for Beckys muscles to recieve is quickerand more of it. Both increasing her vital capacity and resperitory Muscles will lead to an increase in Beckys football perfofmance

(Total for Question 12 = 6 marks)

TOTAL FOR SECTION C = 15 MARKS

Q13

This was a recall question for identifying structural parts of the cardiovascular system from the diagrams. Generally, candidates performed well on this question with the vast majority accessing at least one mark for the left ventricle. Common errors were stating pulmonary artery/aorta, instead of the pulmonary vein.

This response gained 3 marks.

13 Identify the structures of the heart labelled A–C.

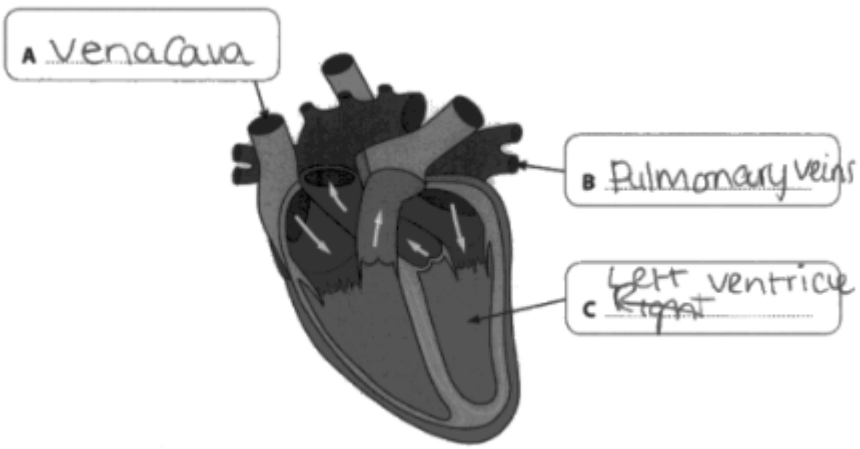


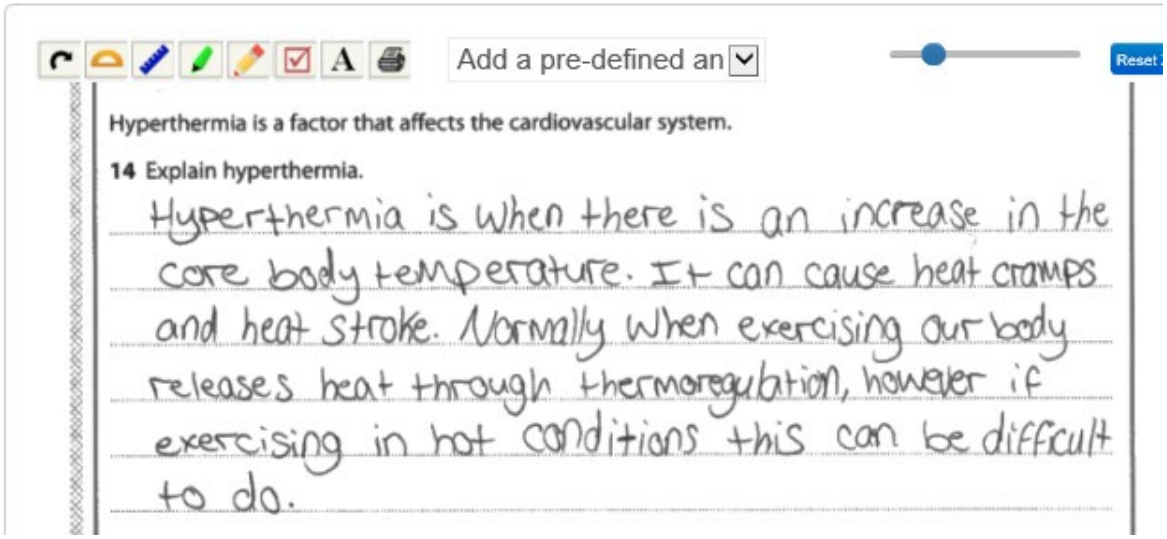
Figure 6

Q14

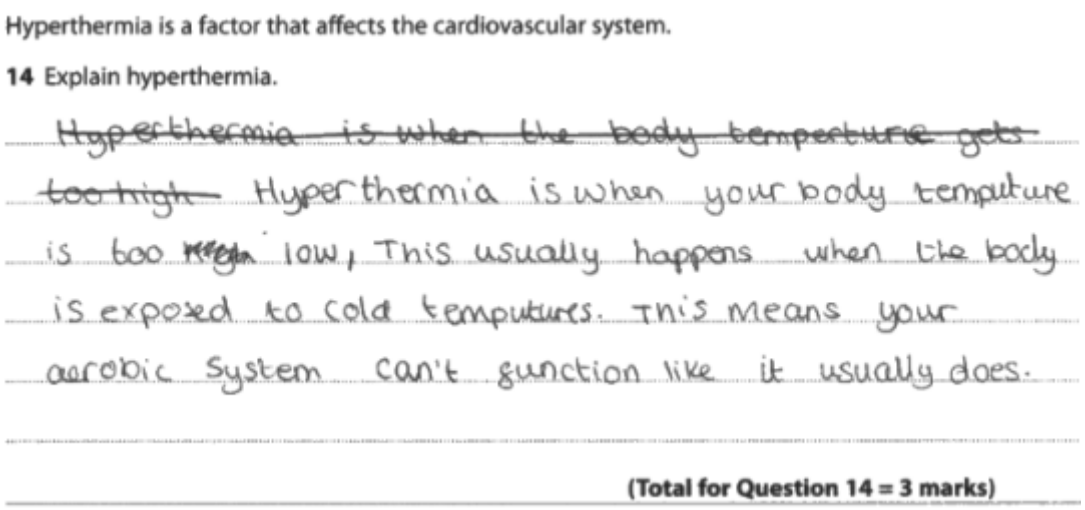
This was a new concept and examined for the first time, on the whole candidates struggled to articulate a coherent response, but many achieved one mark for increased body temperature. Common errors were mixing up with hypothermia but struggled for the expansion points.

This response gained 3 marks.

3 marks - increase in core body temperature, failed thermoregulation and difficult to release heat.



This response gained 0 marks.



Q15a

This question again acted as a good differentiator, generally candidates achieved one mark for the concept of hypertrophy for Beth/lack of hypertrophy for Katie (converse was accepted for this question), which is the first point on the mark scheme. Following this sigificantly fewer candidates accessed the mark point for stroke volume and why it needed to beat less to maintain resting cardiac output. Common errors were discussing exercise, when the question was about rest.

This response was awarded 3 marks.

Beth and Katie are identical twins, Beth (trained athlete) regularly participates in exercise and Katie (untrained athlete) does no exercise. **Table 3** displays their resting heart rates.

	Resting heart rate (BPM)
Beth	55
Katie	75

Table 3

15 (a) Explain why Katie's resting heart rate is higher than Beth's resting heart rate.

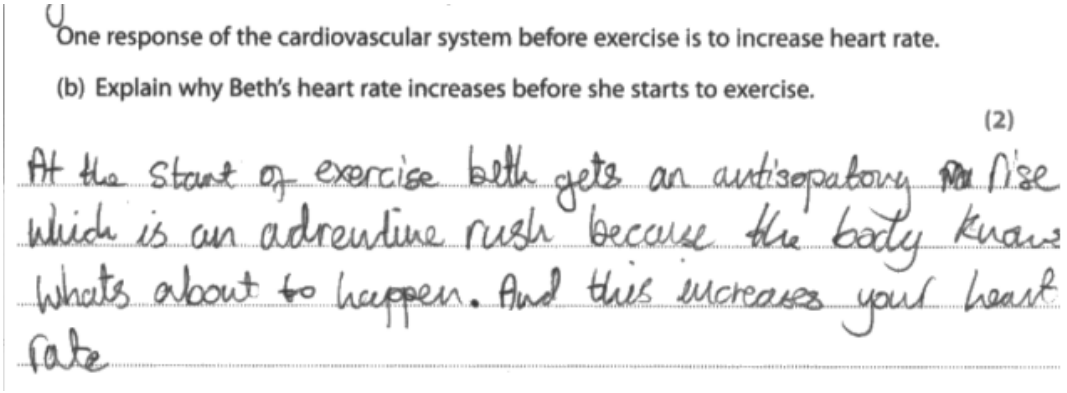
(3)

This is because Beths heart is stronger than katies, due to exercise, and so Beths heart can pump more blood around the body, per pump, than katies. Therefore, Katies heart has to beat more times, so that the same volume of blood is pumped around the body. Therefore, Katies resting heart rate is higher.

Q15b

The recall question looked at why heart rate increased before the athlete starts to exercise. On the whole candidates performed well, with many achieving full marks for anticipatory rise due to adrenalin.

This response was awarded 2 marks.


One response of the cardiovascular system before exercise is to increase heart rate.

(b) Explain why Beth's heart rate increases before she starts to exercise.

(2)

At the start of exercise beth gets an antisopatory rise which is an adrenline rush because the body knows whats about to happen. And this increases your heart rate

Q15c

This was the second extended response question of the paper and focused on the sympathetic and parasympathetic nervous system and the effects on the cardiac cycle, and indicative content was written according to encompass this knowledge and application.

Like all the extended response questions, the quality of candidate responses varied. Some candidates were clearly very knowledgeable about the sympathetic and parasympathetic nervous system, but some candidates struggled to express this in the context of the cardiac cycle. Alternatively, some candidates could articulate about the cardiac cycle, but not the sympathetic and parasympathetic nervous systems.

Level 1 responses used the information in the question to stay is speeds up/ slows down heart rate, or discussed through the cardiac cycle, but not both and technical terminology was used sporadically. At level 3 candidates charted the effect of the sympathetic and parasympathetic nervous system in controlling the cardiac cycle before and after exercise.

This response was placed at Level 3 and given 6 marks.

The answer clearly assesses a number of points from the indicative content, focusing on the effects of the sympathetic and parasympathetic nervous system, with effective use of technical terminology, appropriate development in reference to the effects on the cardiac cycle control.

(c) Analyse how the sympathetic and parasympathetic nervous systems control the changes in Beth's cardiac cycle, during and after her exercise session.

(6)

The sympathetic nervous system increases Beth's heart ~~durin~~ rate during exercise, and the parasympathetic nervous system decreases her heart rate during recovery. In the cardiac cycle, the SAN informs both atria to contract. It then transmits this impulse to the AVN, which slows the impulse down and sends it to specialised cardiac muscle fibres called Bundle of His fibres, which transmit the impulse through the muscular ~~wa~~ walls of the ventricles. Here the purkinje fibres recieve this impulse and inform the ventricles to contract. The sympathetic nervous system increases the speed of this cycle, to increase oxygen delivery and CO_2 removal during exercise, and the parasympathetic nervous system then slows it down after exercise as there is less of a need for oxygen to the muscles and a lower CO_2 content in the blood.

This response was placed at Level 2 and given 3 marks.

The answer provides the correct identification of the sympathetic and parasympathetic nervous system, in its context and role, but there was no discussion on cardiac cycle control.

(c) Analyse how the sympathetic and parasympathetic nervous systems control the changes in Beth's cardiac cycle, during and after her exercise session.

(6)

Beth's sympathetic nervous system, otherwise known as "fight or flight" has the role of preparing the body for intense physical activity, prior to it occuring. It raises heart rate & releases adrenaline.

Her Parasympathetic system, otherwise known as 'rest & digest', has the role of slowing the body down & relaxing it after exercise. It lowers heart rate, & shuts off many high energy activities within the body.

Both of these are within the autonomic nervous system, which controls involuntary actions of the body.

In conclusion they control her cardiac cycle chiefly through the alteration of her heart rate, the sympathetic system raises it in preparation of exercise & the parasympathetic lowers it after exercise.

Q16a and Q16b

This question proved to be a good differentiator, evident through the spread of marks. It was clear that those candidates who understood the three processes of the aerobic energy system and their ATP yield scored highly. Some candidates found this question difficult to access any of available marks, due to lack of knowledge and understanding. Common errors were putting the three energy systems as the three processes, although the question clearly states the aerobic system is broken into three processes and putting anaerobic glycolysis for process 1.

This response gained 6 marks

16 The aerobic energy system can be broken down into three processes.

Complete **Table 4** by:

(a) Identifying, **in the correct order**, each process of the aerobic energy system

(3)

(b) Identifying the amount of ATP produced at that stage of the process.

(3)

	(a) Name of process	(b) Amount of ATP produced
Process 1	~~ATP P~~ Aerobic glycolysis	2 ATP
Process 2	krebs cycle	2 ATP
Process 3	electric transport chain	34 ATP

Table 4

Q17

This question required the candidates to assess the contributions of the energy systems for an 800m and why the lactate was the predominant system used.

Like all of the extended response questions, the quality of candidate responses varied. Some candidates were clearly very knowledgeable about the different energy systems in relation to intensity and duration and could clearly articulate why the lactate system was the dominant system used in the race. Other candidates were unable to address the question fully by writing everything they knew about the energy system/s in general rather than answering the specific question.

Level 1 responses came from those candidates who identified it was a high intensity or time, therefore lactate system was used more. Common mistakes were explaining anaerobic glycolysis process, with is irrelevant in the context of the question. Level 3 responses those who assessed the energy systems and articulated them using technical terminology why the lactate is predominant over the other two systems.

This response was placed at Level 3 and given 5 marks.

The answer assesses why the lactate systems is used rather than the other two energy systems. It discusses the response in relation to time and intensity and why the other systems would not fuel it effectively.

Evan is an 800 m runner who has just completed a race in two minutes. Throughout the race he used all three energy systems but mainly the lactate system.

17 Assess why the lactate system was the main energy system used by Evan during the 800 m race.

In the first ten seconds of the race the ATP-Pc system would be the only working system. When it begins to fade at around ten seconds, the process of anaerobic glycolysis begins. This system would work from the 10 second point up until completion of the race, as it produces enough energy to supply for 2-3 minutes.

However, due to the presence of oxygen inspired during the race, the aerobic system is also partially used. However due to the time it takes for the reactions to take place within the system, the lactate system would be the only system producing energy ~~then~~ for the majority of the race, as it takes time for the aerobic system to produce any ATP. //

In conclusion the lactate system was the main energy system as due to the time duration of the race it was the system that best fit the body's needs, it became active around the 10 second point of the race & could readily supply energy for the remainder of the race.

This response was placed at Level 1 and given 1 mark.
The answer generates credit through the identification of running faster at a higher intensity. No other parts of the response are creditworthy.

Evan is an 800 m runner who has just completed a race in two minutes. Throughout the race he used all three energy systems but mainly the lactate system.

17 Assess why the lactate system was the main energy system used by Evan during the 800 m race.

lactic acid needs to be secreted in order for Evans muscles not to tire during is 800m run. Lactate system was mainly used because he's a long distance runner and it exerts a lot of energy which will reduce him getting fatigued quicker the system then allows him to run faster at a higher intensity without getting tired.

Q18

The final question in the paper is a synoptic analysis. I urge centres to read the guidance under AO5 (page 20) of the specification to see the combinations between body systems. This question will always be a maximum of two systems. Candidates should look to synthesise their writing and make connections between the systems where possible demonstrating the inter-relationship.

Like all of the extended response questions, the quality of candidate responses varied. Some candidates were clearly very knowledgeable about how the skeletal and muscular systems adaptations work together. Some candidates were unable to address the question fully.

Low level responses demonstrated some knowledge and understanding of the indicative content and often lacked balance or coverage. Common errors were bringing in joints of the lower body (hip, knee, ankle), so irrelevant in the context of this question.

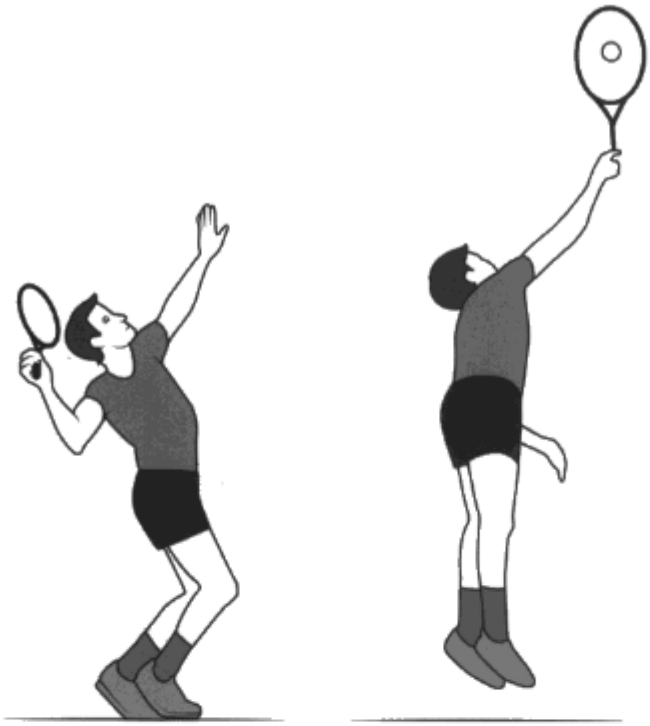
High level responses displayed synoptic coverage from both areas as well as making link to how these systems work collectively. High-level responses displayed coverage from both areas as well as clearly relating this to the movement taking place.

Level 1 responses tended to focus on isolated elements that make general assertions and did not reference the movement. Level 4 responses provided accurate knowledge of both the skeletal and muscular systems and how they work together to enable the movement (tennis serve) to take place. Like any levels of response-based question, it is not 1 point equals 1 mark, the indicative content is extensive for candidates to demonstrate a breadth of knowledge and generate credit.

This response below was placed at Level 4 and given 8 marks.

The answer clearly analyses the how the systems work together. Each system is visited and application to the movement and interrelationships are developed throughout.

Ted is a tennis player. **Figure 7** shows the preparation (position A) and the hitting (position B) phases of his serve.



Position A Position B

Figure 7

18 Analyse how the skeletal and muscular systems interact to enable the movement of the shoulder, elbow and wrist of Ted's racquet arm from position A to position B in **Figure 7**.

(8)

The muscles used to complete this action are the bicep, tricep and the deltoid. The bicep and tricep form an antagonistic pair while the deltoid is the fixator as it is stabilising the joint. In position A there is flexion at the elbow joint meaning that the

agonist is the bicep and the antagonist is the tricep.* At the elbow whereas in position B the arm has ~~retracted due to~~ circumducted and is now extended. Therfore in position B the agonist is the tricep and the antagonist is the bicep.

These muscles pull on the bones to form the movements that occur. The bones articulating at the elbow are the humerus, ~~and~~ the radius and Ulna. When the bicep contracts it forces the ulna and radius to be pulled upwards which decreases the angle of the joint this is called flexion. When ~~the~~ Ted is in the position B the bicep has contracted causing the arm to extend which allows him to reach high and serve the ball. At the shoulder the humerus forms a ball and socket joint with the scapula. The deltoid will pull on the arm to allow it to adduct however in this case the arm has abducted to allow Ted to reach the ball away from the midline of the body. As there is a greater range of movement at the shoulder joint it allows for the ~~shoulder to~~ arm to circumduct and gain as much power as possible.

* The elbow joint is a hinge joint.

P.to

The wrist

The wrist is a joint which only allows for flexion and extension. It is made up of the tarsals, and ulna and radius. In position A it is extended to pull the racket back as far as possible. It then flexes to bring the racket through and generate power due to a flick at the wrist. This happens at position B.

This response below was placed at Level 2 and given 4 marks.
The answer identifies that wrist and shoulder joint correctly, the muscles and types of contraction are also correct at the shoulder. There are however, some inaccuracies at the wrist and elbow.

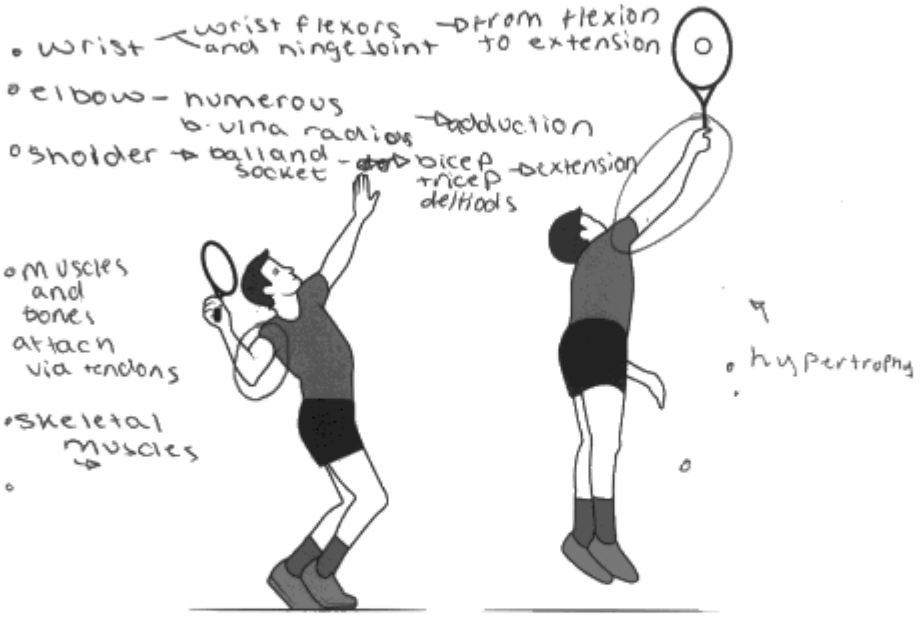
L2 4 marks - Wrist joint and shoulder joint correctly identified. Correct muscle and movement identified for the shoulder joint and type of contraction, inaccuracies on elbow and wrist joi
credit for tendons connecting muscle to bone, last point on the MS.

Add a pre-defined annc

SECTION F: Interrelationships between Body Systems for Sports Performance.

Answer ALL questions. Write your answers in the spaces provided.

Ted is a tennis player. **Figure 7** shows the preparation (position A) and the hitting (position B) phases of his serve.



Position A Position B

Figure 7

18 Analyse how the skeletal and muscular systems interact to enable the movement of the shoulder, elbow and wrist of Ted's racquet arm from position A to position B in **Figure 7**.

(8)

The muscular and skeletal systems work together in order to enable movement of teds racquet arm. This is due to them both being connected via tendons, in which the skeletal system moves because of the muscular system. During Teds racquet movement

16

from position A to B his wrist being a hinge joint allows performing a eccentric contraction the wrist flexors to extend pointing the racket in the direction it is needed. The ulna and radius adduct as they move away from the body as it is be pushed into the air by the elbow which is carried by the bicep brochii and tricept brochii which are posterior and inferior to the humerus causing extention away from the body. finally, the shoulder flexes as the concentric contract deltiod pushed inferior to the body. Without the muscles being connected to the sketal system there would be no movement. A factor affecting the combanation of these two systems is age as if the performer is young their bones wont be developed fully and if their muscles over work it will lead to microtears in which hypertrophy will take place making the muscle grow putting extra strain on the skeletal system.

Summary

Based on their performance on this paper, candidates should:

- Use appropriate technical language throughout their responses,
- Tailor their response based on the command word in the question, e.g. for an explain question there will always be marks available for expansion points and relevance to the scenario.
- Be clear about terminology used in the specification as these words will be repeated in the exam paper, e.g. short-term responses (immediate, due to the exercise/sport), adaptations (long term).
- Only address the correct body system within this section, e.g.in Section A 'The Skeletal System' credit will only be awarded for responses from the specification of the skeletal system. No marks will be available for reference to any other body system.
- I urge Centre's to read the guidance under AO5 (page 20) of the specification to see the combinations between body systems.
- Use the question scenario to demonstrate their ability to apply their knowledge and not write general impacts but relate this to performance.
- Check their paper carefully for any missed questions and attempt and read everything.
- Please click here for the specification and SAMS.

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