Examiners' Report
Lead Examiner Feedback

June 2024

Pearson BTEC Nationals
In Sport (31524H)
Unit 1: Anatomy and Physiology

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Grade Boundaries

What is a grade boundary?

A grade boundary is where we set the level of achievement required to obtain a certain grade for the externally assessed unit. We set grade boundaries for each grade, at Distinction, Merit and Pass.

Setting grade boundaries

When we set grade boundaries, we look at the performance of every learner who took the external assessment. When we can see the full picture of performance, our experts are then able to decide where best to place the grade boundaries – this means that they decide what the lowest possible mark is for a particular grade.

When our experts set the grade boundaries, they make sure that learners receive grades which reflect their ability. Awarding grade boundaries is conducted to ensure learners achieve the grade they deserve to achieve, irrespective of variation in the external assessment.

Variations in external assessments

Each external assessment we set asks different questions and may assess different parts of the unit content outlined in the specification. It would be unfair to learners if we set the same grade boundaries for each assessment, because then it would not take accessibility into account.

Grade boundaries for this, and all other papers, are on the website via this link

Introduction

Centres and learners should be congratulated on their preparation for this assessment. Overall, learners performed better than 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 learners 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 learners have performed overall in the exam. For each question there is a brief analysis of learner responses. You will also find examples of learner 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 learners for future examination series.

Learner performance varied throughout the paper. Whilst the extended response questions still provided the greatest challenge, this was the best series as regards to performance on these. Most learners gained some marks for these questions, and it is encouraging to see that more learners are accessing to top mark boundaries. 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 learners did not make full use of the stimulus material provided in the question, 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.
Nevertheless, performance continues to get better series by series, with the mean mark increasing by 2.5 marks.

As always the emphasis in this paper is on learner'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 learners to have the opportunity to practice this in their preparation for the assessment. Learners 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 learners 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 centres

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

Where the stimulus material uses a particular sport, it is not necessary for learners 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 learner responses. This section should be considered with the live external assessment and corresponding mark scheme.

Q1

The majority of learners performed as anticipated on this question, with many identifying the correct answers. It is important that technical terminology is used and phonetic spelling was credited. Common errors were identifying the cranium as irregular and tarsals as long bones.

This response gained 4 marks

1 Complete **Table 1** by identifying **each** type of bone given.

Example	Type of bone
Cranium	flat
Tarsals	short
Ulna	long
Vertebrae	Irregular

Table 1

Q2

For Q2 learners were required to describe the functions of the skeleton and how they support performance in football. To achieve the application mark learners needed to identify the correct function. Generally this was answered well with a number of learners accessing full marks. Common errors were giving generic information such as the cranium protects the brain, rather than linking this to football, such as 'when heading the ball'

This response gained 4 marks

Fran is a footballer. The functions of her skeleton are vital for her participation in a game of football. Two of these functions are leverage and weight bearing.

2 Describe how **two other** functions of the skeleton support Fran when playing football.

Reduce friction across a joint which will prevent bones rubbing together & prevent an injury.

RBC production which will give more oxygen & energy to working muscles.

This response gained 2 marks

Fran is a footballer. The functions of her skeleton are vital for her participation in a game of football. Two of these functions are leverage and weight bearing.

2 Describe how **two other** functions of the skeleton support Fran when playing football.

Two other functions that the skeleton could provide other than weight bearing and leverage could include, that the skeleton provides framework for the skeleto muscles it also provides protection for internal organs. For example, the cranium protects the brain and the ribs protect organs such as the liver, kidnes and heart.

Q3a and Q3b

For Q3a learners were required to identify the movement occurring when serving in the image provided. The majority of learners found this challenging. Common errors were putting rotation rather than circumduction.

For Q3b learners were required to identify the joint found at the shoulder. The majority of learners accessed the available marks for both of these questions.

This response gained 1 mark for Q3a and 1 mark for Q3b

Julian is a cricketer. **Figure 1** shows him bowling.

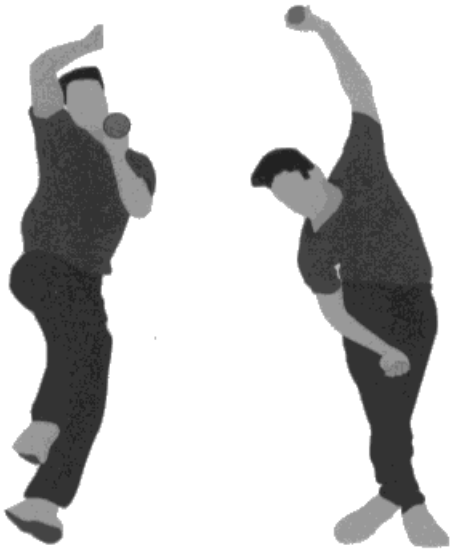


Figure 1

(Source: © Irfan H/Shutterstock)

3 (a) State the movement that is taking place at the shoulder joint of Julian's bowling arm (left arm).

circumduction

(b) State the type of synovial joint at his shoulder.

(1)

Ball and socket

Q3c

For Q3c learners were required to explain how the articular cartilage helps the bowling action. Generally this was answered well which was displayed through the spread of marks. Common errors were bringing in synovial fluid without referencing smoother movement.

This response gained 1 mark

(c) Explain how the articular cartilage enables Julian to bowl successfully in cricket.

(3)

Articular Cartilage enables Julian to bowl successfully in Cricket as it will hold muscle to bone. and Articular Cartilage will allow a friction free movement so therefore when the ~~muscle is being~~ movement is being carried out by the bone gliding across one another

This response gained 3 marks

(c) Explain how the articular cartilage enables Julian to bowl successfully in cricket.

(3)

the articular cartilage will lubricate julians shoulder so it can go through at a full range of motion without friction or injury.

Q4 & Q5

Both questions are recall questions and learners performed as anticipated on this question, with the spread of marks clearly outlining the learners knowledge and understanding of muscle locations and antagonistic movements during a shoulder press.

This response gained 2 marks for Q4 and 3 marks for Q5

Figure 2 shows the muscles in the lower body.

4 Identify the muscles labelled **A–C**.

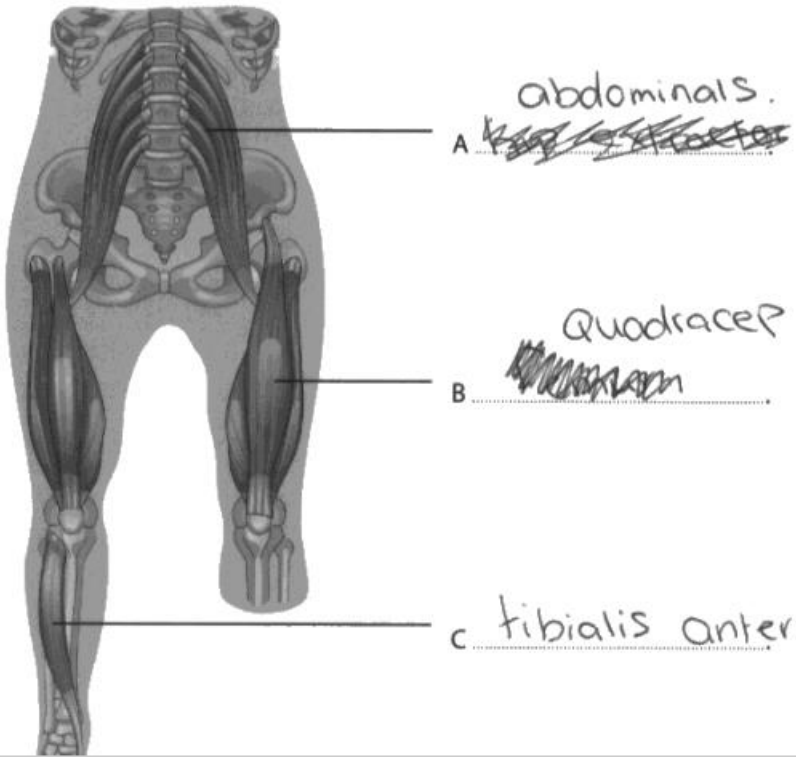


Figure 3 shows Pippa performing a shoulder press.



(Source: © Lio putra/Shutterstock)

Figure 3

5 Complete **Table 2** for the upwards phase of the shoulder press by stating:

(a) the agonist muscle

(1)

(b) the type of contraction of the agonist muscle

(1)

(c) the antagonist muscle.

(1)

	Upward phase
Agonist	(a) deltoid
Type of contraction	(b) Concentric
Antagonist	(c) Latissimus dorsi

Table 2

Q6

Q6 performed as anticipated. The question required learners to describe how the ageing process affects muscle mass, the vast majority of learners achieved 1 mark, for stating it would reduce. Fewer learners gained the second marking point of it would make muscles weaker. Common errors were stating that it would make Asim weaker and not specifically his muscles.

This response gained 2 marks.

Asim is 60 years old and he stopped going to the gym 10 years ago. Recently he has started to go to the gym again.

6 Describe how the ageing process affects muscle mass.

one way how the ageing process affects muscle mass is that it decreases. This is because the muscles weaken and lose strength the older that they get without frequent exercise.

This response gained 1 marks.

Asim is 60 years old and he stopped going to the gym 10 years ago. Recently he has started to go to the gym again.

6 Describe how the ageing process affects muscle mass.

Age affects muscle mass as over time your muscles become weaker meaning you may not be able to lift as much as he previously did.

Q7a

This was a recall question and learners performed as anticipated on this question, with the spread of marks clearly outlining the learners knowledge and understanding of muscular system responses other than microtears. Common errors were bringing in muscular adaptations.

This response gained 2 marks.

Lottie is a javelin thrower.

As part of her training programme she participates in three gym-based sessions using heavy weights.

One response to Lottie's muscular system is microtears in the muscle.

7 (a) State **two other** responses of the muscular system to exercise or lifting weights.

1 ~~No~~ Increase in muscle Temperature

2 Increased muscle pliability

Q7b

Learners found this question challenging to access all marks, the question required to explain the impact of microtears on the strength of Lottie's muscles. A significant number of learners achieved the mark for they make the muscle stronger, however much fewer accessed the mark for causes a swelling.

This response gained 2 marks

(b) Explain the impact of microtears on the strength of Lottie's muscles.

(3)

Microtears occur ~~often~~ commonly after weight training. They are tiny tears in the muscle fibres. which may cause pain or swelling, known as delayed onset muscle soreness. This pain can last 24-48 hours and may prevent Lottie being able to train for a while as they need rest to recover. ~~After~~ This means her muscles are growing.

(Total for Question 7 = 5 marks)

This response gained 1 mark

(b) Explain the impact of microtears on the strength of Lottie's muscles.

(3)

Microtears occure during weight bearing activity this happens when there is too much pressure put on the muscles and small tears will appear, after a while these tears will make the muscle stronger.

Q8a

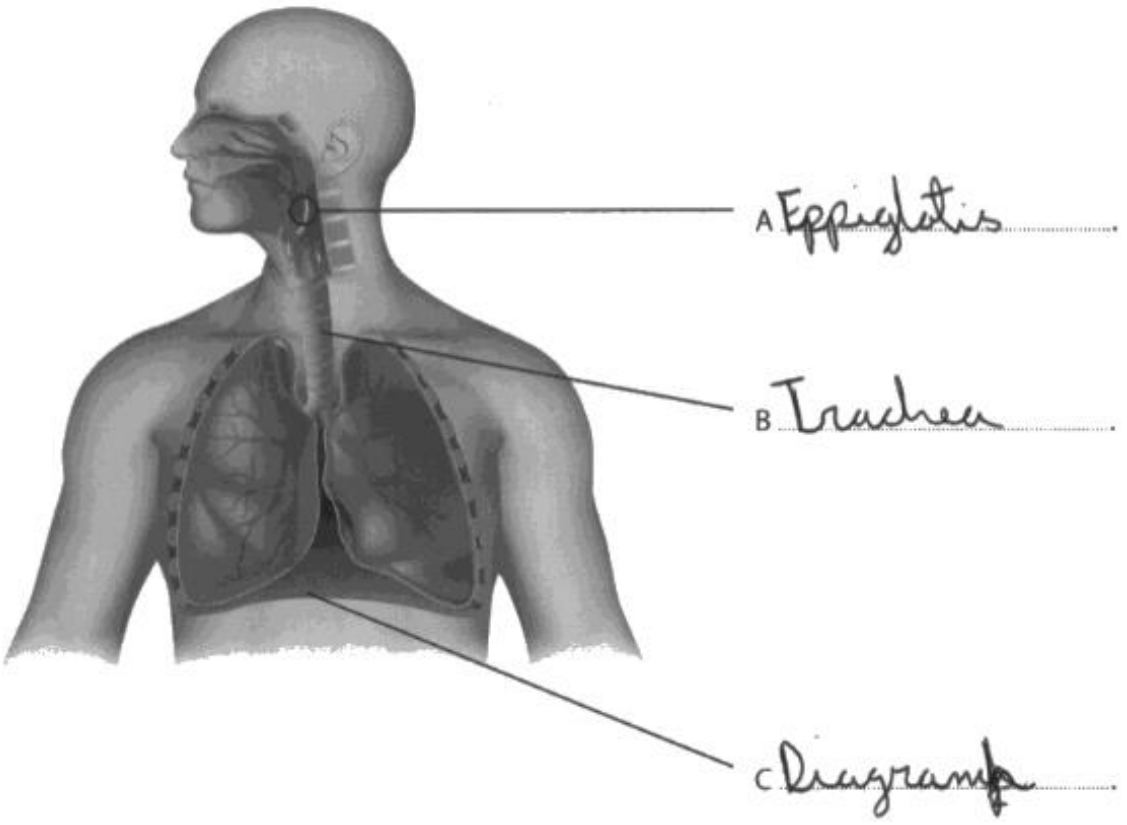
The majority of learners performed as anticipated on this question, with a nice spread of marks, many could identify the diaphragm and trachea, with much fewer identifying the epiglottis. Common errors were not using technical terminology and calling the trachea the 'windpipe'

This response gained 3 marks.

Figure 4 shows the structure of the respiratory system.

8 (a) Identify the structures labelled **A–C**.

(3)



Q8b

On the whole learners performed as expected on this question, with the spread of marks clearly outlining their knowledge and understanding of the role of the external intercostal muscles during inspiration.

Many identified that they would contract, with less identifying the impact of that contraction. Common errors were identifying that they would relax

This response gained 0 marks

(b) Describe the role of the external intercostal muscles during inspiration.

(2)

During inspiration, the intercostal muscle go ~~down~~ up & out to let the ribs get bigger to help the pressure on the lungs ~~to~~ to intake more air.

This response gained 2 marks

(b) Describe the role of the external intercostal muscles during inspiration.

(2)

During inspiration, the intercostal muscles will contract and push the ribcage upwards and out. The external intercostal muscles will expand the chest to take in more oxygen.

Q9a

The majority of learners found this question accessible, a significant number correctly identified that asthma causes a shortness of breath.

Significantly fewer identified that it is due to a narrowing of the airways.

This response gained 1 mark.

Destiny is a badminton player who has asthma. She plays badminton three times per week.

9 (a) Describe asthma.

(2)

Asthma is when not enough oxygen is getting into the lungs affecting her performance due to a lack of breath

This response gained 2 marks.

Destiny is a badminton player who has asthma. She plays badminton three times per week.

9 (a) Describe asthma.

(2)

Asthma is a problem with your respiratory system that causes your oral passage to swell so it's alot harder to breathe.

Q9b

The majority of learners found this question accessible, a significant number correctly identified that diffusion rates increase and the impact on performance. Fewer learners achieved the mark for O2/CO2 due to failing to mention 'more/quicker O2 or more CO2 removed'.

Common errors were taking the previous question on asthma into this response. It is important to remind centres that each question is individual and should be treated that way.

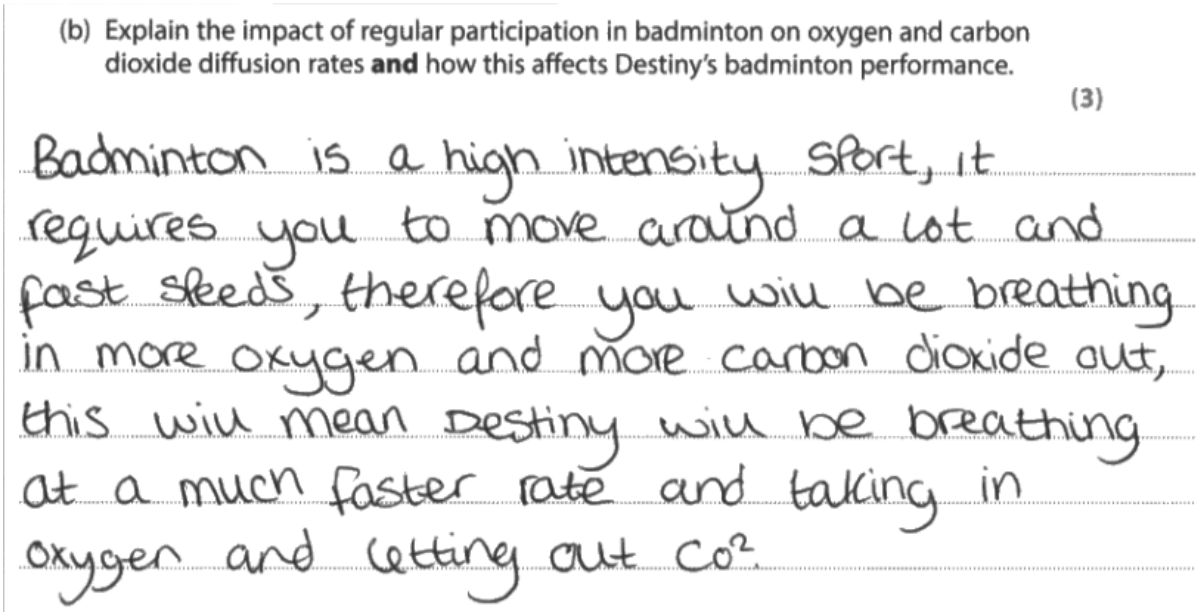
This response gained 3 marks.

(b) Explain the impact of regular participation in badminton on oxygen and carbon dioxide diffusion rates **and** how this affects Destiny's badminton performance.

(3)

Playing badminton regularly will increase the diffusion rate meaning that the waste product Carbon dioxide will be cleared away quicker and the Oxygen will get to the working muscles fast allowing destiny to not fatigue as quickly and be able to play for longer.

This response gained 1 mark.



(b) Explain the impact of regular participation in badminton on oxygen and carbon dioxide diffusion rates **and** how this affects Destiny's badminton performance.

(3)

Badminton is a high intensity sport, it requires you to move around a lot and fast speeds, therefore you will be breathing in more oxygen and more carbon dioxide out, this will mean Destiny will be breathing at a much faster rate and taking in oxygen and letting out Co^2.

Q9c

This was the first extended response question of the paper and learners had to analyse the changes to lung volumes and the impact that this will have on performance. The indicative content was written accordingly to encompass this knowledge and application.

Like all of the extended response questions, the quality of learners' responses varied. Some learners were clearly very knowledgeable about changes to lung volumes. Other learners were unable to address the question fully and only highlighted that lung volume would go up or down and not the specific without linking it to performance.

At level 3 learners' responses provided accurate knowledge of the changes to lung volumes and the impact that would have on badminton performance, using technical terminology with clear development of the point.

Overall, learners found this question accessible but it was the hardest of all the extended responses, although a clear specification point.
Some learners also discussed the impacts on the cardiovascular system, when it was in the respiratory section and thus generated no credit.

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 with appropriate development in reference to the question.

When Destiny is playing a match, some of her lung volumes change. - Minute volume

(c) Analyse the changes to Destiny's lung volumes and the impact this will have on her badminton performance.

(6)

Destiny's tidal volume will increase when exercising as the amount of breaths she takes will increase. This will allow more O_2 to be taken in and transported to the working muscles to make her work at a higher intensity for longer during her badminton performance. Destiny's minute volume will also increase as she will be taking more breath's per minute while exercising, this will also allow more O_2 to be delivered to working muscles whilst also being able to breathe out more CO_2 which will reduce Destiny's fatigue levels during her badminton performance. Destiny's ~~exp~~ expiratory ~~respiratory~~ reserve volume will decrease as she will be taking deeper breaths to maximise the amount of O_2 she can take in. This will help Destiny as she is breathing deeper meaning she can take in more O_2 to working muscles, meaning she will be able to last the duration of the game.

(Total for Question 9 = 11 marks)

This response was placed at Level 1 and given 2 marks. The first half of the response is vague, the reference to stroke volume is irrelevant. Credit awarded for the impact on performance, work at a higher intensity for longer and withstand fatigue.

When Destiny is playing a match, some of her lung volumes change.

(c) Analyse the changes to Destiny's lung volumes and the impact this will have on her badminton performance.

(6)

Dentiny's ~~fun~~ lung volumes might decrease quicker than her aponets because of her asthma. This could lead to her running out of energy at the end of sets quicker than her aponets which puts her at a disadvantage. But if Destiny boks to start of the set well it and yet it over with quickly she might not run out of ~~energy~~ energy. Her stroke volune may mcreqse due to the exersice that she is ~~partsap~~ partisapating in. Her vital capity may be used if her O_2 and CO_2 diffusion rates increase. This will enable her to work at a high intensity for a longer priod of time and withstand fatigue as long as possible.

(Total for Question 9 = 11 marks)

Q10

This was a recall question and learners found it somewhat challenging to access all marks. It required them to name regions of the heart responsible for nervous control of the cardiac cycle. Many correctly answered the bundles of his, with much fewer accessing the other three available mark points.

This response gained 4 marks.

Figure 5 shows the nervous control of the cardiac cycle.

10 Identify the structures labelled **A–D**.

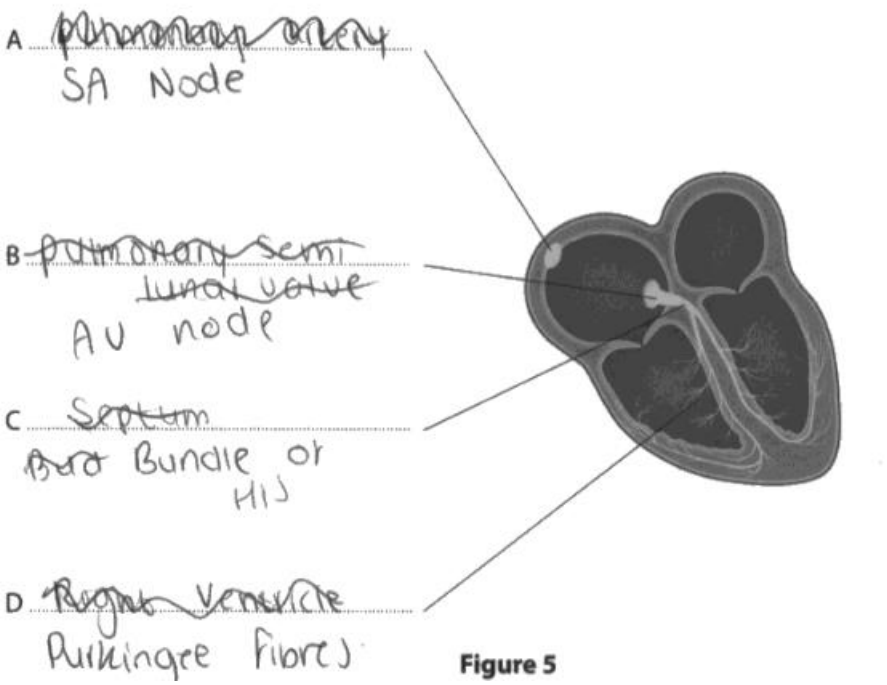
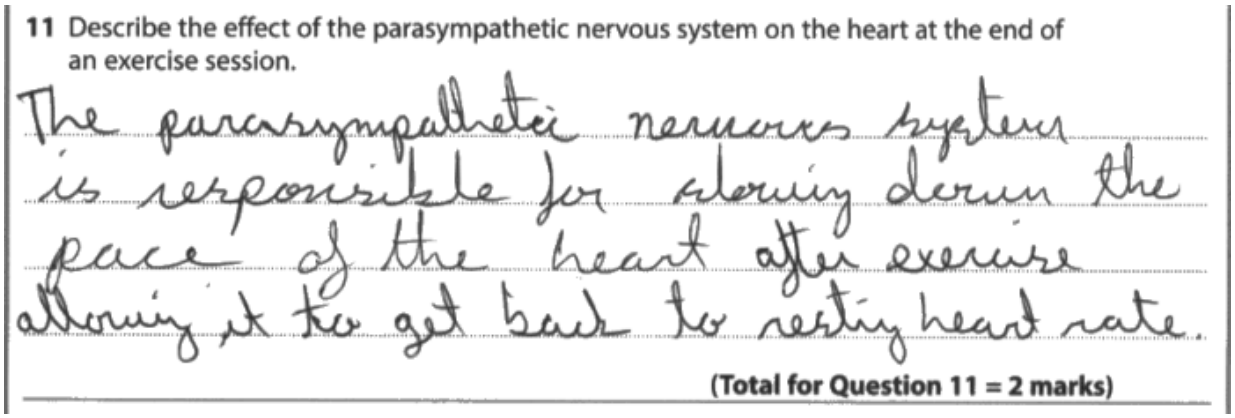


Figure 5

Q11

The majority of learners found this question unexpectedly challenging to access both marks. Overall, responses were generally too vague, some learners achieved the impact slows heart rate, but much fewer stated the back to resting levels.

This response gained 2 marks.

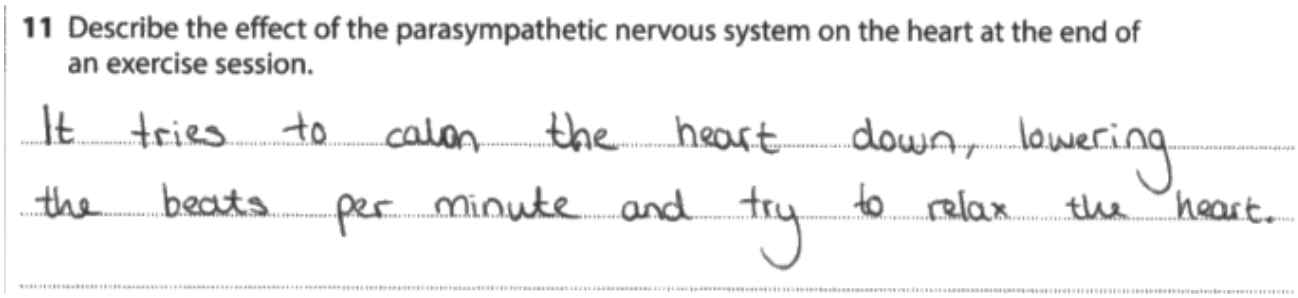


11 Describe the effect of the parasympathetic nervous system on the heart at the end of an exercise session.

The parasympathetic nervous system is responsible for slowing down the pace of the heart after exercise allowing it to get back to resting heart rate.

(Total for Question 11 = 2 marks)

This response gained 1 mark.



11 Describe the effect of the parasympathetic nervous system on the heart at the end of an exercise session.

It tries to calm the heart down, lowering the beats per minute and try to relax the heart.

Q12

This question acted as a good differentiator, for how the cardiovascular system removes waste products.

It was clear from the spread of marks that some learners found this question challenging. A significant number of learners accessed 1 mark for correctly naming a waste product. However, much fewer learners accessed the other available mark points.

This response gained 3 marks

12 Describe how the cardiovascular system removes waste products.

Blood carries the waste product such as carbon dioxide back to the lungs, where it is diffused through the alveoli and exhaled out of the lungs to allow more oxygen back into the lungs.

This response gained 1 mark

12 Describe how the cardiovascular system removes waste products.

The cardiovascular system removes waste products such as unnecessary CO_2 and lactate. ~~[illegible]~~ If a build up of lactic acid occurs, the body needs to remove it, otherwise fatigue will occur.

Q13a

This was a recall question and learners performed as anticipated on this question, with the spread of marks clearly outlining the learners knowledge and understanding of the cardiovascular system responses. Common errors were bringing in other body system responses or adaptations.

This response gained 2 marks

Jim is a long-distance runner. During a training session his cardiovascular system responds to exercise. Two of these responses are increased heart rate and increased cardiac output.

13 (a) State **two other** responses of the cardiovascular system during a training session.

(2)

1 Increased ~~breathing rate~~ stroke volume

2 Increase blood pressure

This response gained 1 mark

Jim is a long-distance runner. During a training session his cardiovascular system responds to exercise. Two of these responses are increased heart rate and increased cardiac output.

13 (a) State **two other** responses of the cardiovascular system during a training session.

(2)

1 Increased blood pressure

2 Increased musele temperature

Q13b

This was the second extended response question of the paper and focused on the impact that an increased cardiac output and heart rate will help to complete a run, the indicative content was written according to encompass this knowledge and application.

Like all of the extended response questions, the quality of learner responses varied. Some learners were clearly very knowledgeable about these areas, but some learners struggled to express this beyond transferring more oxygen to working muscles.

Level 1 responses generally only included that the heart transport oxygen and provided limited application to performance.
At level 3 learners charted accurately impacts on performance of the increases in both cardiac output and heart rate.

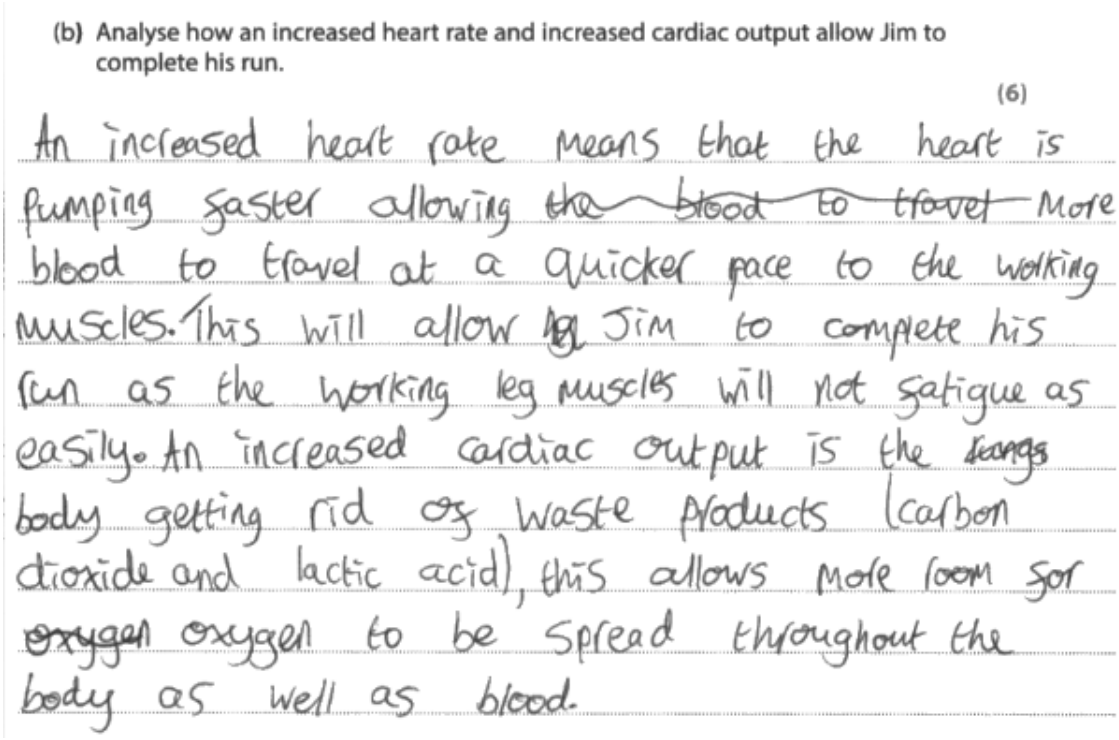
This response was placed at Level 3 and given 5 marks.
The answer clearly assesses a number of points from the indicative content, focusing on the impact that an increased cardiac output and heart rate will have on running performance, with effective use of technical terminology and appropriate development in reference to the question.

(b) Analyse how an increased heart rate and increased cardiac output allow Jim to complete his run.

(6)

Due to Jim having an increased heart rate he will be able to work harder for longer without fatiguing. He will be able to participate in exercise and not feel out of breath as quickly. An increased heart rate means Jims body is being put under more stress and tension where the body will adapt. For example in a match he will be able to run for the whole duration of the game without tiring. Also as, Jim has an increased cardiac output this will allow Jim to keep going at his maximal intensity. Cardiac output = Stroke volume x heart rate. $Q = SV \times HR$. As Jim has an increased heart rate this also increases his stroke volume in relation to cardiac output. more blood will be able to be ejected from the heart per beat to allow for quicker removal of CO_2 and lactic acid. This will also increase diffusion rates and will allow O_2 to be diffused within the body. more blood volume will be able to be transported in the blood. **(Total for Question 13 = 8 marks)**

This response was placed at Level 1 and given 2 marks. The answer assesses some of the points from both areas of the indicative content, but included less impacts on performance.



(b) Analyse how an increased heart rate and increased cardiac output allow Jim to complete his run.

(6)

An increased heart rate means that the heart is pumping faster allowing ~~the blood to travel~~ more blood to travel at a quicker pace to the working muscles. This will allow ~~leg~~ Jim to complete his run as the working leg muscles will not fatigue as easily. An increased cardiac output is the ~~lungs~~ body getting rid of waste products (carbon dioxide and lactic acid), this allows more room for ~~oxygen~~ oxygen to be spread throughout the body as well as blood.

Q14

This was a recall question for identifying the intensity, duration and recovery time for the lactate energy system stage. From the spread of marks it was clear that learners either knew this or did not.

This response gained 3 marks.

14 Complete **Table 3** for the lactate energy system by stating:

(a) the intensity

(1)

(b) the duration

(1)

(c) the recovery time.

(1)

	Lactate system
Intensity	(a) High/medium
Duration	(b) 60-90 secs
Recovery time	(c) 8 mins

Table 3

Q15

This question acted as a good differentiator,

It was clear from the spread of marks that some learners found this question challenging and this area of knowledge for some was missing. Those who did display knowledge of the effect of missing a meal for a person with diabetes, and the effect this has on performance, achieved the majority of the available marking points.

This response gained 4 marks

Eve is a netball player. She has diabetes and has missed a meal before her match.

15 Explain **one** possible effect of missing a meal before a match for a player with diabetes.

Eve could see an effect of low insulin in her body which stands for hypoglycemia and low sugar levels. Eve could suffer from dizzyness to fainings due to her missing her meal before her game. This could lead her to have bad performance and energy due to her lack of food intake before her match.

(Total for Question 15 = 4 marks)

This response gained 2 marks

Eve is a netball player. She has diabetes and has missed a meal before her match.

15 Explain **one** possible effect of missing a meal before a match for a player with diabetes.

One effect of Eve missing a meal before her match could be increase blood pressure. Diabetes is where the persons sugar levels can get low which can cause eve to get dizzy in her game. It important she eats befor the game to prevent this.

Q16

The final question of this section required the learners to analyse the main energy system used during the shot put.

Like all of the extended response questions, the quality of learner responses varied. Some learners were clearly very knowledgeable about the ATP-PC system in relation to the shot put. Other learners were unable to address the question fully by writing everything they knew about the energy systems in general rather than answering the specific question.

Level 1 responses came from those learners who identified around time or intensity for the system, with limited or accurate links to performance.
Level 3 responses were those who completed a full analysis of the ATP-PC system and used technical terminology accurately throughout.

This response was placed at Level 3 and given 6 marks. It fully addresses a number of areas from the indicative content through, time, intensity, fuel use and recovery

Sam is a shot putter. He makes three throws in the first round of a shot putting competition to qualify for a place in the second round of the competition.

16 Analyse the main energy system used in shot put.

The ATP-PC System is the System used in the Shot Put. It last 8-12 seconds and the recovery time is a 1:10 ratio so for every Second used 10 Seconds is required for rest. for example if Sam used 3 seconds of energy he would need 30 Seconds of rest. The ATP-PC System is explosive and uses Creatine phosphate as its energy Source. This energy energy System is anaerobic which means oxygen is not used. The creatine phosphate is broken down by kinease creatine. This System fatigues easily.

This response was placed at Level 2 and given 3 marks.
The answer generates credit through the correct identification ATP-PC system and links to intensity and recovery.

Sam is a shot putter. He makes three throws in the first round of a shot putting competition to qualify for a place in the second round of the competition.

16 Analyse the main energy system used in shot put.

The main energy System that Sam is going to use as a Shot putter is his ATP-PC System. This System is Suitable for Short, high intensity Sports or exercise as it only last a few seconds. This is fine for Sam as he will only be throwing at a high intensity for a few seconds. The ATP-PC system also has a very quick recovery which Sam will need as a Shot putter as he will need to recover quickly after each ~~through~~ throw and be ready to throw again almost immedicitly after. Creatine is the fuel source for the ATP-PC System. which means he does not need fuel sources such as carbohydrates or fats to use this system

Q17

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. Learners 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 learner responses varied. Some learners were clearly very knowledgeable about how the respiratory and muscular systems work together. Some learners 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 responses irrelevant in the context of this question. Other errors were bringing in cardiovascular responses rather than respiratory.

High level responses displayed synoptic coverage from both areas as well as making links to how these systems work collectively. High-level responses displayed coverage from both areas as well as clearly relating this to the cycling performance.

Like any levels of response based question, it is not 1 point equals 1 mark, the indicative content is extensive for learners 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 systems adaptations visited and application to cycling performance and interrelationships are developed throughout.

Mina is a long-distance cyclist. Each cycle race is 50 miles long. Mina has been training and riding competitively for 10 years, so her respiratory and muscular systems have adapted.

17 Analyse how the adaptations of Mina's respiratory and muscular systems affect her cycling performance.

(8)

- The adaptations of the respiratory system is an increase of strength in the respiratory muscles, an increase in CO_2 and O_2 diffusion rates and an increase in Vital Capacity.
- Vital Capacity is the amount of air exhaled after maximum inhalation
- ~~The~~ As a result of the respiratory muscles getting stronger this mean that she will be able to aerobically respire quicker and stronger, this means her lungs are stronger and the other respiratory muscles. This affects Mina's performance especially as gaseous exchange can happen quicker and more efficient, allowing ~~oxy~~ oxygen to be ~~transported~~ diffused into the working muscles, causing her to cycle longer and faster without fatiguing quickly. ~~and without a build up of lactic acid and she becomes resistant to lactate.~~
- The increase of CO_2 and O_2 diffusion rate allows gaseous exchange to occur quicker and more efficient as ~~the~~ gaseous exchange produces oxygen into our working muscles.
- ~~The adap~~ Some adaptations of the muscular system is increased muscular hypertrophy, increase tendon strength, increase number and size of mitochondria and increase in storage of fat and glycogen.

- An increase in the number and size of mitochondria allows Mira to have more energy, as the mitochondria is the powerhouse of the cell, containing mainly energy which is found in every muscle cell. This allows Mira to have more energy when cycling, positively effecting her performance as she will be able to cycle for longer and faster without a build up of ~~lactate~~ lactic acids and she will fatigue less.
- Muscular hypertrophy is ~~as~~ where the muscles become stronger and denser allowing ~~Mira~~ Mira to exert more force into the pedals to cycle ~~faster~~ quicker, this positively effects her performance as she will be able to finish the 50 miles in a better time.
- An increase in the storage of fats and glycogen is very important as it's a fuel source for when Mira runs out of carbohydrates, ~~which~~ having a better storage of fats and glycogen ~~allows~~ allows Mira to be able to switch fuel source easily. This positively effects her performance as She'll be able to cycle for longer periods of time without cramping or fatiguing. Resulting in a better time for Mira. **(Total for Question 17 = 8 marks)**

TOTAL FOR SECTION F = 8 MARKS

This response below was placed at Level 2 and given 4 marks.
The answer identifies some elements of knowledge and understanding with some errors, however these points are not always developed or links made to cycling performance.

Mina is a long-distance cyclist. Each cycle race is 50 miles long. Mina has been training and riding competitively for 10 years, so her respiratory and muscular systems have adapted.

17 Analyse how the adaptations of Mina's respiratory and muscular systems affect her cycling performance.

(8)

Starting with her muscular system, overtime she would of developed muscular hypertrophy which is where her muscles became stronger, this means she'll be able to exert more force for a longer duration of time, this also links to muscular endurance being increased overtime.

moving onto her respiratory ~~sys~~ system where she would of developed an increase stroke volume which is the amount of air that can be breathed in from one breath which will mean she can take in more oxygen meaning her muscles can work for longer + at a high intensity Stunting fatigue.

Summary

Based on their performance on this paper, learners should:

- Use appropriate technical language throughout their responses,
- Tailor their response based on the command word in the question, eg. 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, eg. short-term responses (immediate, due to the exercise/sport), adaptations (long term).
- Only address the correct body system within this section, eg.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 centres 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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with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom