

BTEC Level 3 National in Sport

First teaching September 2016



Sample Marked Learner Work

External Assessment

Unit 1: Anatomy and Physiology

In preparation for the first teaching from September 2016 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 Nationals BTEC Level 3 qualification.

What is Sample Marked Learner Work (SMLW)?

The following learner work has been prepared as guidance for centres and learners. It can be used as a helpful tool when teaching and preparing for external units.

Each question explores two responses; one good response, followed by a poor response. These responses demonstrate how marks can be both attained and lost.

The SMLW includes examples of real learners' work, accompanied with examiner tips and comments based on the responses of how learners performed.

Below are two boxes and a tips section displaying the format. Each question will show a learner response, followed by comments on the command verbs and the content of the question. Tips may be offered where possible.

The appendix has attached a mark scheme showing all the possible responses that perhaps were not explored in the SMLW, but can still be attained.

The red box comments on the command verbs used in the question. Command typically means; to instruct or order for something to be done. Likewise, in assessments, learners are required to answer questions, with the help of a command verb which gives them a sense of direction when answering a question.

This box highlights the command verb used and comments if the learner has successfully done this, or not.

The green box comments on the content words and phrases. Content makes reference to subject knowledge that originates from the specification. Learners are required to use subject specific knowledge to answer the questions in order to gain maximum marks.

The comments include:

- *Any key words/phrases used in the learner's answer.*
- *Why has the learner gained x amount of marks? And why/how have they not gained any further marks?*
- *Any suggestions/ ideas regarding the structure of the answer.*
- *If the answer meets full marks- why it is a strong answer? What part of the content has been mentioned to gain these marks?*

TIPS!



Tips offer helpful hints that the learner may find useful. For example:

- *Recommended length of the answer*
- *Reference to the amount of marks awarded*
- *General advice for the learner when answering questions*

Question 1: Explain how bones of the skeleton are used in movement for sport.

[Total marks for Q1 – 2 marks]

1 Explain how bones of the skeleton are used in movement for sport.

The muscles are connected to the bones.
These skeletal muscles contract and
relax to produce a movement, which
in turn causes the bones to move.

2

Total for Question 1 = 2 marks

Good response: The command verb is explain, the learner has provided an explanation to how the bones of the skeleton are used in movement and therefore accessed both available marks.

Poor response: Question 1 addresses the function of the skeletal system, within Topic A2.

One mark has been awarded for identifying how bones allow for muscle attachment and one mark for explaining how the bones create movement.

1 Explain how bones of the skeleton are used in movement for sport.

As they are attached to muscles, they contract
and relax the bones to move.

1

Total for Question 1 = 2 marks

Poor example: The learner has not provided an explanation to how the bones of the skeleton are used in movement and therefore not accessed both available marks.

Question 1 addresses the function of the skeletal system, within Topic A2.

One mark awarded for attached to muscles, but no marks are awarded for contracting and relaxing the bones.



When a question gives you the area to focus on and the command verb is explain, there is always one mark awarded for identifying how and one mark awarded for justifying the reason.

Question 2a: Identify one type of exercise that Anita could take part in to help the osteoporosis from getting worse. [Total marks for Q2a – 1 mark]

Anita has the first stages of osteoporosis. She has been told to take part in exercise to help prevent this condition from getting worse.

2 (a) Identify **one** type of exercise that Anita could take part in to help prevent the osteoporosis from getting worse.

1 mark

Swimming, weight training, jogging

1

Good example: The command verb is identify, the learner has provided one type of exercise to prevent osteoporosis from getting worse.

Question 2 (a) addresses the additional factors affecting the skeletal system, within Topic A6.
One mark has been awarded for a correct identification of a weight bearing activity.

2 (a) Identify **one** type of exercise that Anita could take part in to help prevent the osteoporosis from getting worse.

1 mark

Swimming

0

Poor example: The command verb is identify, the learner has not provided one type of exercise to prevent osteoporosis from getting worse.

Question 2 (a) addresses the additional factors affecting the skeletal system, within Topic A6.
Swimming is a non-weight bearing activity and therefore no marks can be awarded.



When a question is identify a single word answer can be used, there is no need to write a long sentence and waste time.

Question 2b: Explain why weight bearing exercise will help to prevent the osteoporosis from getting worse.

[Total marks for Q2b – 3 marks]

(b) Explain why weight bearing exercise will help to prevent the osteoporosis from getting worse.

3 marks

Weight bearing exercise would allow the bones to take up minerals so that they reduce the rate of bone loss which will then help maintain bone mass by making the bones stronger.

3

Good example: The command verb is explain, the learner has provided an explanation to why weight bearing exercise will help prevent osteoporosis from getting worse and therefore accessed all available marks.

Question 2 (b) is a continuation from 2 (a) and assesses the additional factors affecting the skeletal system, within Topic A6.

One mark has been awarded for identifying why weight-bearing exercise would prevent worsening osteoporosis through bones taking up minerals and two marks for explaining how it prevents osteoporosis from getting worse, one mark for reducing the rate of bone loss and one mark for making the bones stronger by maintaining bone mass.

(b) Explain why weight bearing exercise will help to prevent the osteoporosis from getting worse.

3 marks

Weight bearing activities help strengthen the joint and ligaments and tendons

0

Poor example: The command verb is explain, the learner has not provided an explanation to why weight bearing exercise will help prevent osteoporosis from getting worse and therefore none of the available marks.

Question 2 (b) is a continuation from 2 (a) and assesses the additional factors affecting the skeletal system, within Topic A6.

Osteoporosis is a bone condition, this learner's response explains about joints, ligaments and tendons and therefore achieves no marks.



When questions continue such as 2 (a) and 2 (b). Make sure that you do not repeat yourself and write the same thing. You will only be assessed on something once.

Question 3: Analyse how movement at the synovial joints in the lower skeleton allows the gymnast to achieve the position shown in the picture.

[Total marks for Q3 – 6 marks]

- 3 Analyse how movement at the synovial joints in the lower skeleton allows the gymnast to achieve the position shown in the picture.



(Source: © Olga Bogatvrenko/Shutterstock)

The three synovial joints that are within the lower skeleton of the gymnast are the hip, knee and ankle. These joints are slightly different and therefore allow different types and ranges of movement.

The hip joint is a ball and socket joint and the movement that is occurring in the straddle is flexion and abduction.

The knee joint is a hinge joint and the movement that is occurring to keep her leg straight is extension.

The ankle joint is also a hinge joint and the movement occurring is plantar flexion when she points her toes.

All synovial joints have ligaments that provide stability and hold the bones together. On the end of the bones, there is a cartilage that reduces friction and acts as a shock absorber.

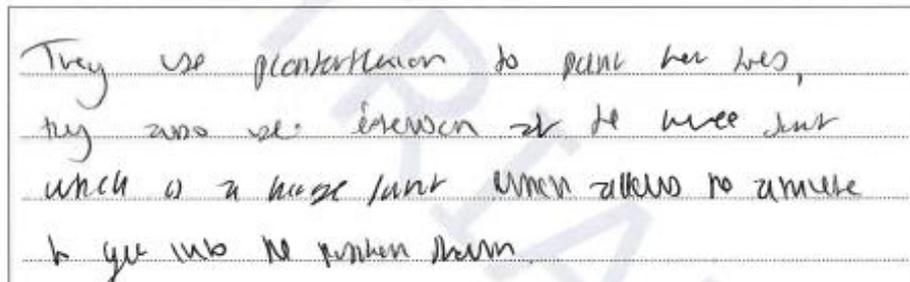
Good example: The command verb is analyse, the learner has provided a detailed analysis to how the movements of the lower skeleton are achieved in the picture shown. An analysis requires learners to examine in detail in order to discover a theme or break something down into its components parts, in this case it is the synovial joints and movements. All analysis questions are worth 6 marks.

Question 3 addresses the joints of the skeletal system, within Topic A3. The question requires reference to the joints of the lower skeleton, the types of synovial joint and their ranges of movement and the structure and function of synovial joints

This response has been awarded 6 marks. Marks have been awarded because the three synovial joints that are within the lower skeleton of the gymnast are the hip, knee and ankle have been addressed in terms of the type of joint and movements occurring at them.

Also there is an analysis of synovial joints in terms of their structure and how this supports movement, structures such as ligaments and cartilage have been addressed

This is a comprehensive and detailed answer that covers all requirements of the question. It is written in a logical sequence which enables ease of reading and therefore accessing the full marks. There is correct use of technical terminology and most points on the mark scheme are covered.



They use plantarflexion to point her toes,
they also use extension at the knee joint
which is a huge joint which allows her to
get into the position shown.

1

Poor example: The command verb is analyse, the learner has not provided a detailed analysis to how the movements of the lower skeleton are achieved in the picture shown. An analysis requires learners to examine in detail in order to discover a theme or break something down into its components parts, in this case it is the synovial joints and movements. All analysis questions are worth 6 marks.

Question 3 addresses the joints of the skeletal system, within Topic A3. The question requires reference to the joints of the lower skeleton, the types of synovial joint and their ranges of movement and the structure and function of synovial joints

One mark has been awarded for this response. Plantar-flexion to point the toes is the correct movement identified and therefore is creditable. Stating the knee joint is a hinge joint is also correct, but eversion is incorrect the movement at the knee is extension.

To achieve full marks the learner needs to highlight the ankle, knee and hip joint. State what type of joint they are as well as the movements occurring.

The synovial joint structure also needs to be referenced in terms of the function of ligaments and cartilage.



If a figure/picture or graph is given as a reference then you must ensure that you use it.



With analysis it is important that you answer the question rather than writing everything you know about the topic. Try underlining the focus of the question, that way you can keep referring back to it and make sure that you are answering it correctly.

Question 4: Explain how the use of weighted lunges would improve Stephanie's high jump performance. [Total marks for Q4 – 3 marks]

Stephanie is a high jumper. She uses weighted lunges as part of her training as shown.



(Source: © Syda Productions/Shutterstock)

- 4 Explain how the use of weighted lunges would improve Stephanie's high jump performance.

In doing weighted lunges she would cause micro tears in the muscle fibre. These would heal over time and heal bigger and stronger allowing harder contractions which is useful for propelling her body weight further and in this case higher.

2

Total for Question 4 = 3 marks

Good example: The command verb is explain, the learner has provided an explanation but not fully to how weighted lunges would improve high jump performance, and therefore not achieved all marks.

Question 4 addresses the adaptations of the muscular system to exercise, topic B7.

One mark has been awarded for identifying how weighted lunges would increase leg strength and one mark for explaining that this would enable the athlete to jump higher, giving the learner a total of two marks.

To achieve the third mark the learner needed to explain that by increasing leg strength it would enable more force to be generated.

Stephanie is a high jumper. She uses weighted lunges as part of her training as shown.



[Source: © Syda Productions/Shutterstock]

- 4 Explain how the use of weighted lunges would improve Stephanie's high jump performance.

it increases the leg muscles to allow stephanie to jump up with power generated!

Total for Question 4 = 3 marks



Poor example: The command verb is explain, the learner has not provided an explanation to how weighted lunges would improve high jump performance.

Question 4 addresses the adaptations of the muscular system to exercise, topic B7.

This answer is too vague, increases leg muscles needs to be more specific to increasing leg strength, jump up needs to be jump higher to achieve the mark.

TIPS!



When the question is related to sporting performance, it is important that you say that how the training/activity taking place will impact on the athletes' performance in their sport.



In this case the weighted lunges help them jump higher.

Question 5a: State why Stephanie's training may cause DOMS.

[Total marks for Q5a - 1 mark]

Two days after Stephanie's training session she experiences delayed onset of muscle soreness (DOMS).

5 (a) State why Stephanie's training may cause DOMS.

1 mark

She has torn muscle fibres and was doing an anerobic exercise.

1

Good example: The command verb is State, the learner has stated why training may cause DOMS.

Question 5 (a) addresses the responses of the muscular system to a single sport or exercise session

For this the learner has stated why weight training can cause delayed onset of muscle soreness (DOMS), through torn muscle fibres and therefore achieved the one mark available.

5 (a) State why Stephanie's training may cause DOMS.

1 mark

Increase in the muscles.

0

Poor example: The command verb is State, the learner has not stated why training may cause DOMS.

Question 5 (a) addresses the responses of the muscular system to a single sport or exercise session

Increase in the muscles refers to hypertrophy not DOMS.



When a question is based upon adaptations then this means that it is over a period of time. When a question is based upon responses then this is directly related to the activity/sport at that time.



Look at the number of lines as a guidance to how much you must include. When stating you are required to provide a definition or example.

Question 5b: Explain how muscle adaptation occurs as a result of Stephanie's training. [Total marks for Q5b -2 marks]

(b) Explain how muscle adaptation occurs as a result of Stephanie's training. 2 marks

The muscle fibres would tear then repair becoming bigger and stronger and thicker, meaning that she would have stronger muscles

1

Good example: The command verb is explain, the learner has provided an explanation to how muscle adaptations occur as a result of weight training and therefore accessed both marks.

Question 5 (b) is a continuation from 5 (a) but addresses the adaptations of the muscular system to exercise topic B7.

One mark has been awarded for explaining 'by the muscles tearing' and the second mark for explaining that this would 'cause them to be bigger and stronger'.

(b) Explain how muscle adaptation occurs as a result of Stephanie's training. 2 marks

This is due to the intensity & repetition of her training

0

Poor example: The command verb is explain, the learner has not provided an explanation to how muscle adaptations occur as a result of weight training and therefore not accessed any marks.

Question 5 (b) is a continuation from 5 (a) but addresses the adaptations of the muscular system to exercise topic B7.

The response does not relate to muscle adaptation but discusses intensity and repetition of training and therefore is not credited with any marks. Marks are awarded for explaining 'by the muscles tearing' and the second mark for explaining that this would 'cause them to be bigger and stronger'.



When a question is based upon adaptations then this means that it is over a period of time. When a question is based upon responses then this is directly related to the activity/sport at that time.

Question 6: Using this data explain which athlete would be best suited to compete in a 10km run.

[Total marks for Q6 – 4 marks]

The table shows data of muscle fibre types for three different athletes.

	Type I	Type IIa	Type IIx
Michael	10%	20%	70%
Earle	40%	20%	40%
David	70%	20%	10%

6 Using this data explain which athlete would be best suited to compete in a 10km run.

David is suited to compete in a 10km run because he has a higher percentage of type I muscle fibre. This utilise his aerobic system and enable continuous contraction to meet the demand in a 10km run

3

Good example: The command verb is explain, the learner has provided an explanation of what muscle fibre types are best suited to a 10km run.

Question 6 addresses fibre types of the muscular system, topic B5.

Three marks have been awarded for this response. One mark has been awarded for a valid reason for the choice of athlete (David has the highest percentage of type 1) and two marks for explaining that this would enable the athlete to utilise the aerobic system and enabling continuous contractions.

To achieve the forth mark the learner needed to explain that type one fibres are resistant to fatigue.

6 Using this data explain which athlete would be best suited to compete in a 10km run.

David would be best suited as he has a higher percentage of type 1 muscle fibres which is needed for a long distance run (slow twitch fibres)

1

Poor example: The command verb is explain, the learner has not provided an explanation of what muscle fibre types are best suited to a 10km run.

Question 6 addresses fibre types of the muscular system, topic B5.

One mark has been awarded for a valid reason for the choice of athlete (David has the highest percentage of type 1), but the remainder of the answer is too vague to achieve marks. Marks would be awarded for referencing, withstand fatigue, enable continuous contractions and use the aerobic energy system.



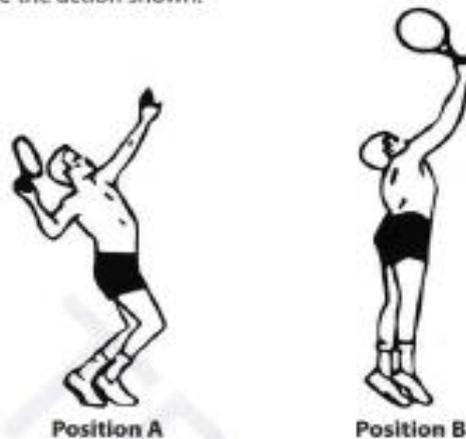
If you are presented with a table it is important that you use it in relation to the sport provided in the question.

Question 7: Analyse how the antagonistic muscle pairs at the shoulder and elbow allow the tennis player to complete the action shown.

[Total marks for Q7 – 6 marks]

Antagonistic muscle pairs allow movement.

7 Analyse how the antagonistic muscle pairs at the **shoulder and elbow** allow the tennis player to complete the action shown.



In position A:

- bicep is contracted (agonist) and the tricep is relaxed (antagonist) to flex the elbow
- at the shoulder - the deltoid is contracted (agonist) and the latissimus dorsi are relaxed and the antagonist

In position B:

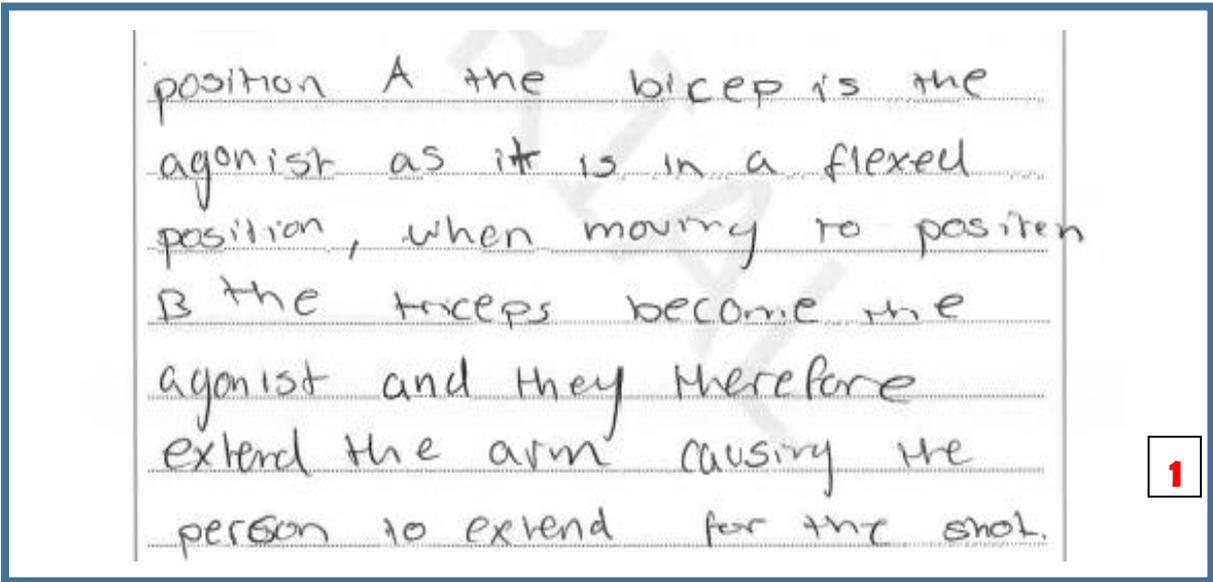
- to extend the elbow the tricep is now the agonist and contracted, the bicep is the antagonist
- the shoulder - the pectorals are the agonist and the deltoids are the antagonist.

5

Good example: The command verb is analyse, the learner has provided a detailed analysis of the antagonistic muscle pairs at the shoulder and elbow during the action shown from Position A to Position B. An analysis requires learners to examine in detail in order to discover a theme or break something down into its components parts, in this case it is the antagonistic muscle pairs at the shoulder and elbow.

Question 7 addresses the antagonistic muscle pairs at the shoulder and elbow within Topic B3. The question requires reference to the agonist and antagonist muscles acting on the shoulder and the elbow.

The answer was awarded 5 marks. The 5 marks have been awarded stating the correct muscle and actions at both positions. To achieve the extra 1 mark the learner needed to say that in Position A the shoulder is in horizontal extension and the shoulder in position B is in horizontal flexion. Nevertheless, this is a comprehensive and detailed answer that almost all requirements of the question. It is written in a logical sequence which enables ease of reading and therefore accessing the majority of marks available. There is correct use of technical terminology and most points on the mark scheme are covered.



position A the bicep is the
agonist as it is in a flexed
position, when moving to position
B the triceps become the
agonist and they therefore
extend the arm causing the
person to extend for the shot.

1

Poor example: The command verb is analyse, the learner has not provided a detailed analysis of the antagonistic muscle pairs at the shoulder and elbow during the action shown from Position A to Position B. An analysis requires learners to examine in detail in order to discover a theme or break something down into its components parts, in this case it is the antagonistic muscle pairs at the shoulder and elbow.

Question 7 addresses the antagonistic muscle pairs at the shoulder and elbow within Topic B3. The question requires reference to the agonist and antagonist muscles acting on the shoulder and the elbow.

This response has been awarded 1 mark for stating that that bicep is the agonist. The learner looks at both position A and B, but only references the agonist muscle in each position with the focus on the elbow. To improve the answer both the agonist and antagonist muscles need to be included for both positions and for both joints (Shoulder and Elbow) as stipulated in the question.



When you are presented with two images such as Position A and Position B, you must ensure that you reference both of them to achieve the top marks.



With high tariff questions it is important to ensure that fully read the question and build your answer. In this question it asks for antagonistic muscle pairs at the shoulder and elbow joint, therefore with questions like this you need to start at position A and the elbow joint, state the agonist and antagonist muscles, when you are asked about muscles you will be expected to name the type of contraction occurring. From that you then need to analyse what movements these actions carry out, remember when talking about movements we only talk about joints

E.g. The bicep is the agonist muscle in position A, it is undergoing a concentric contraction that causes the elbow to undergo flexion allowing the racket head to be taken back.

Question 8: Explain the effect of taking part in a rugby game on Yannick's tidal volume.
[Total marks for Q8 – 3 marks]

Yannick is a rugby player.

8 Explain the effect of taking part in a rugby game on Yannick's tidal volume.

Tidal volume is the amount of air which enters the lungs during normal inhalation at rest. The average tidal volume is 500 ml and the same amount leaves the lungs during exhalation. So if Yannick is playing rugby he will need to inhale larger amount of air ~~more~~ during Rugby game as he ~~was~~ will normally would. This is because he will run for long period of time and it will be much harder for him to inhale larger amount of air during intense exercise such as Rugby.

2

Total for Question 8 = 3 marks

Good example: The command verb is explain, the learner has provided an explanation of how participation within a rugby game will effect an individual's tidal volume.

Question 8 addresses lung volumes in response to participation in exercise, topic C3.

Two marks have been awarded for this response. One mark has been awarded for an identification that tidal volume will increase and one mark for explaining that this would enable Yannick to participate in the game

To achieve the third mark the learner needed to explain that they take in more air as the need more oxygen for their working muscles.

8 Explain the effect of taking part in a rugby game on Yannick's tidal volume.

Yannick's tidal volume will
~~increase~~, decrease as he has to
take more short sharp breaths



Poor example: The command verb is explain, the learner has not provided an explanation of how participation within a rugby game will effect an individuals tidal volume.

Question 8 addresses lung volumes in response to participation in exercise, topic C3.

No marks have been awarded because the learner identified that Yannick's tidal volume has decreased rather than increased and there was no application to the effects of taking part in rugby as stipulated in the question.

Question 9: Explain the role of carbon dioxide in the chemical control of breathing during exercise.

[Total marks for Q9 – 3 marks]

- 9 Explain the role of carbon dioxide in the chemical control of breathing during exercise.

Carbon dioxide is produced by human body as a by product of respiration. It is determined by chemoreceptors which increase the rate of breathing to keep the human body functioning well.

3

Good example: The command verb is explain, the learner has provided an explanation of how carbon dioxide is involved within chemical control of breathing during exercise.

Question 9 addresses how breathing is controlled via chemical processes in response to participation in exercise, topic C4.

This response has been awarded the full 3 marks. One mark has been awarded for the learner explaining that carbon dioxide is produced in the body as a by-product of respiration, one mark has been awarded in response to the learner stating that it is detected by chemoreceptors and the final mark awarded for it would increase the rate of breathing in the learner's response.

- 9 Explain the role of carbon dioxide in the chemical control of breathing during exercise.

CO₂ is taken out of the body once the oxygen has travelled round supplying the body.

0

Poor example: The command verb is explain, the learner has not provided an explanation of how carbon dioxide is involved within chemical control of breathing during exercise.

Question 9 addresses how breathing is controlled via chemical processes in response to participation in exercise, topic C4.

The question is focused upon chemical control, the learner has discussed removal of carbon dioxide and therefore achieved no marks.



When you are asked a question about chemical control, you must always reference chemoreceptors and state what they do, in relation to the levels of oxygen and carbon dioxide in the body.



Look at the number of lines that you are given to answer a question as a guide to how much is necessary to write to achieve the total marks available.

Question 10: Explain how increasing the strength of the respiratory muscles aids performance in long distance cycling. [Total marks for Q10 – 4 marks]

Endurance training results in adaptation to the respiratory system.

10 Explain how increasing the strength of the respiratory muscles aids performance in long distance cycling.

Respiratory muscles contracting forcefully can result in the ability to inhale more air into our lungs. By doing this our body can conduct to the demand of oxygen and also the removal of the by product which is carbon dioxide due to the increase vital capacity.

4

Good example: The command verb is explain, the learner has provided an explanation of how increasing the strength of the respiratory muscles aids performance in long distance cycling.

Question 10 addresses the adaptations of the respiratory system in response to participation in exercise and sports performance, topic C6.

This response has been awarded all four available marks. One mark has been awarded for an explaining that respiratory muscles contract more forcibly, one mark for explaining that we can then inhale more air, one mark for enabling the body to meet the increased demand for oxygen and the final mark awarded for it would increase the vital capacity.

This is a coherently written answer that addresses all areas on the mark scheme.

10 Explain how increasing the strength of the respiratory muscles aids performance in long distance cycling.

• Strengthening of respiratory muscles allows more air to be taken in, therefore more oxygen can be delivered to the muscles

2

Poor example: The command verb is explain, the learner has not provided an explanation of how increasing the strength of the respiratory muscles aids performance in long distance cycling.

Question 10 addresses the adaptations of the respiratory system in response to participation in exercise and sports performance, topic C6.

Two marks have been awarded for this response. The first mark was awarded for the learner stating that more air can be taken in and one mark for more oxygen delivered to the working muscles, however for further marks to be awarded the learner needed to explain about the increased strength would allow more forceful contractions and then relate it to cycling performance

Question 11: Discuss the effects of participating in swimming on the respiratory system for an individual suffering with asthma. [Total marks for Q11 – 6 marks]

Julie is an 18 year old swimmer and has asthma.

11 Discuss the effects of participating in swimming on the respiratory system for an individual suffering with asthma.

For - warm, moist air inhaled can open airways
- it can open airways / relax bronchi
- strengthens respiratory muscles

Against - can cause narrow airways
/ bronchi contract (tighten)
- cause asthma attack
- cause quick muscle fatigue as not enough O₂ through airways so not being delivered to muscles.

4

Good example: The command verb is discuss, the learner has attempted to provide a discussion of the effects of participating in swimming on asthma. When discussing, learners are required to identify the issue, situation, problem, argument that is being assessed in the question given exploring all aspects and investigating fully in this case it is the positive and negative impacts of asthma on swimming performance.

Question 11 addresses the effects of participating in swimming on asthma within Topic C7. The question requires reference to the positive and negative effects.

This response has been awarded four marks. This answer has attempted to look at both positives and negatives but it is lacking a little in balance and therefore did not achieve all marks. Marks have been awarded for the warm moist air opens the airways and it strengthens respiratory muscles for the positive effects. In addition, marks have been awarded for it can cause an asthma attack, narrowed airways and causes the muscles to fatigue. In order to improve this answer to achieve the full marks it requires greater application to swimming performance, such as the effects on breathing rate and stroke rate. It is written in a logical sequence this enables ease of reading with correct use of technical terminology.

11 Discuss the effects of participating in swimming on the respiratory system for an individual suffering with asthma.

• The warm moist air helps the swimmer with asthma to breathe easier

1

Poor example: The command verb is discuss, the learner has not provided a discussion of the effects of participating in swimming on asthma. When discussing, learners are required to identify the issue, situation, problem, argument that is being assessed in the question given exploring all aspects and investigating fully in this case it is the positive and negative impacts of asthma on swimming performance.

Question 11 addresses the effects of participating in swimming on asthma within Topic C7. The question requires reference to the positive and negative effects.

One mark awarded for this response for the warm moist air would enable the athlete to breathe easier, both positives and negatives must be discussed with application to swimming.



When you are provided with a sport ensure that you use it to base your answer around. Don't worry, it will not be a sport that you are unfamiliar with or have not experienced before.



Discussions are difficult but remember you need to look at both sides of the argument to ensure that you get the best grades possible.

Question 12: Describe the pathway of blood flows as it leaves the heart through the major blood vessels to the body and lungs. [Total marks for Q12 – 4 marks]

12 Describe the pathway of blood flow as it leaves the heart through the major blood vessels to the body and lungs.

* Blood flows from the aorta to the body.
* It then travel through the vena cava
* Then to the heart through the four chambers
* ~~It~~ From the heart it flow through pulmonary artery to the lungs.
* It then comes back to the heart through ~~pub~~ pulmonary vein.

4

Total for Question 12 = 4 marks

Good example: The command verb is describe, the learner has provided a description of the pathway of blood as it leaves the heart and to the body and lungs.

Question 12 addresses the structure of the cardiovascular system, topic D1.

The learners answer contains four linked points, which provide a logical description of the pathway of blood flow, identifying each major blood vessel in the correct order.

All four marks have been awarded. One mark has been awarded for an describing that blood flows from the aorta to the body, one mark for it travels through the vena cava, one mark for flowing through the pulmonary artery to the lungs and the final mark awarded for it comes back to the heart through the pulmonary vein.

One mark has been awarded for pulmonary artery flowing into lungs, because this is the only blood vessel referenced only one mark can be given.

12 Describe the pathway of blood flow as it leaves the heart through the major blood vessels to the body and lungs.

As the heart contracts it force
blood into the Pulmonary artery
into the capillaries and veins that
would then go into the ~~B~~ lungs
and provides them with blood
that is oxygenated.

1

Total for Question 12 = 4 marks

Poor example: The command verb is describe, the learner has not provided a description of the pathway of blood as it leaves the heart and to the body and lungs.

Question 12 addresses the structure of the cardiovascular system, topic D1.

One mark has been awarded for pulmonary artery flowing into lungs, because this is the only blood vessel referenced only one mark can be given.

TIPS!



These questions allow you to hit all the marks available, but you must ensure that you get everything in the correct order. Try practicing them by making a flow chart.

Question 13: State the function of the bicuspid valve.

[Total marks for Q13 – 1 mark]

13 State the function of the bicuspid valve.

~~It~~ It stops the blood that is entering the left ventricle from flowing backward into the left atrium.

Total for Question 13 = 1 mark

1

Good example: The command verb is State, learners are required to provide a definition or example of the function of the bicuspid valve.

Question 13 addresses the function of the bicuspid valve topic D1.

One mark has been awarded for stating the correct function of the bicuspid valve it prevents backflow between the LEFT ventricle and atrium.

13 State the function of the bicuspid valve.

To stop the blood entering the ventricles when they are full - it helps them contract to send the blood away.

Total for Question 13 = 1 mark

0

Poor example: The command verb is State, learners are required to provide a definition or example of the function of the bicuspid valve.

Question 13 addresses the function of the bicuspid valve topic D1.

The response needs to reference the LEFT side of the heart and also prevent backflow.



When you are given a specific part of the body ensure that you relate its function and be specific.

In this question if you answered it with prevents backflow between the ventricles and atrium, then that is not specific enough, you must reference that it prevents backflow between the LEFT ventricles and atrium.

Question 14: Describe the nervous control of the cardiac cycle.

[Total marks for Q14 – 4 marks]

14 Describe the nervous control of the cardiac cycle.

• The SA node transmits a signal to the AV node, which sends the impulse to the bundle of His then to the Purkinje fibres, ~~causing~~ which sends the impulse over the ventricles to cause the heart to contract.

4

Good example: The command verb is describe, the learner has provided a description of nervous control of the cardiac cycle.

Question 14 addresses nervous control of the cardiac cycle, topic D1.

The learner's answer contains four linked points, which provide a logical description of the nervous system responses to the cardiac cycle in the correct order.

Four marks have been awarded. One mark has been awarded for describing that the SA node transmits impulses, one mark for it traveling to the AV node, one mark for sending the impulse to the Bundle of His and the final mark awarded for to the Purkinje fibres.

Two marks have been awarded for the SA node transmits impulses and also the bundle of His, however the AV node is incorrect and needs to be the AV node and also reference to the Purkinje fibres is missing.

14 Describe the nervous control of the cardiac cycle.

SA node transmits electrical impulse to the AV node which travels down to bundle of His to cause the heart to contract.

2

Poor example: The command verb is describe, the learner has not fully provided a description of nervous control of the cardiac cycle

Question 14 addresses nervous control of the cardiac cycle, topic D1.

Two marks have been awarded one for the SA node transmits impulses and one for the bundle of his, however the NA node is incorrect and needs to be the AV node and also reference to the purkinje fibres is missing.



These questions allow you to hit all the marks available, but you must ensure that you get everything in the correct order. Try practicing them by making a flow chart.

Question 15a: Explain this change in Garcia's heart rate.

[Total marks for Q15a – 4 marks]

Garcia is a basketball player. The table shows Garcia's heart rate at rest and then 1 minute before taking part in basketball.

Resting Heart Rate (bpm)	Heart rate 1 minute before taking part in basketball (bpm)
70	80

15 (a) Explain this change in Garcia's heart rate.

4 marks

Adrenaline is released into the system due to anticipation. This therefore means more blood is pumped around the body, leading to an increased heart rate.

3

Good example: The command verb is explain, the learner has provided an explanation of how heart rate changes in relation to rest up to participation in performance.

Question 15 (a) addresses responses of the cardiovascular system in response to participation in exercise, topic D4, with the particular focus on anticipatory rise.

Three marks have been awarded for this response. One mark has been awarded for an identifying the anticipatory rise, one mark has been awarded for adrenaline is released into the system and the final mark awarded for it would increase the amount of blood pumped around the body.

To achieve the fourth mark the learner needed to explain that this was a result of increased stimulation of the sympathetic nervous system.

15 (a) Explain this change in Garcia's heart rate.

4 marks

Garcia's heart rate increases because he is undergoing physical activity. During the onset of exercise the muscles have a higher demand for oxygen and so the heart rate increases to increase the athlete's cardiac output which means more oxygen will be delivered to the working muscles.

1

Poor example: The command verb is explain, the learner has not provided an explanation of how heart rate changes in relation to rest up to participation in performance.

Question 15 (a) addresses responses of the cardiovascular system in response to participation in exercise, topic D4, with the particular focus on anticipatory rise.

This answer achieved one mark for stating more oxygen will be delivered to the working muscles. The learner has answered the wrong question the table shows heart rate 1 minute BEFORE exercise, but the learner has written the answer following commencement of exercise, therefore not addressing the anticipatory rise and adrenalin release as required.

TIPS!



If you are presented with a table it is important that you use it in relation to the sport provided in the question.

Question 15b: Explain why Garcia's resting heart rate has decreased.

[Total marks for Q15b – 3 marks]

Garcia has been taking part in basketball training for over 6 months. In this time Garcia's resting heart rate has dropped from 78bpm to 70bpm.

(b) Explain why Garcia's resting heart rate has decreased.

3 marks

As exercise provides hypertrophy meaning the heart is stronger, therefore can pump more blood in one beat. This means, in the long term, his heart is more efficient and doesn't require as many beats of blood out.

3

Good example: The command verb is explain, the learner has provided an explanation of why Garcia's heart rate has decreased following participation in a 6 month training programme.

Question 15 (b) is a continuation of Garcia the basketballer and addresses adaptations of the cardiovascular system in response to participation in exercise, topic D5.

A well constructed answer that achieves all three marks available. One mark has been awarded for an identifying that hypertrophy has occurred, two marks have been awarded for explaining that this would result in more blood being pumped per beat and therefore the heart would need to be less.

(b) Explain why Garcia's resting heart rate has decreased.

3 marks

Because ~~she~~ he has a better cardiac output as
his heart has increased in size and strength
As ~~she~~ he has gotten fitter, ~~she~~ he does not need as
much blood pumped to his working muscles. ~~she~~ he
has a quicker recovery time!

1

Poor example: The command verb is explain, the learner has not provided an explanation of why Garcia's heart rate has decreased following participation in a 6 month training programme.

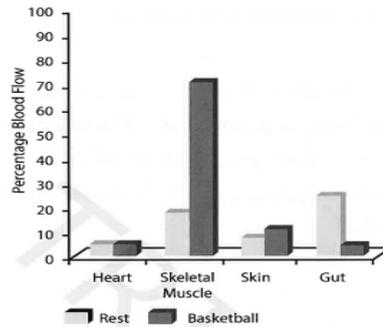
Question 15 (b) is a continuation of Garcia the basketballer and addresses adaptations of the cardiovascular system in response to participation in exercise, topic D5.

One mark has been awarded for this response for increased size and strength of heart, however the remainder of the answer is too vague, technical terminology should be used whenever possible, stating that due to hypertrophy there will be an increased stroke volume which will reduce resting heart rate because cardiac output remains the same.

Question 15c: Using the graph, analyse why the distribution of blood changes when playing basketball.

[Total marks for Q15c – 6 marks]

The graph shows the percentage distribution of Garcia's blood when he is at rest compared to when he is playing basketball.



4

(c) Using the graph, analyse why the distribution of blood changes when playing basketball.

6 marks

- The blood flow to the heart remains constant.
- The blood flow to the skeletal muscles increases a large amount, as the muscles contract during basketball and so need more blood to carry more oxygen to them.
- Blood flow to skin increases due to vasodilation, with the body sweating to improve loss of heat.
- Blood flow to the gut decreases as it is not important when playing basketball.

The command verb is analyse, the learner has provided an analysis to why blood is redistributed when participating in sport. An analysis requires learners to examine in detail in order to discover a theme or break something down into its components parts, in this case it is the adaptations of the cardiorespiratory system.

Question 15 (c) addresses the redirection of blood flow within Topic D4.

The question requires reference the graph and to analyse why blood flow changes in different parts of the body when participating in sport. It is written in a logical sequence which enables ease of reading. There is correct use of technical terminology.

The answer was awarded 4 marks and to achieve the extra 2 marks the learner needed to say that through an increased blood supply to the muscles then this would result in better removal of waste products. Also an expansion of the heart remaining constant to encompass that it would receive far more blood because it is pumping faster.

(c) Using the graph, analyse why the distribution of blood changes when playing basketball.

6 marks

Because when he plays basketball his blood is redirected to his working muscles as they need more oxygen to be able to carry on. Where as when you rest your gut needs the blood to digest your food. More oxygen which is carried in the blood needs to get to his muscles otherwise there will be a build up of lactic acid.

2

The command verb is analyse, the learner has not provided an analysis to why blood is redistributed when participating in sport. An analysis requires learners to examine in detail in order to discover a theme or break something down into its components parts, in this case it is the adaptations of the cardiorespiratory system.

Question 15 (c) addresses the redirection of blood flow within Topic D4.

This response only received 2 marks because it only referenced the redistribution of blood at the skeletal muscle, however it correctly analysed that this supports the process of removal of waste products. Further marks could have been awarded if the learner used the other information provided in the graph and discussed the gut, skin and heart following the start of exercise.

TIPS!



If a figure/picture or graph is given as a reference then you must ensure that you use it.



With analysis it is important that you answer the question rather than writing everything you know about the topic. Try underlining the focus of the question, that way you can keep referring back to it and make sure that you are answering it correctly.

Question 16: Explain why it is an advantage for long distance runners to have high numbers of mitochondria. [Total marks for Q16 – 2 marks]

16 Explain why it is an advantage for long distance runners to have high numbers of mitochondria.

Because mitochondria is the site of aerobic respiration, so the more mitochondria the more energy that can be produced allowing the runner to keep running

Total for Question 16 = 2 marks

2

Good example: The command verb is explain, the learner has provided an explanation of why it is an advantage for long distance runners to have high numbers of mitochondria.

Poor example: The command verb is explain, the learner has not provided an explanation of why it is an advantage for long distance runners to have high numbers of mitochondria.

Question 16 addresses the adaptations of the energy systems to exercise, topic E5, with the particular focus on the increased number of mitochondria.

Two marks have been awarded for explaining that more energy can be produced because the mitochondria is the site of aerobic respiration.

16 Explain why it is an advantage for long distance runners to have high numbers of mitochondria.

Mitochondria is where aerobic respiration takes place so that more energy can be used to run for longer.

1

Question 16 addresses the adaptations of the energy systems to exercise, topic E5, with the particular focus on the increased number of mitochondria.

One mark has been awarded for stating that by having more mitochondria then the athlete can run for longer because more energy can be used. Aerobic hydration is used rather than aerobic respiration therefore no marks can be awarded for this point.



When sports are used within the question, remember you need to use them with 'explain' questions because marks will be awarded for application.

Question 17: Describe the process of ATP production from carbohydrates through the aerobic energy system.

[Total marks for Q17 – 5 marks]

17 Describe the process of ATP production from carbohydrates through the aerobic energy system.

The carbohydrates under go glycolysis. This produces pyruvic acid which in the absence of O_2 is converted into Acetic coenzyme A. This then produces citric acid which then under goes kreb's cycle producing 2 ATP molecules & producing CO_2 . From kreb's cycle the electron transport chain occurs which produces water molecules but mainly is important for producing ^{another} 32 ATP molecules. In total the aerobic system produces 36 ATP molecules.

Total for Question 17 = 5 marks

4

Good example: The command verb is describe, the learner has provided a description of the process of ATP production from carbohydrates through the aerobic energy system.

Poor example: The command verb is describe, the learner has provided a description of the process of ATP production from carbohydrates through the aerobic energy system.

Question 17 addresses the aerobic energy system and in particular ATP production from carbohydrates topic E4.

The learners answer contains four linked points, which provide a logical description of the carbohydrate ATP production.

Four marks have been awarded for this response. One mark has been awarded for a describing that glucose is broken down through glycolysis, one mark for it enters the krebs cycle, one mark for onto the electron transport chain and the final mark awarded for water molecules produced as waste.

To achieve the final mark the learner needed to describe that carbohydrates are broken down into alucose.

17 Describe the process of ATP production from carbohydrates through the aerobic energy system.

carbohydrates are broken down in
the body then used to supply
the body with energy to take
part in ~~the~~ exercise.



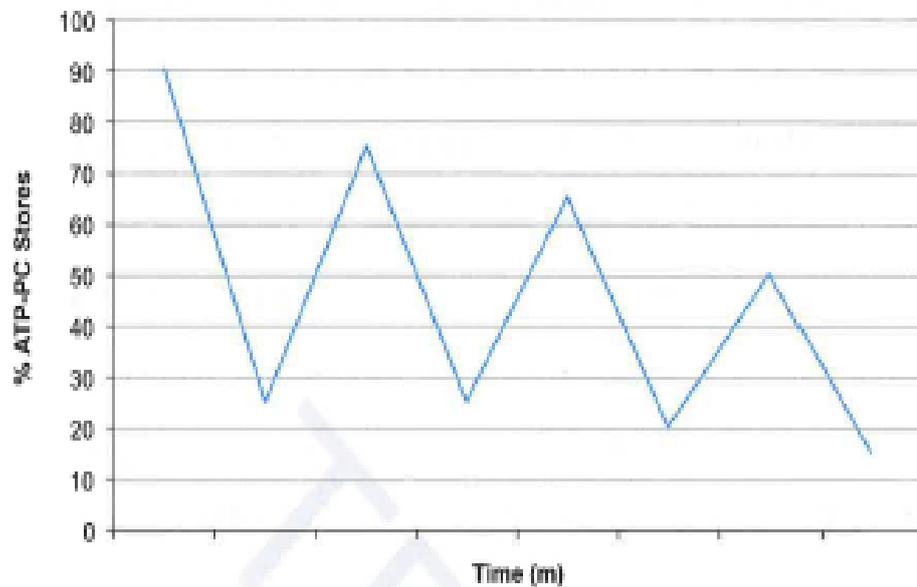
Question 17 addresses the aerobic energy system and in particular ATP production from carbohydrates topic E4.

The answer is not specific enough and achieved 0 marks, stating carbohydrates are broken down is not enough, the answer needed to say that they are broken down into glucose.

Question 18 Explain why competing in a hockey match has this effect on muscle ATP-PC stores.

[Total marks for Q18 – 3 marks]

The graph shows the ATP-PC stores in a performer's muscle whilst competing in a hockey match.



18 Explain why competing in a hockey match has this effect on muscle ATP-PC stores.

ATP-PC is used for short, quick bursts and are best suited to high intensity exercise. A hockey player may use it up when sprinting for the ball. As recovery for this only takes ten seconds they may rebuild it when jogging around the pitch before using it up when they have to sprint for the ball again.

2

Total for Question 18 = 3 marks

Good example: The command verb is explain, the learner has provided an explanation of the effects of participation in sport on the ATP-PC muscle stores.

Poor example: The command verb is explain, the learner has not provided an explanation of the effects of participation in sport on the ATP-PC muscle stores.

Question 18 addresses responses of the ATP-PC energy system in response to participation in exercise, topic E2.

Two marks have been awarded for this response, one mark through an implication of different intensities and one mark for allowing the body to recover/rebuild ATP.

To achieve the final mark the learner needs to state that the varying intensities in the game would require more energy to be produced.

The graph shows the ATP-PC stores in a performer's muscle whilst competing in a hockey match.



18 Explain why competing in a hockey match has this effect on muscle ATP-PC stores.

The ATP-PC stores don't have enough time to fully replenish, therefore the % of ATP-PC decreases every time it is used before it is fully replenished.

Total for Question 18 = 3 marks

Question 18 addresses responses of the ATP-PC energy system in response to participation in exercise, topic E2.

0 marks have been awarded for this response. There is little application to hockey and the graph has been incorrectly interpreted. The peaks demonstrate that there has been an increase in the % ATP-PC stores following periods of exertion, but this is not evident.

TIPS!



If you are presented with a table it is important that you use it in relation to the sport provided in the question.

Question 19: Evaluate the importance of the aerobic energy system for elite 100m sprinters in competition and training.

[Total marks for 19 – 6 marks]

19 Evaluate the importance of the aerobic energy system for elite 100m sprinters in competition and training.

The aerobic system is used predominantly for low intensity work over a long period of time and the 100m sprint is high intensity work over a short period of time, therefore it will use the ATP-PC system.

100m sprinters require an instant supply of energy and the aerobic system could not provide this quickly enough.

However, the aerobic system is important for a 100m sprinter because they need to recover after their race especially if they are running heats. The aerobic system will be used following the race to regenerate ATP so that they are ready again to perform and will be able to do so at the same intensity.

6

Good example: The command verb is evaluate, the learner has provided a detailed evaluation of the importance of the aerobic energy system for a 100m sprinter.

An evaluation requires learners to review information before bringing it together to form a conclusion or come to a judgement in relation to its context drawing on evidence and strengths and weaknesses, in this case it is the importance of the aerobic energy system for a 100m sprinter.

Poor example: The command verb is evaluate, the learner has provided a detailed evaluation of the importance of the aerobic energy system for a 100m sprinter.

An evaluation requires learners to review information before bringing it together to form a conclusion or come to a judgement in relation to its context drawing on evidence and strengths and weaknesses, in this case it is the importance of the aerobic energy system for a 100m sprinter.

Question 19 addresses the aerobic system in exercise and sport, within Topic E4. The question looks at the strengths and weaknesses of the aerobic energy system in relation to performance and recovery of a 100m sprinter.

This is a comprehensive and detailed answer that covers all requirements of the question.

The response achieved all six marks. It is written in a logical sequence with the weaknesses of the system followed by the strengths of the system, this enables ease of reading and therefore accessing the full marks. There is correct use of technical terminology.

19 Evaluate the importance of the aerobic energy system for elite 100m sprinters in competition and training.

100m only lasts a few seconds
so aerobic wouldn't be used during
event but might be in training
C-V system by running longer
distances.

1

Question 19 addresses the aerobic system in exercise and sport, within Topic E4. The question looks at the strengths and weaknesses of the aerobic energy system in relation to performance and recovery of a 100m sprinter.

This response has been awarded 1 mark. The answer provided only states that aerobic energy system will not be used because the event only lasts a few seconds. It is important to write specifically in terms of time frames 'only lasts 10 seconds' and when evaluating the learner needs to look at both sides to why the aerobic system is deemed important to a 100m sprinter and why it is not deemed important.



When evaluating it is important that you address both sides of the argument/theory/concept. If you don't then you will not be evaluating and therefore will never access all the marks available for the question.

Question 20: Analyse how adaptations to Suky's cardiorespiratory system could improve her marathon running performance. [Total marks for Q20 – 8 marks]

20 Analyse how adaptations to Suky's cardiorespiratory system could improve her marathon running performance.

Suky's cardiorespiratory systems refer to her cardiovascular and respiratory systems working together. Through her training for a marathon her body will make the following adaptations and these will have a positive affect on her marathon running performance.

There will be an increased capillarisation around the alveoli and skeletal muscle, this will result in ^{more} efficient gas exchange system and more oxygen can be diffused into the blood stream and more carbon dioxide can be removed from the blood, this will have an impact because more oxygen can be supplied to maintain energy production throughout the race.

The fact that more oxygen can be taken up at the lungs due to the increased capillarisation, then the more oxygen can be off loaded throughout the ^{race} ~~load~~ sustaining performance. The effect of this that it will improve Suky's $\dot{V}O_2$ max which will result in her having higher aerobic endurance capabilities to support her

8

END OF EXAM

Total for Question 20 = 8 marks
TOTAL FOR SECTION F = 8 MARKS
TOTAL FOR PAPER = 90 MARKS

through
the
race.

Good example: The command verb is analyse, the learner has provided an detailed analysis to how adaptations of the cardiorespiratory system could improve marathon running performance. An analysis requires learners to examine in detail in order to discover a theme or break something down into its components parts, in this case it is the adaptations of the cardiorespiratory system.

Poor example: The command verb is analyse, the learner has attempted an analysis to how adaptations of the cardiorespiratory system could improve marathon running performance. An analysis requires learners to examine in detail in order to discover a theme or break something down into its components parts, in this case it is the adaptations of the cardiorespiratory system.

Question 20 addresses the interrelationship between body systems. The question looks at the adaptations of the cardiorespiratory system and how this relates to marathon running performance. It is a synoptic answer so requires various points of the specification to be covered, in this case it is C6 and D5.

This is a comprehensive and detailed answer that covers all requirements of the question. It is written in a logical sequence. This enables ease of reading and therefore accessing the full marks. There is correct use of technical terminology.

This response has been awarded the full 8 marks, with the interrelationship of the cardiovascular and respiratory systems clearly made with the impact on performance. The systems are not addressed in isolation but the response clearly displays how they work together.

20 Analyse how adaptations to Suky's cardiorespiratory system could improve her marathon running performance.

It increases O_2 diffusion efficiency
It increases CO_2 / waste removal efficiency
Capillarisation near muscles
Increased ~~flow~~ O_2 delivery
Cardiac output increases, stroke volume
increases
Increases O_2 ~~carriage~~ carriage ability of
red blood cells
Larger mitochondria
Increased VO_2 max
Increases aerobic respiration capability
and efficiency
Less muscle fatigue, reduce ~~overall~~ OBLA

4

Question 20 addresses the interrelationship between body systems. The question looks at the adaptations of the cardiorespiratory system and how this relates to marathon running performance. It is a synoptic answer so requires various points of the specification to be covered, in this case it is C6 and D5.

Four marks have been awarded for this response, the learner has demonstrated accurate knowledge and understanding and a lot of the information provided is factually correct. However, the response becomes more of a list and does not really satisfy the command word in the question.

This final question will always test your ability to work synoptically and you will be expected to construct an answer that displays the interrelationship between at least two body systems, which the learner has not done.



The final question on the paper always relates to AO5, this is where you need to make links between body systems identified in the question in response to short-term and long-term exercise and sports participation, therefore this question is worth the most marks and should be your most comprehensive response.



Remember to make those links of the body systems clear, this is how you will score the best marks.

Unit 1: Anatomy and Physiology – sample marking grid

General marking guidance

- All learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Marking grids should be applied positively. Learners must be rewarded for what they have shown they can do, rather than be penalised for omissions.
- Examiners should mark according to the marking grid, not according to their perception of where the grade boundaries may lie.
- All marks on the marking grid should be used appropriately.
- All the marks on the marking grid are designed to be awarded. Examiners should always award full marks if deserved. Examiners should also be prepared to award zero marks, if the learner's response is not rewardable according to the marking grid.
- Where judgement is required, a marking grid will provide the principles by which marks will be awarded.
- When examiners are in doubt regarding the application of the marking grid to a learner's response, a senior examiner should be consulted.

Specific marking guidance

The marking grids have been designed to assess learner work holistically. Rows in the grids identify the assessment focus/outcome being targeted. When using a marking grid, the 'best fit' approach should be used.

- Examiners should first make a holistic judgement on which band most closely matches the learner's response and place it within that band. Learners will be placed in the band that best describes their answer.
- The mark awarded within the band will be decided based on the quality of the answer, in response to the assessment focus/outcome and will be modified according to how securely all bullet points are displayed at that band.
- Marks will be awarded towards the top or bottom of that band, depending on how they have evidenced each of the descriptor bullet points.

Question number	Answer	Mark
1	Award one mark for identifying how bones are used and one mark for justifying/rationalising that reason. Credit to a total of two marks. The bones allow for muscle attachment (1) which are required so muscles can pull on bones only to create movement (1).	(2)
2a	Award one mark for providing an example of a type of 'weight-bearing exercise', e.g. running (1).	(1)
2b	Award one mark for identifying why weight-bearing exercise would prevent worsening osteoporosis and up to two marks for justifying/rationalising that reason. Credit to a total of three marks. Weight-bearing exercise would stimulate the bones to take up minerals/calcium (1) and so reduce the rate of bone loss (1) helping to maintain bone mass by making the bones stronger/denser (1). Accept any other appropriate answer.	(3)

Question number	Indicative content	
3	<p>Answers will be credited according to the learner’s demonstration of knowledge and understanding of the material, using the indicative content and level descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers.</p> <p>Shape of synovial joints:</p> <ul style="list-style-type: none"> • determines range of movement, e.g. hinge joint at knee, the femur articulates with the tibia but allows movement in only one direction • hip ball and socket – flexion and abduction are occurring at the hip, to allow the legs to be moved upwards and outwards into the piked position shown • knee-hinge-extension of the leg at the knee, allows the gymnast to straighten the leg <p>Ankle-hinge-plantarflexion at the ankle, allows the gymnast to achieve the desired ‘form’, i.e. to point their toes.</p> <p>Synovial joint structure:</p> <ul style="list-style-type: none"> • ligaments hold bones of joint in place to stabilise joint • cartilage reduces the friction between the articulating surfaces so movement can be repeated many times, e.g. cartilage in the knee acts as a shock absorber to prevent collisions between the bones during training/practice sessions when the gymnast practises the movement, taking her body weight. 	
<p>Mark scheme (award up to 6 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.</p>		
Level	Mark	Descriptor
Level 0	0	No rewardable material.
Level 1	1–2	<ul style="list-style-type: none"> • Demonstrates isolated elements of knowledge and understanding. • Provides little or no reference to relevant movement at the synovial joints. • Generic statements may be presented, rather than linked factors/components being identified and explored in the context of the skeletal system. Limited attempt to address the question. • Response is likely to lack clarity, organisation and the required technical language.

Level	Mark	Descriptor
Level 2	3-4	<ul style="list-style-type: none"> • Demonstrates accurate knowledge and understanding. • References to relevant movement at the synovial joints are present. • Learners will identify linked factors/components, with some development in the form of mostly accurate and relevant factual material, leading to an analysis of the skeletal system in the context being presented. The accuracy in the detail on the factors identified is likely to vary. • The response may contain parts that lack clarity or proper organisation. Evidence of correct technical language being used.
Level 3	5-6	<ul style="list-style-type: none"> • Demonstrates accurate knowledge and understanding. • Sustained coverage of relevant movement at the synovial joints is present. Might demonstrate the ability to integrate and synthesise relevant information about the skeletal system. • A contextualised analysis of the skeletal system is developed using mostly coherent chains of reasoning, leading to a range of factors/components being present. Learners will demonstrate understanding of linkages and relationships between/within systems. • Response demonstrates good organisation, clarity and use of technical language.

Question number	Answer	Mark
4	<p>Award one mark for identifying a reason how weighted lunges would improve sporting performance and up to two additional marks for justifying/rationalising that reason. Credit to a total of three marks.</p> <p>Improves leg strength (1) which allows for more force to be generated (1) to be able to jump higher (when performing the high jump) (1).</p>	(3)
5a	<p>Award one mark for stating why training may cause DOMS.</p> <p>Micro-tears of muscle fibres (1).</p> <p>Accept other appropriate responses.</p>	(1)
5b	<p>Award up to two marks for explanation of how muscle adaptation occurs as a result of strength training. Credit to a total of two marks.</p> <p>Muscular hypertrophy occurs (1) as the short-term damage stimulates muscle growth (1).</p>	(2)
6	<p>Award one mark for valid reason for choice of athlete and up to three additional marks for justifying/rationalising the choice of that athlete. Credit to a total of four marks.</p> <p>The athlete with the highest percentage/70% of Type 1 muscle fibres (1) as these utilise the aerobic energy system (1) therefore they are resistant to fatigue (1) and enable continuous contraction to meet the demands of the event (1).</p> <p>Accept other appropriate responses.</p>	(4)

Question number	Indicative content
7	<p>Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and level descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers.</p> <p>A First phase of preparation (racquet back, elbow flexed)</p>

	<ul style="list-style-type: none"> • Biceps are the agonists and contract concentrically to flex the elbow. • Triceps are the antagonist and relax to permit contraction of the agonist. • Shoulder horizontal extension. • Deltoids are the agonist and contract concentrically to horizontally flex the shoulder. • Latissimus dorsi are the antagonist and relax to permit contraction of the agonist. <p>B Execution phase (racquet through, elbow extended)</p> <ul style="list-style-type: none"> • Biceps are the antagonists and relax to permit contraction. • Triceps are the agonist and contract to extend the elbow. • Shoulder horizontal flexion. • Deltoids are the antagonist and relax to permit contraction of agonist. • Pectorals are the agonist and contract to produce horizontal flexion.
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Mark scheme (award up to 6 marks) refer to the guidance on the cover of this document for how to apply levels- based mark schemes*.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	<ul style="list-style-type: none"> • Demonstrates isolated elements of knowledge and understanding. • Provides little or no reference to relevant movement, possibly as a result of antagonistic muscle pair action. • Generic statements may be presented, rather than linked factors/components being identified and explored in the context of the muscular system. Limited attempt to address the question. • Response is likely to lack clarity, organisation and the required technical language.
Level 2	3–4	<ul style="list-style-type: none"> • Demonstrates accurate knowledge and understanding. • References to relevant antagonistic muscle action are present. • Learners will identify linked factors/components with some development in the form of mostly accurate and relevant factual material, leading to an analysis of the muscular system in the context being presented. The accuracy in the detail on the factors identified is likely to vary. • The response may contain parts that lack clarity or proper organisation. Evidence of correct technical language being used.
Level 3	5–6	<ul style="list-style-type: none"> • Demonstrates accurate knowledge and understanding. • Sustained coverage of antagonistic muscle action is present. Might demonstrate the ability to integrate and synthesise relevant information about the muscular system. • A contextualised analysis of the muscular system is developed, using mostly coherent chains of reasoning, leading to a range of factors/components being present. Learners will demonstrate understanding of linkages and relationships between/within systems. • Response demonstrates good organisation, clarity and use of technical language.

Question number	Answer	Mark
8	Award one mark for identifying that tidal volume would increase and up to two additional marks for justifying/rationalising why there is this increase in tidal volume. Credit to a total of three marks.	(3)

	<p>Yannick's tidal volume would increase (1) because during exercise a person has to take in more air (1). They take in more air as they need more oxygen to provide energy for their working muscles (1). Accept other appropriate responses.</p>	
9	<p>Award up to three marks for explanation of the role of carbon dioxide in the chemical control of breathing during exercise. Excess carbon dioxide is produced as a waste product of respiration (1). This excess carbon dioxide is detected by chemoreceptors (1) which increase the rate/depth of breathing (1).</p>	(3)
10	<p>Award up to four marks for explanation of how respiratory muscle strength can improve endurance. Allows respiratory muscles to contract more forcefully (1) resulting in the ability to take a greater quantity of air into the lungs (1) in order to keep pace with the body's increase in demand for oxygen/removal of carbon dioxide (1) (which allows the body to keep cycling for prolonged periods of time) due to an increased vital capacity (1).</p>	(4)

Question number	Indicative content	
11	<p>Answers will be credited according to the learner’s demonstration of knowledge and understanding of the material, using the indicative content and level descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers.</p> <p>Negative:</p> <ul style="list-style-type: none"> • exercise induced asthma/asthma attack • wheezing whilst breathing and coughing • feeling of tightness in the chest • inflamed bronchi • narrowed airways • reduction in the amount of air able to get into the lungs. <p>Positive:</p> <ul style="list-style-type: none"> • the air breathed in while swimming is warm and moist • reducing the chance of an asthma attack • exercise strengthens the respiratory muscles • increase in vital capacity • helps to reduce the effects of asthma. 	
<p>Mark scheme (award up to 6 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.</p>		
Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	<ul style="list-style-type: none"> • Demonstrates isolated elements of knowledge and understanding. • Provides little or no reference to relevant physiological effects. • Generic assertions may be presented. Limited attempt to address the question. • Response is likely to lack clarity, organisation and the required technical language.
Level 2	3–4	<ul style="list-style-type: none"> • Demonstrates accurate knowledge and understanding. • Line(s) of argument occasionally supported through the application of relevant references to physiological effects. • Discussion is partially developed, but is likely to be imbalanced. Learners will produce statements with some development in the form of mostly accurate and relevant factual material. • The response may contain parts that lack clarity or proper organisation. Evidence of correct technical language being used.

Level	Mark	Descriptor
Level 3	5-6	<ul style="list-style-type: none"> • Demonstrates accurate knowledge and understanding. • Line(s) of argument supported throughout by sustained application of relevant references to physiological effects. • Displays a well-developed and logical balanced discussion, containing logical chains of reasoning. Demonstrates an awareness of competing arguments. • Response demonstrates good organisation, clarity and use of technical language.

Question number	Answer	Mark
12	<p>Answers should contain four linked points, which in combination provide a logical description of the pathway of blood flow, identifying each major blood vessel in the correct order.</p> <ul style="list-style-type: none"> • Blood flows from the aorta to the body (1) • it then travels through the vena cava back to the heart (1) • then flows through the pulmonary artery to the lungs (1) • and back to the heart by the pulmonary vein (1). <p>Accept other appropriate answers that fit into logical order/sequence.</p>	(4)
13	<p>Award one mark for function of bicuspid valve. To prevent back flow of blood between (left) ventricle and atrium.</p>	(1)
14	<p>Answers should contain four linked points, which in combination provide a logical description of the nervous system responses to the cardiac cycle in the correct order.</p> <ul style="list-style-type: none"> • The Sino Atrial Node (SAN) transmits impulses (1) • to the Atrio Ventricular Node (AVN) (1). • The impulse then travels down the bundle of His (1) • to the Purkinje Fibres (1). <p>Accept other appropriate answers that fit into logical order/sequence.</p>	(4)

Question number	Answer	Mark
15a	<p>Award one mark for identifying the anticipatory rise and up to three additional marks for justifying/rationalising why there is this increase. Credit to a total of four marks.</p> <p>Before Garcia takes part in exercise there will be an anticipatory rise in his heart rate (1). This is because adrenalin is released in the blood (1) which has the effect of increasing the heart rate via the sympathetic nervous system (1). This increases oxygen/energy delivery to the muscles (1).</p> <p>Accept any other appropriate answer.</p>	(4)
15b	<p>Award one mark for identifying why Garcia's heart rate has decreased and up to two additional marks for justifying/rationalising why there is this decrease. Credit to a total of three marks.</p> <p>The size of his heart muscle will have increased/training would have resulted in cardiac hypertrophy (1), which means each time his heart contracts it will be able to pump out more blood/there is an increased stroke volume at rest (1) so the heart does not need to contract as many times to produce the same cardiac output as before training (1).</p> <p>Accept any other appropriate answer.</p>	(3)

Question number	Indicative content	
15c	<p>Answers will be credited according to the learner’s demonstration of knowledge and understanding of the material, using the indicative content and level descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers.</p> <ul style="list-style-type: none"> • Vasoconstriction to areas where blood is not required and vasodilation to areas where blood is required, which results in increased blood flow to skeletal muscle • More blood is required to supply oxygen and nutrients to working muscles. • Increased blood supply to remove waste products. • Increased blood flow to the skin for thermoregulation to cool the body via evaporation of sweat. • Less blood flow to the gut, as the focus during exercise is for increased blood flow to support the body with movement rather than digestion. • Same percentage of blood to the heart at rest and during exercise. However, the heart is working harder during exercise and as such, it will in fact receive more blood as the cardiac output increases. It requires more blood as it is pumping faster during exercise so will need more oxygen and nutrients than when at rest. 	
<p>Mark scheme (Award up to 6 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.</p>		
Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	<ul style="list-style-type: none"> • Demonstrates isolated elements of knowledge and understanding. • Provides little or no reference to distribution of blood. • Generic statements may be presented, rather than linked factors/components being identified and explored in the context of the cardiovascular system. Limited attempt to address the question. • Response is likely to lack clarity, organisation and the required technical language.
Level 2	3–4	<ul style="list-style-type: none"> • Demonstrates accurate knowledge and understanding. • References to relevant blood distribution during rest and exercise are present. • Learners will identify linked factors/components, with some development in the form of mostly accurate and relevant factual material, leading to an analysis of the cardiovascular system in the context being presented. The accuracy in the detail on the factors identified is likely to vary. • The response may contain parts that lack clarity or proper organisation. Evidence of correct technical language being used.

Level	Mark	Descriptor
Level 3	5-6	<ul style="list-style-type: none"> • Demonstrates accurate knowledge and understanding, • Sustained coverage of distribution of blood during rest and exercise is present. Might demonstrate the ability to integrate and synthesise relevant information about the cardiovascular system. • A contextualised analysis of the cardiovascular system is developed using mostly coherent chains of reasoning leading to a range of factors/components being present. Learners will demonstrate understanding of linkages and relationships between/within systems. • Response demonstrates good organisation, clarity and use of technical language.

Question number	Answer	Mark
16	<p>Award one mark for identifying why it is an advantage and one mark for justifying/rationalising that reason. Credit to a total of two marks.</p> <p>The more mitochondria they have the more energy can be generated (1) because mitochondria are the site for aerobic respiration (1).</p> <p>Accept other appropriate answers.</p>	(2)
17	<p>Answers should contain five linked points which in combination provide a logical description of the process of carbohydrate ATP production through the aerobic energy system.</p> <ul style="list-style-type: none"> • Carbohydrates are broken down into glucose (1). • Glucose is broken down through glycolysis (1). • The substrate then goes into the Krebs cycle (1). • Then enters the electron transport chain (1). • Waste products produced are water and carbon dioxide (1). <p>Accept other appropriate answers that fit into logical order/sequence.</p>	(5)
18	<p>Award one mark for identifying that there is varying intensity and up to two additional marks for justifying/rationalising how that variation in intensity would affect the ATP-PC stores in the way shown. Credit to a total of three marks.</p> <p>Hockey has this effect, as it has periods of work alternating with periods of recovery (1). Therefore, the energy demands during the game vary in line with the intensity (1), accounting for the opportunity for the body to replace some of the ATP-PC stores (1).</p> <p>Accept other appropriate answers.</p>	(3)

Question number	Indicative content	
19	<p>Answers will be credited according to the learner’s demonstration of knowledge and understanding of the material, using the indicative content and level descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers.</p> <p>Why aerobic system might not be considered important</p> <ul style="list-style-type: none"> • Aerobic energy system is used for low intensity work, 100 m sprint is high intensity exercise. • Aerobic energy system used for working over a long duration, 100 m sprint is of short duration/elite performers complete around 10 s • Aerobic energy system is typically used by endurance athletes, 100 m sprinters are power athletes. • 100 m needs energy to be available instantly • Aerobic energy system would not be able to provide energy quickly enough therefore anaerobic energy system would be used during the activity. <p>Why aerobic system might be considered important</p> <ul style="list-style-type: none"> • Elite performers often have to complete more than one heat in one day • Therefore they need to recover before the next race. • The aerobic energy system can be used to regenerate ATP. • To regenerate PC stores. • So that the 100 m runner can perform again at the same intensity as before in the next heat. • 100 m runner will not train aerobic energy pathways, therefore they will not be as efficient as that of an endurance athlete but they will still provide energy for recovery, either during ‘heats’ in competitions or in training sessions. 	
<p>Mark scheme (award up to 6 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.</p>		
Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	<ul style="list-style-type: none"> • Demonstrates isolated elements of knowledge and understanding. • Provides little or no reference to relevant effects of aerobic energy system on 100 m sprinters. • A conclusion may be presented, but will be generic and the supporting evidence will be limited. Limited attempt to address the question. • Response is likely to lack clarity, organisation and the required technical language.

Level	Mark	Descriptor
Level 2	3-4	<ul style="list-style-type: none"> • Demonstrates accurate knowledge and understanding. • Line(s) of argument occasionally supported through the application of relevant references to aerobic energy systems and the 100 m. • Judgement is made from a partially-developed discussion, although the discussion may be imbalanced or superficial. Learners will produce statements with some development in the form of mostly accurate and relevant factual material leading to a conclusion being presented. • The response may contain parts that lack clarity or proper organisation. Evidence of correct technical language being used.
Level 3	5-6	<ul style="list-style-type: none"> • Demonstrates accurate knowledge and understanding. • Line(s) of argument supported throughout by sustained application of relevant references to aerobic energy systems and 100 m. Might demonstrate the ability to integrate and synthesise relevant systems. • Arrives at a supported judgement from a well-developed and logical balanced discussion, containing logical chains of reasoning. Demonstrates an awareness of competing arguments using them to reach a valid conclusion. • Response demonstrates good organisation, clarity and use of technical language.

Question Number	Indicative content
20	<p>Answers will be credited according to the learner’s demonstration of knowledge and understanding of the material, using the indicative content and level descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers.</p> <p>Cardiorespiratory system</p> <ul style="list-style-type: none"> • The increased capillarisation around the alveoli. • Increased diffusion rate of oxygen into the blood stream. • Increased removal of carbon dioxide and waste products out of the blood stream. • Therefore, more oxygen can be supplied to sustain energy production during the marathon. • Increased removal of waste products over a sustained period of time. • Capillarisation of skeletal muscle and alveoli, so that blood has more contact time with oxygen in the lungs. • Thus, more oxygen can be taken up and it also has more contact time with the muscles so more oxygen can be offloaded. • These both help to increase a person’s VO₂ max. • An increased VO₂ max means that they have higher aerobic endurance which is required in order to run a marathon.

Mark scheme (award up to 8 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.

Level	Mark	Descriptor
Level 0	0	No rewardable material.
Level 1	1–2	<ul style="list-style-type: none"> – Demonstrates isolated elements of knowledge and understanding. – Provides little or no reference to interrelationships of the relevant body systems. – Generic statements may be presented, rather than linked factors/components being identified and explored in the context of the body systems mentioned. Limited attempt to address the question. – Response is likely to lack clarity, organisation and the required technical language.
Level 2	3–4	<ul style="list-style-type: none"> – Demonstrates accurate knowledge and understanding but may contain lapses. – References to relevant interrelationships between the body systems are present. – Learners will identify linked factors/components, with some development in the form of mostly accurate and relevant factual material, leading to an analysis of the body systems in the context being presented. The accuracy in the detail on the factors identified is likely to vary. – The response may contain parts which lack clarity or proper organisation. Evidence of correct technical language being used.
Level	Mark	Descriptor
Level 3	5–6	<ul style="list-style-type: none"> – Demonstrates accurate knowledge and understanding. – Sustained coverage of interrelationships between the body systems is present. Might demonstrate the ability to integrate and synthesise relevant information systems. – A contextualised analysis of the interrelationships between systems is developed using mostly coherent chains of reasoning, leading to a range of factors/components being present. Learners will demonstrate understanding of linkages and relationships

		<p>between/within systems.</p> <ul style="list-style-type: none"> - The response demonstrates clarity, organisation and the correct use of technical language.
Level 4	7-8	<ul style="list-style-type: none"> - Demonstrates accurate and thorough knowledge and understanding. - Sustained coverage of interrelationships between the body systems is present. Demonstrates the ability to integrate and synthesise relevant systems. - Displays a well-developed contextualised analysis of the interrelationships between systems, containing logical chains of reasoning throughout. Learners demonstrate thorough understanding of linkages between/within systems - Response demonstrates good organisation and clarity.