Examiner's Report
Principal Examiner Feedback

Summer 2018

Pearson Edexcel GCE
In Physical Education (8PE0/01)
Component 1: Scientific Principles of Physical Education

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

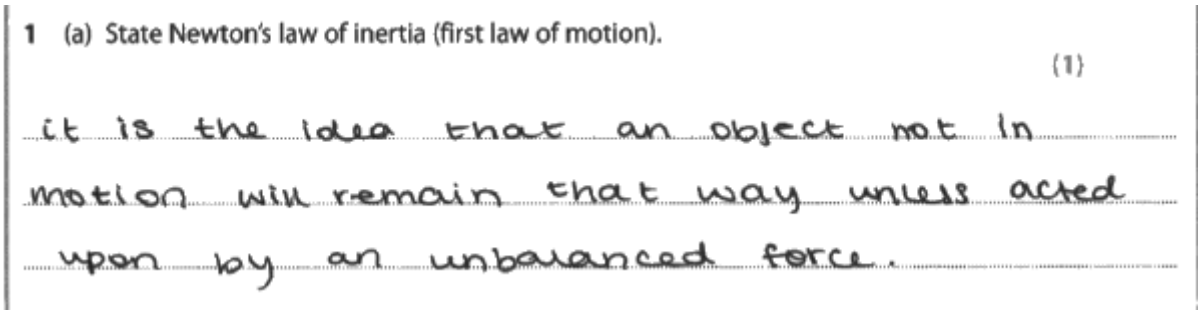
Summer 2018
Publications Code 8PE0_01_1806_ER

Introduction

Overall, this paper was better answered than last year with candidates showing a far better understanding of the use of command words. However, candidates still need to ensure that answers are linked in all "explain "questions. There was far less coverage of the new topic areas but centres need to ensure they are covering these new topics in good detail, especially where new language and terminology are concerned. Candidates still struggled to score in the top band with the extended questions and centres are encouraged to ensure candidates answer these questions covering a wide range of points with some analysis/evaluation of each point discussed. In particular, the asterixed (*) question should cover all aspects of the specification and not just focus on physiological aspects. Centres are also encouraged to make good use of the topic guides and the online magazine Inside Track which ensures candidates are kept up to date with current thinking as well as good exam tips and detailed information on various topics.

8PE0_01_Q01(a)

Candidates must be familiar with all three of Newton's laws and how they apply to sport. Key language that needs to be used in this topic area is the use of force. This law was known by most candidates and was well explained.



1 (a) State Newton's law of inertia (first law of motion).

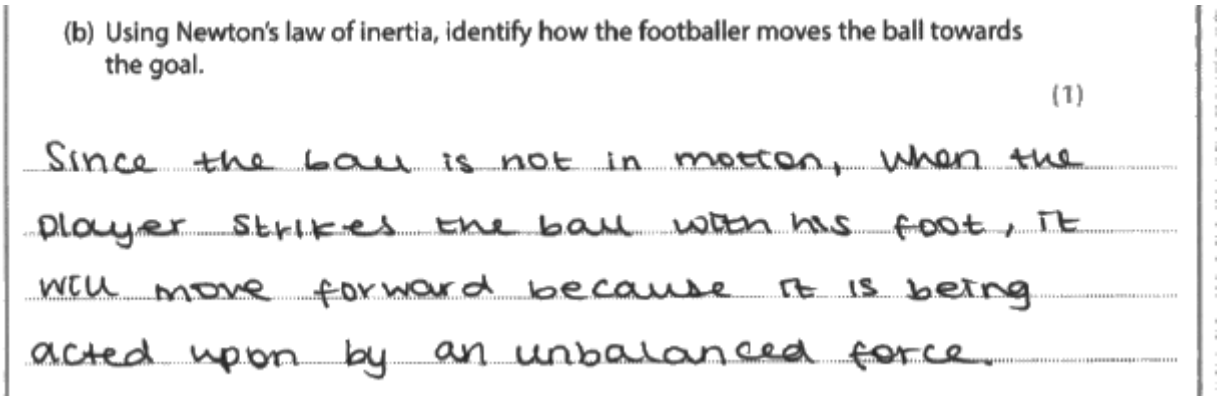
(1)

it is the idea that an object not in motion will remain that way unless acted upon by an unbalanced force.

This candidate is able to provide an accurate description and therefore receives one mark.

8PE0_01_Q01(b)

Again, the key word needed here was the use of force. Candidates must learn the laws and be able to provide sporting examples to illustrate their application.



(b) Using Newton's law of inertia, identify how the footballer moves the ball towards the goal.

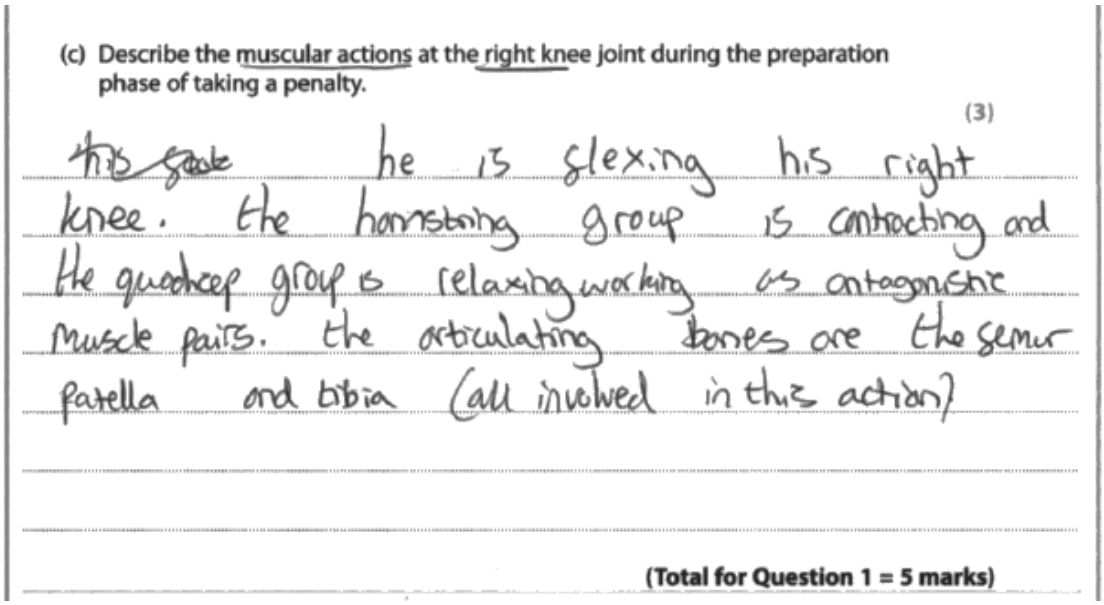
(1)

Since the ball is not in motion, when the player strikes the ball with his foot, it will move forward because it is being acted upon by an unbalanced force.

This candidate is clear in their application of force to the ball and therefore receives one mark.

8PE0_01_Q01c

Candidates must be familiar with all the muscles and joint actions detailed in the specification. Centres should spend time ensuring that candidates are able to analyse movement at each of the joints specified. Candidates need to ensure the correct terminology is used in movement analysis. E.g. no marks will be awarded for "bending" – it must be flexion. This question also clearly stated the preparation phase, so this is the only movement that would gain credit.



(c) Describe the muscular actions at the right knee joint during the preparation phase of taking a penalty.

(3)

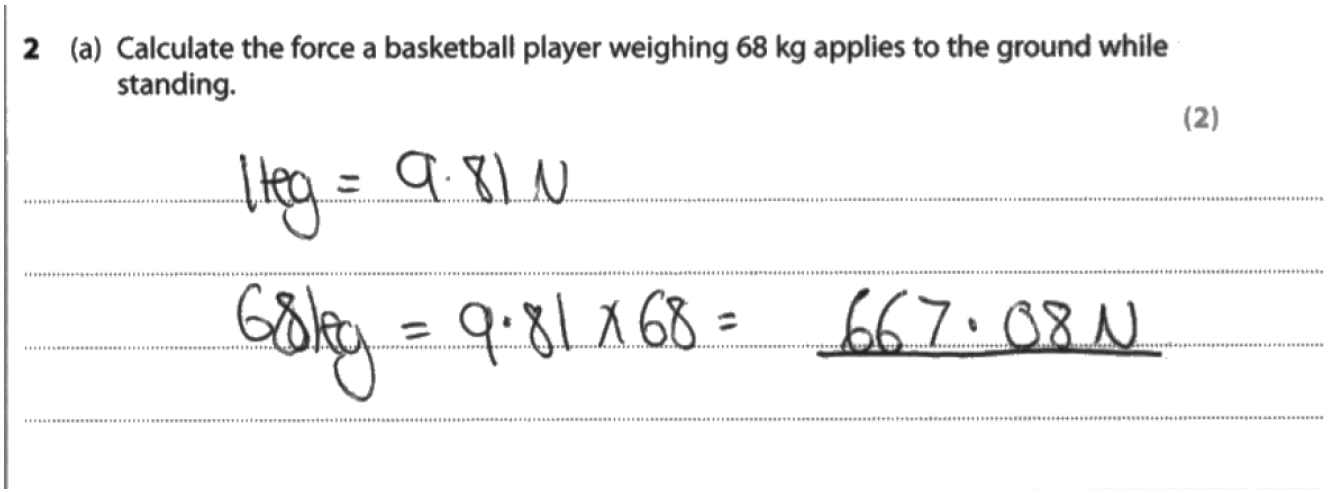
this time he is flexing his right knee. the hamstring group is contracting and the quadricep group is relaxing working as antagonistic muscle pairs. the articulating bones are the femur patella and tibia (all involved in this action)

(Total for Question 1 = 5 marks)

This candidate clearly describes the action at the knee joint including the relevant muscles and resulting action and scores three marks.

8PE0_01_Q02(a)

Candidates need to be familiar with all the formulae that may be used in calculation questions, and the unit of measurement. In the specification, 9.81 N is clearly stated as the force of gravity and this should be the value used in any calculation.


2 (a) Calculate the force a basketball player weighing 68 kg applies to the ground while standing.

(2)

1kg = 9.81 N

68kg = 9.81 x 68 = 667.08 N

This candidate identifies the formula with a clear explanation of the working out and scores maximum 2 marks.

8PE0_01_Q02(b)

Candidates must be familiar with all three of Newton's laws and how they apply to sport. Key language that needs to be used in this question is the use of force and the equal reaction. This law was known by most candidates and was well explained.

(b) Using Newton's law of action and reaction (third law), describe how the basketball player uses this force to perform a jump shot.

3rd (2)

Newton's law states that any force exerted, will have an equal and opposite reaction. The basketball player will bend their legs and exert force onto the ground, ~~the~~ according to Newton's laws, the ground exerts the same force and pushes the player up, to jump and get enough power on the shot.

(Total for Question 2 = 4 marks)

This candidate shows a clear understanding that pushing on the ground results in the same but equal force being applied back by the ground.

8PE0_01_Q03(a) and (b)

Definition questions require candidates to know key terms as outlined in the glossary in the specification. Centres should ensure that candidates know these well and should regularly refer to both the glossary and the topic guides on the website. Many candidates referred to both acting as stabilisers but were vague on what was being stabilised.

3 Define the following terms:

(a) synergist

(1)

The synergist is ~~the~~ a muscle that stabalizes the joint that the prime mover acts on.

(b) fixator.

(1)

The fixator is the muscle that stabalizes the bone that the prime mover originates.

(Total for Question 3 = 2 marks)

This candidate has clearly spent some time learning the definitions from the glossary and scores maximum marks.

8PE0_01_Q04(a)

Most candidates gave a clear definition of bradycardia. However, some candidates gave a description of it rather than a definition and therefore gained no mark. The question clearly states the command word define.

4 (a) Define the term 'bradycardia'.

(1)

When your resting heart rate falls below 60bpm as a result of training

4 (a) Define the term 'bradycardia'.

(1)

Bradycardia is the growing / strengthening of the heart.

In the first example, the candidate is very clear on the definition of bradycardia. In the second example, the candidate clearly knows what bradycardia is but has not stated that the resting heart rate is below 60 bpm and so scores no mark.

8PE0_01_Q04(b)

Most candidates were able to identify adaptations that occurred and explain the impact. Candidates needed to link their points in order to gain marks. Most candidates were able to identify multiple links involving the adaptations to the heart.

(b) Explain how 'bradycardia' occurs.

(3)

prolonged aerobic training leads to ~~cardiac hyperto~~ Cardia hypertrophy when the heart muscle gets bigger. This increases the contractility of the myocardium resulting in a stronger force of contraction during left ventricular systole. This would increase stroke volume and venous return so more blood being pumped out of the left ventricle of the heart so then heart rate will decrease to maintain cardiac output. An example would be a marathon runner who does aerobic training consistently.

(Total for Question 4 = 4 marks)

(b) Explain how 'bradycardia' occurs.

(3)

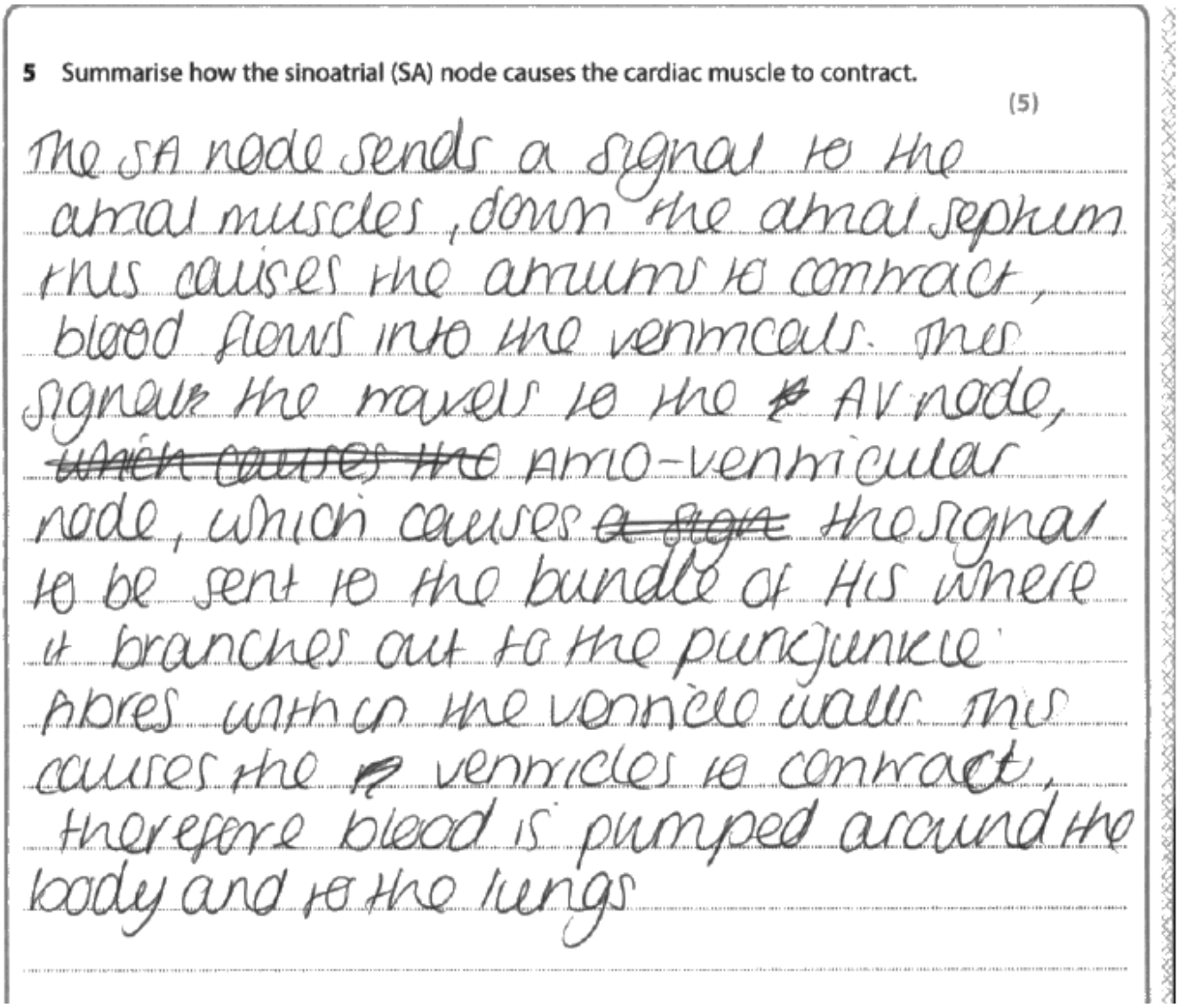
Bradycardia occurs when someone has been excercising for a long time or extensively. It is a long-term adaptation to exercise. It occurs by the working muscles, continuosly needing an ~~high~~ increased amount of blood to get oxygen to the muscles, so by the body needing a higher amount of blood, even more blood is inevitably going to travel through the heart so it will increase in size

(Total for Question 4 = 4 marks)

In the first example, the candidate clearly links their points together using the word “so” and “resulting” and scores 3 marks. In the second example there is only a very tentative link between exercising and a growth in heart size, scoring 1 mark. This could have been clarified further by saying the long-term aerobic training.

8PE0_01_Q05

This question asked candidates to summarise the cardiac muscle contraction. Candidates were expected to discuss the role of the SA Node and the AV node in the contraction of the atria and the ventricles. Candidates tended to either answer this question extremely well, showing excellent knowledge of the different phases or display limited knowledge of the language expected. Candidates must be able to name the phases but also describe what happens in each phase.



5 Summarise how the sinoatrial (SA) node causes the cardiac muscle to contract.

(5)

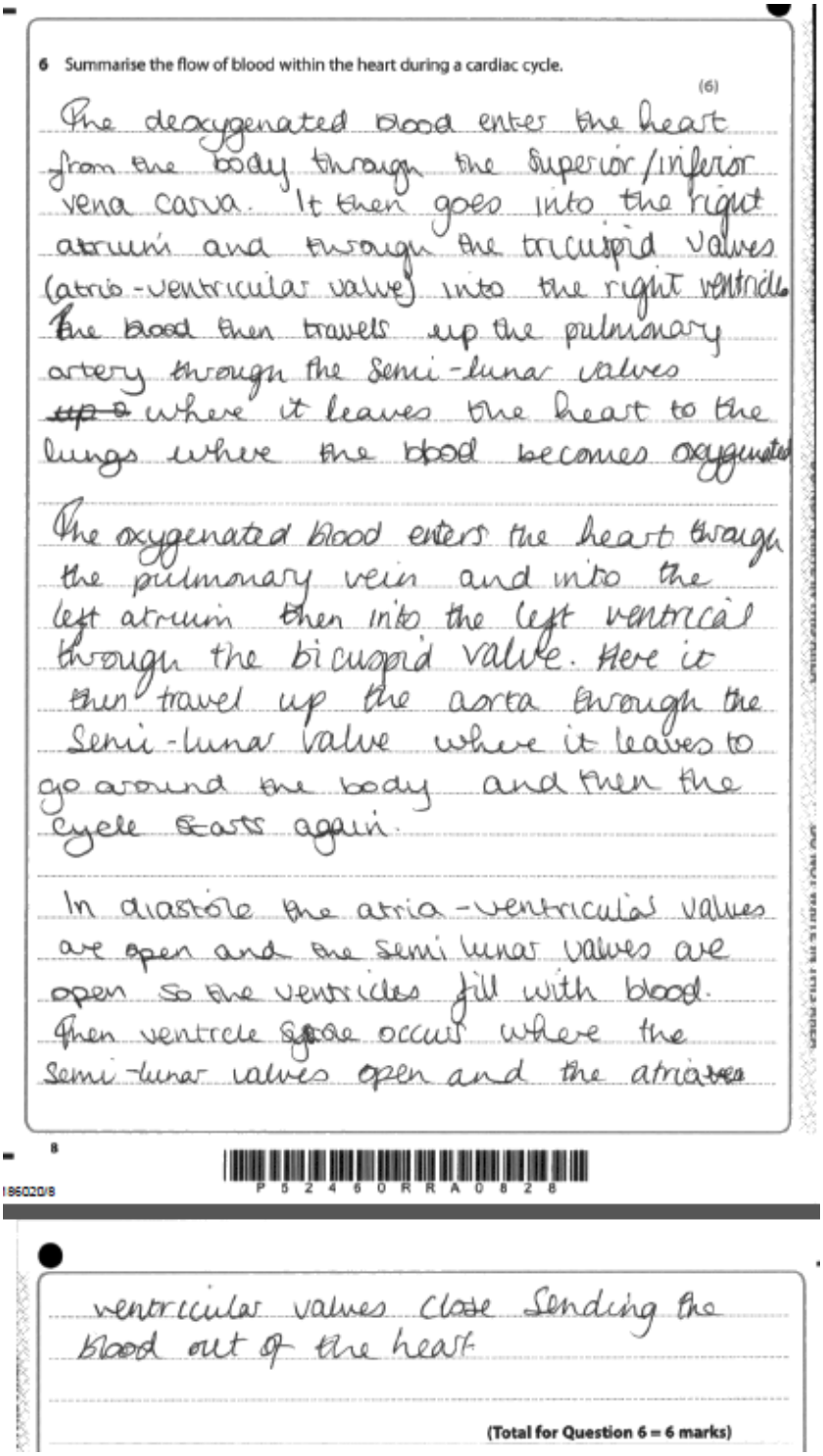
The SA node sends a signal to the atrial muscles, down the atrial septum this causes the atriums to contract, blood flows into the ventricals. The signal the travels to the AV node, ~~which causes the~~ atrio-ventricular node, which causes ~~a signal~~ the signal to be sent to the bundle of His where it branches out to the purkinje fibres within the ventricle walls. This causes the ventricles to contract, therefore blood is pumped around the body and to the lungs

In the first example, the candidate shows excellent knowledge going through the contraction step by step and gaining maximum 5 marks.. In the second example,

the candidate shows some knowledge of the process but gives no specific detail as to what is happening.

8PE0_01_Q06

This question asked specifically about the flow of blood. A number candidates discussed the four phases of contraction and still managed to gain some marks, but the discussions lacked the detail expected about the difference between the left side and the right side of the heart and the various structures involved. Centres should encourage candidates to learn the flow of blood from any starting point in the heart e.g. the left atrium and then to read any question carefully as it may state a different starting point! Some answers were particularly confusing,



6 Summarise the flow of blood within the heart during a cardiac cycle.

(6)

The deoxygenated blood enter the heart from the body through the superior/inferior vena cava. It then goes into the right atrium and through the tricuspid valves (atrio-ventricular valve) into the right ventricle. The blood then travels up the pulmonary artery through the semi-lunar valves ~~up~~ where it leaves the heart to the lungs where the blood becomes oxygenated

The oxygenated blood enters the heart through the pulmonary vein and into the left atrium then into the left ventrical through the bicuspid valve. Here it then travel up the aorta through the semi-lunar valve where it leaves to go around the body and then the cycle starts again.

In diastole the atria-ventricular values are open and the semi lunar values are open so the ventricles fill with blood. Then ventricle ~~s~~ase occur where the semi-lunar values open and the atriaves

8

I86020/8

P 5 2 4 6 0 R R A 0 8 2 8

ventricular values close sending the blood out of the heart

(Total for Question 6 = 6 marks)

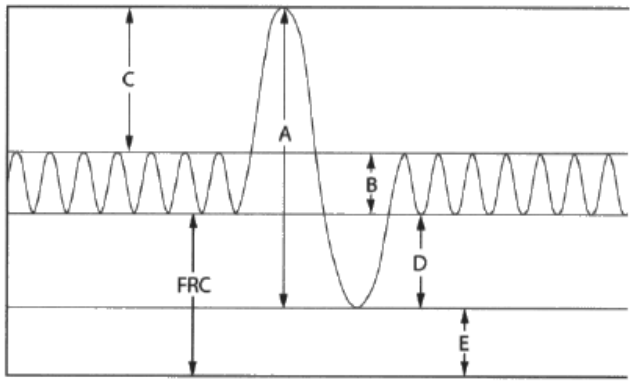
showing no clear understanding of what happened in each side of the heart with valves, chambers and structures all mixed up.

In this example, the candidate gives a clear description of the blood flow through the heart naming all the correct structures and valves and easily scored the maximum 6 marks.

8PE0_01_Q07a

Candidates need to know the correct names of all the lung volumes and be able to spell them correctly. Only the correct terminology will be accepted so it is important for candidates to know the correct names and be able to describe the importance of each.

7 (a) Name the respiratory volumes labelled A to E in Figure 2.



(Source: Modified from Lung Volume By Vihsadas at en.wikipedia (Transferred from en.wikipedia) [Public domain], from Wikimedia Commons)

Figure 2

(i) A

(1)

Vital capacity.

(ii) B

(1)

Tidal volume.

(iii) C

(1)

Inspiratory ~~reserve~~ reserve & volume.

(iv) D

(1)

Expiratory ~~reserve~~ reserve volume.

(v) E

(1)

Residual volume

Although some knowledge shown, this candidate has not used the correct terminology and only scores 1 mark for Tidal Volume.

8PE0_01_Q07b

In addition to knowing the correct names. Candidates should also be able to define each volume as stated in the glossary. Formulae are an acceptable way of defining volumes and may be an easier way to learn.

(b) Define the terms:

(i) functional residual capacity

(1)

The is the amount volume of air in your lung, following one maximal expiration

(ii) total lung capacity.

(1)

This is your residual volume added with your viral capacity

(Total for Question 7 = 7 marks)

In the first example the candidate repeats the definition from the glossary in part i) and uses the formula to correctly define TLC in part ii). Abbreviations were also accepted for this e.g. VC + RV.
In the second example the candidate correctly identifies the volume through description.

(ii) total lung capacity.

(1)

this is the total amount of ~~lung~~ air in the lungs after maxim inspiration.

(Total for Question 7 = 7 marks)

8PE0_01_Q08

This question referred specifically to both muscle cells and anaerobic training. In

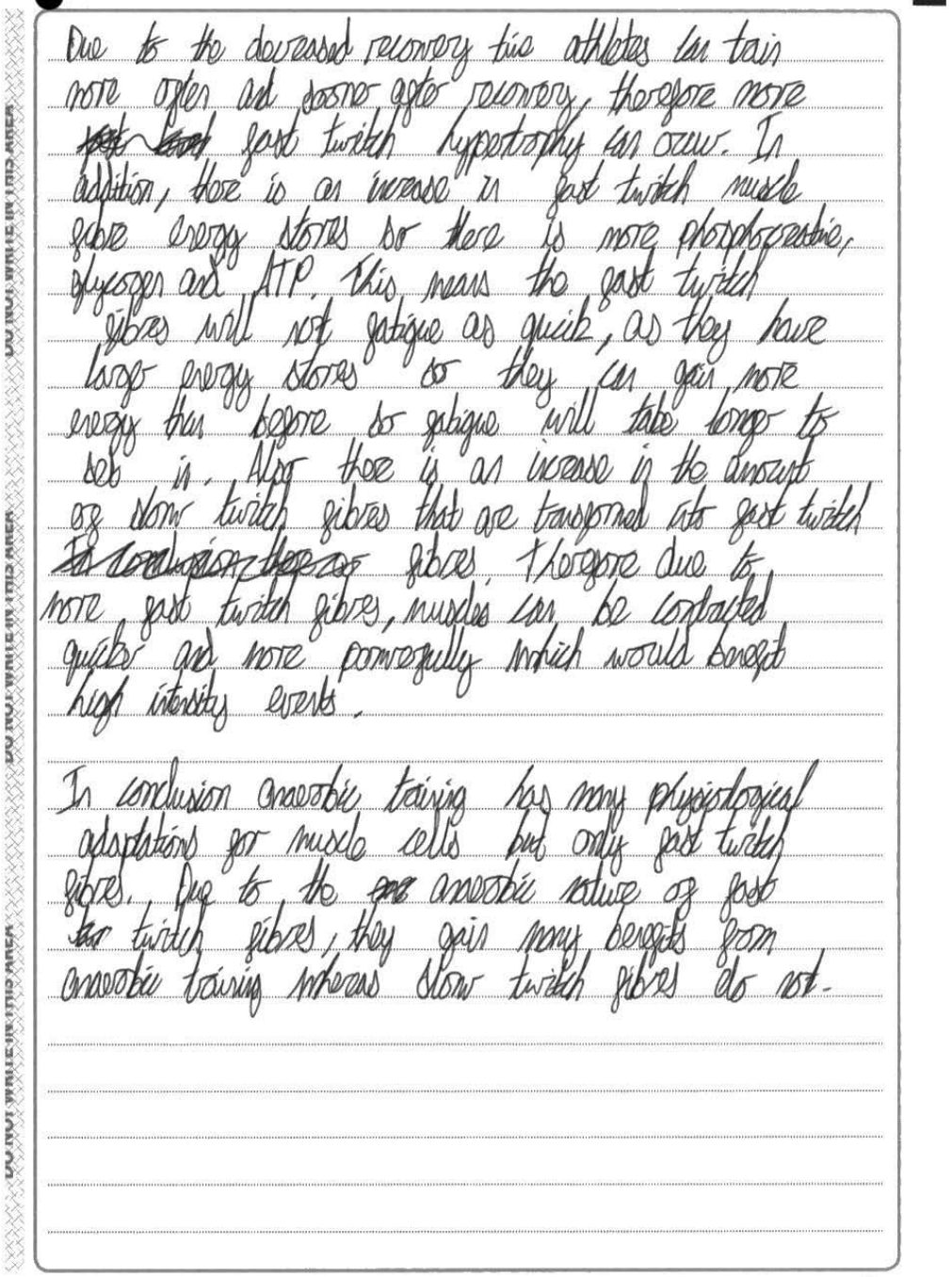
order to score in the higher bands on this question, candidates had to refer to specific muscle cell adaptations and discuss the effect of these adaptations on performance. No credit could be given to general adaptations of anaerobic training that did not affect the muscle cells. Many candidates did discuss elements of the indicative content but failed to analyse the factors or provide any judgement.

8 Discuss the effect of the physiological adaptations that occur in muscle cells as a result of long-term anaerobic training.

(12)

There are many physiological adaptations that occur in muscle cells due to long-term anaerobic training.

For example, ~~hypertrophy can occur so there~~ there can be an increase in the number of fast twitch fibres. This can allow performers to recruit more fast twitch fibres during exercise, therefore they can become more powerful and quick and there would be a longer time before fatigue causes the performer to stop. Fast twitch muscle hypertrophy can also ~~occurs~~ occur, so the performer will be able to contract quicker and more powerfully, as the fast twitch are stronger. In addition, fast twitch fibres become more resistant to lactic acid and therefore delay onset of blood lactate ~~accumulation~~ accumulation. As lactic acid causes fatigue, this adaptation can make the fast twitch muscle cells more fatigue resistant, therefore they can be contracted for longer periods and more often without succumbing to fatigue. Furthermore there is a reduction in in delayed onset of muscle soreness. This adaptation means there is less inflammation and aching after physical activity, therefore there is a decrease in recovery time.


Due to the decreased recovery time athletes can train more often and sooner after recovery, therefore more ~~fast~~ fast twitch hypertrophy can occur. In addition, there is an increase in fast twitch muscle fibre energy stores so there is more phosphocreatine, glycogen and ATP, this means the fast twitch fibres will not fatigue as quick, as they have large energy stores so they can gain more energy than before so fatigue will take longer to set in. Also there is an increase in the amount of slow twitch fibres that are transformed into fast twitch ~~for conclusion therefore~~ fibres, therefore due to more fast twitch fibres, muscles can be contracted quicker and more powerfully which would benefit high intensity events.

In conclusion anaerobic training has many physiological adaptations for muscle cells but only fast twitch fibres. Due to the ~~are~~ anaerobic nature of fast ~~for~~ twitch fibres, they gain many benefits from anaerobic training whereas slow twitch fibres do not.

This candidate identifies a number of relevant adaptations and does expand on some of the points to score some AO3 marks. There is some structure to the essay but there is also some irrelevant discussion and consequently this would achieve a mark in band 3.

8PE0_01_Q09(a)

Candidates clearly know of this test although some were a little unclear on the exact protocol. Most marks were picked up for the use of the stopwatch. Many used incorrect diagrams to explain, and many used a lot of words to describe the pathway when a diagram would have been quicker.
Candidates must make sure they know the protocol for fitness tests covering all the components of fitness in the specification.

SECTION B – Exercise physiology and applied movement analysis

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

9 (a) The Illinois Agility Run Test is used to monitor the development of an athlete's agility.

Describe the protocol for this agility test.

(4)

This test involves a 10m length course of 5m width. 4 cones can be used to mark out the course with 2 turning points. Athletes start lieing down behind a start line and when commanded, they run and a stopwatch is started. They run straight for 10metres and back, then they dodge in between cones to the 10m mark and run back. Then a final 10m sprint to the end. Time taken to complete

SECTION B – Exercise physiology and applied movement analysis

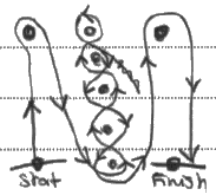
Answer ALL questions. Write your answers in the spaces provided.

9 (a) The Illinois Agility Run Test is used to monitor the development of an athlete's agility.

Describe the protocol for this agility test.

(4)

This test proves the agility of the performer at speed.
At the start they have to run towards a cone situated at a 15 meter distance then go back 15 meters and start a 15 meter zig zag, back and forward. When they finish they must go to a cone situated 15 meters away and go back another 15 meters.



The candidate describes the pathway of the test clearly enough to pick up that specific mark and also identifies other key points of the protocol, gaining maximum marks, The diagram shown would be enough to use to show the pathway but needs dimensions added to gain the extra mark.

8PE0_01_Q09(b)

This was a well answered questions with candidates using a good range of responses from the mark scheme. The candidates should make sure they know what affects validity and reliability of fitness tests.

(b) Consider the factors that could impact on the reliability of the test results.

(4)

The reliability of a test is how accurate the result is and can be effect by the type of footwear worn by the preformer and the surface of the floor. If the floor is sliggy or the shoes aren't grippy it will result in the preformer having to slow for corners or them slipping slowing there time. If the run is timed by a person using a stopwatch the time may not be accurate due to human error, they may be slow to stop the time. The weather conditions, if it's raining or the ground is wet will effect the preformer. Or whether it's windy or not wind resistance may slow them. Whether the preformer has warmed-up or not they may be faster if they've warmed up.

(Total for Question 9 = 8 marks)

(b) Consider the factors that could impact on the reliability of the test results.

(4)

- The surface on which it is performed
- the weather during the performance
- the athletes foot wear
- the athletes motivation.

The two examples shown both gained maximum marks as this question didn't require any further explanation.

8PE0_01_Q10(a) and (b)

This was a well answered question with a large proportion of candidates correctly identifying that improving either the Standing Long Jump or the 30m acceleration test scores would have most impact on performance. However, many summarised this as simply being that the athlete would be able run faster without any real explanation as to why.

10 A 17-year-old female sprinter completed a series of fitness tests. The results are shown in the table below.

Name of test	Score	Rating
Multi-stage fitness test	L7 s3	Average
Standing long jump	1.67	Average
Illinois agility test	17.2	Above average
30 m acceleration sprint	4.6	Above average

(a) Using the results from the table above, identify **one** fitness test score that she should aim to improve.

(1)

30 m acceleration sprint

(b) Summarise the impact an improvement in this fitness test would have on her performance.

(2)

if acceleration is improved through this fitness it will allow her to have a better sprint start. This gives her an advantage in a race as it will allow her to have a good start through post acceleration allowing her to build speed up quicker.

This answer clearly explains that an increase in the test score would show an improvement in acceleration and how this would then impact on performance and scores maximum 3 marks for

the whole question.

8PE0_01_Q10(c)

This was an explain question where candidates were expected to identify hoe different training methods would increase performance. Although many candidates clearly identified the impact, e.g. plyometric training would improve would improve acceleration out of the blocks but failed to link this with the fact the plyometric training would improve power/elastic strength in order to push with more force out the blocks and therefore scored no marks.

(c) Explain how **three** different training methods could result in an improvement in her 100 m performance.

(6)

The first training method that will inprove her performance would be interval training. Interval training is working at high levels of intensity with rest periods. This aims to improve anaerobic power and anaerobic capacity which are used in a 100m performance. So this method can mimic her sport and work the same areas of fitness.

Another method would plyometric training which incorporates leaps, hops and bounds inproving power. This is good for this athlete so they can get an explosive headstart at the starting blocks and their power will allow her to travel at greater distance with each stride.

The final method would be weight training which incorperates different muscle groups improving muscular strength. This would be helpful for this athlete especially in the arms and legs to increase her power.

(Total for Question 10 = 9 marks)

This answer clearly shows how the first paragraph would score no marks as the candidate has not linked how an increase in anaerobic power/capacity would actually improve performance.
However, in the second paragraph, a clear link is explained between the improvement in power from plyometric training and the explosive start out the blocks and scores 2 marks.
The third paragraph is again very vague with no between the improvement in strength and the affect on performance and therefore scores no marks.

8PE0_01_Q11

Most candidates were able to identify the principles of training but gave very generic descriptions of how overload could be applied. Candidates are expected to give specific examples to explain what would change to provide the overload. As the command word ''explain'', marks will be awarded for linked explanation only.

11 Explain how an athlete can apply the FITT principle to produce progressive overload.

(4)

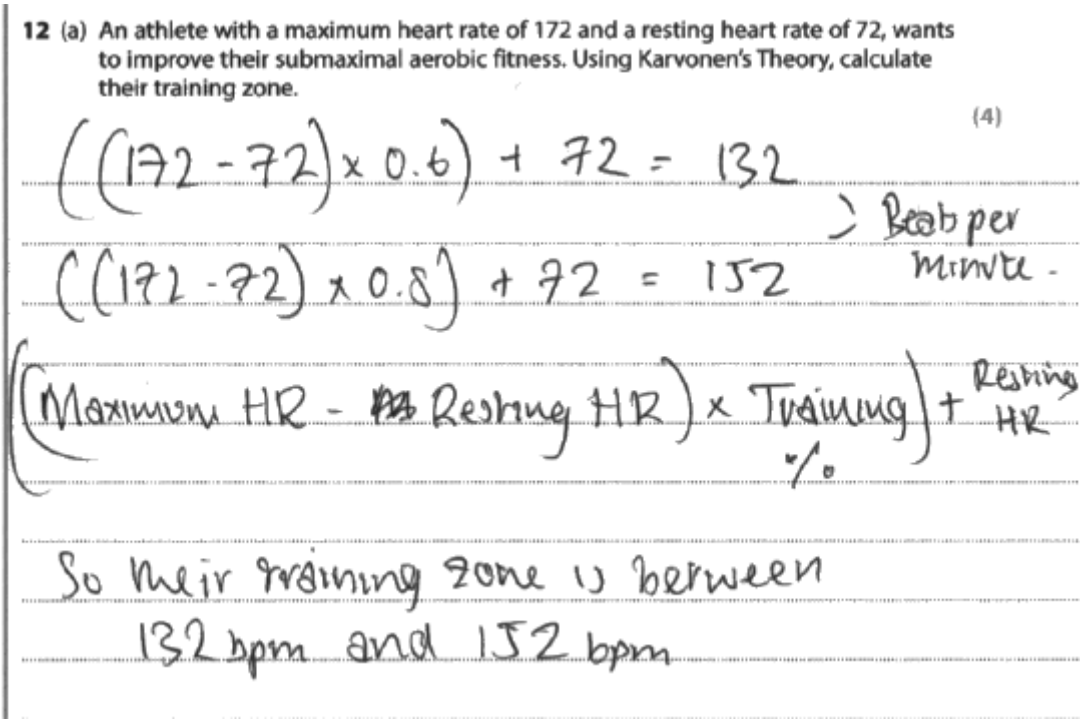
The person can for example in weightlifting, gradually increase the weight used each week. For example when doing a bicep curl, the person can increase the weight by 1 kg each week which will involve the muscles always working harder each week. ~~as and~~ This ~~leads to~~ progressive overload leads to muscular hypertrophy.

(Total for Question 11 = 4 marks)

In the first example, a clear example of how to apply progressive overload is discussed, but the candidate has failed to mention which principle is being discussed so scores no marks.
In the second example, very clear examples are given with the candidate making obvious links and this scores maximum 4 marks.

8PE0_01_Q12(a)

Most candidates showed some knowledge of Karvonen's Theory.



12 (a) An athlete with a maximum heart rate of 172 and a resting heart rate of 72, wants to improve their submaximal aerobic fitness. Using Karvonen's Theory, calculate their training zone.

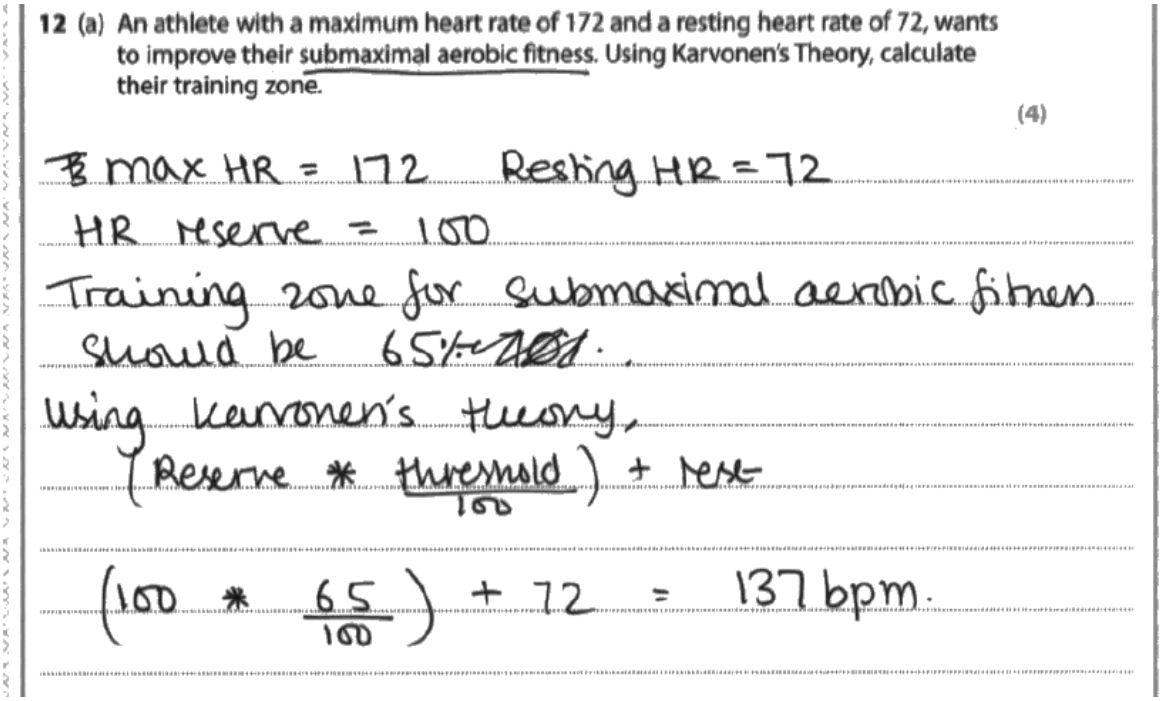
(4)

((172 - 72) x 0.6) + 72 = 132 > Beats per minute.

((172 - 72) x 0.8) + 72 = 152

(Maximum HR - Resting HR) x Training % + Resting HR

So their training zone is between 132 bpm and 152 bpm



12 (a) An athlete with a maximum heart rate of 172 and a resting heart rate of 72, wants to improve their submaximal aerobic fitness. Using Karvonen's Theory, calculate their training zone.

(4)

max HR = 172 Resting HR = 72

HR reserve = 100

Training zone for submaximal aerobic fitness should be 65%.

Using Karvonen's theory,

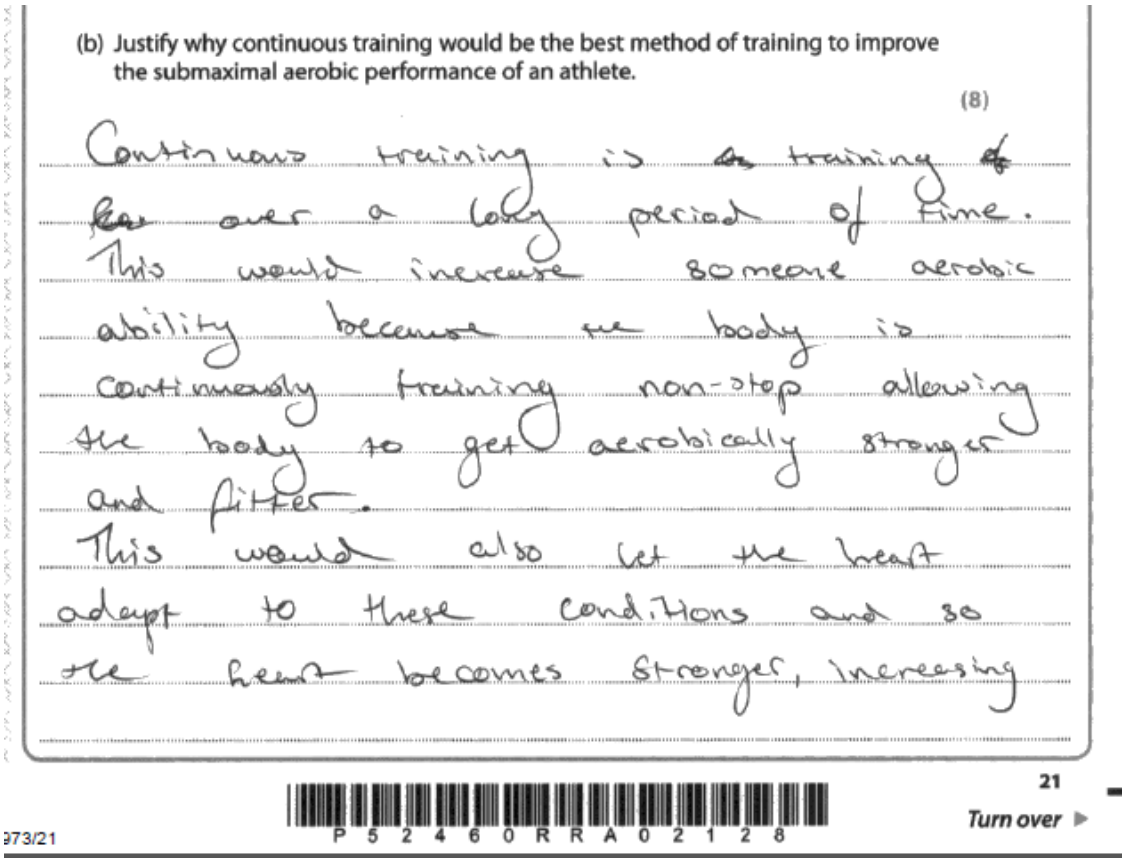
(Reserve * threshold / 100) + rest

(100 * 65/100) + 72 = 137 bpm.

Both candidates clearly know the formula and show all their working. However, the second example only calculates the minimum heart rate and is not calculating the zone, scoring 2 marks. Whereas the first candidate clearly identifies both the minimum and maximum heart rate and then outlines the training zone to gain maximum 4 marks.

8PE0_01_Q12(b)

This question asked candidates to include a range of points and expand upon them to explain the overall impact on performance and why.



(b) Justify why continuous training would be the best method of training to improve the submaximal aerobic performance of an athlete.

(8)

Continuous training is ~~a~~ training ~~of~~ ~~for~~ over a long period of time. This would increase ~~so~~ means aerobic ability because ~~the~~ body is continuously training non-stop allowing the body to get aerobically stronger and fitter. This would also let the heart adapt to these conditions and so the heart becomes stronger, increasing

the volume of blood to be pumped per beat. This is good for aerobic performance because it means more oxygen would be supplied to the working muscles which reduces Lactic acid production and so the athlete would have a longer time to fatigue.

This candidate gives a clear explanation of what sub-maximal training is and then gives a good example of how to expand an AO1 mark in to A03s. They have taken a structural adaptation, explained the functional adaptation and then discussed the impact on performance. A number of paragraphs in this style covering a range of points would be required to reach the top band.

8PE0_01_Q12(b)

This question asked candidates to discuss strategies (in the plural) that could be used six months prior to a competition. A number of candidates gave some very detailed discussion on periodisation, but unfortunately this was only one strategy. Most candidates also concentrated on physiological aspects with only a small minority including discussion on issues such as the use of technology, psychological aspects, analysing opponents' performance and improving tactical strategies. Most candidates also failed to make any analytical comment or judgement on the effectiveness of each strategy.

***13** Discuss strategies an athlete could use six months prior to a major competition to optimise performance.

(12)

1. Periodisation
   - Macrocycle
   - Mesocycle
   - Microcycle

   → All for specific phases: Competition, transition, preparation

- Taper for peak performance

2. Dietary Manipulation

Examples: Boxing - cutting or adding weight
Bodybuilding - Protein
Marathon - Carbohydrates

3. Supplementation

4. Altitude Training: Endurance events → less partial pressure of O_2

+ Increased Myoglobin
+ Increased Mitochondria
+ Increased Haemoglobin

- Away from family
- Altitude Sickness

In order to reach one's full potential for competition, an athlete may use periodisation in order to taper for peak performance during competition. This may include:

Macrocycle - 3 months preparation phase. Preparation phase includes preparing the body, regaining strengths and fitness levels lost during the offseason.

Transition phase (3 months) - increasing intensity of training sessions, working on improving weaknesses in performance and building on strengths.

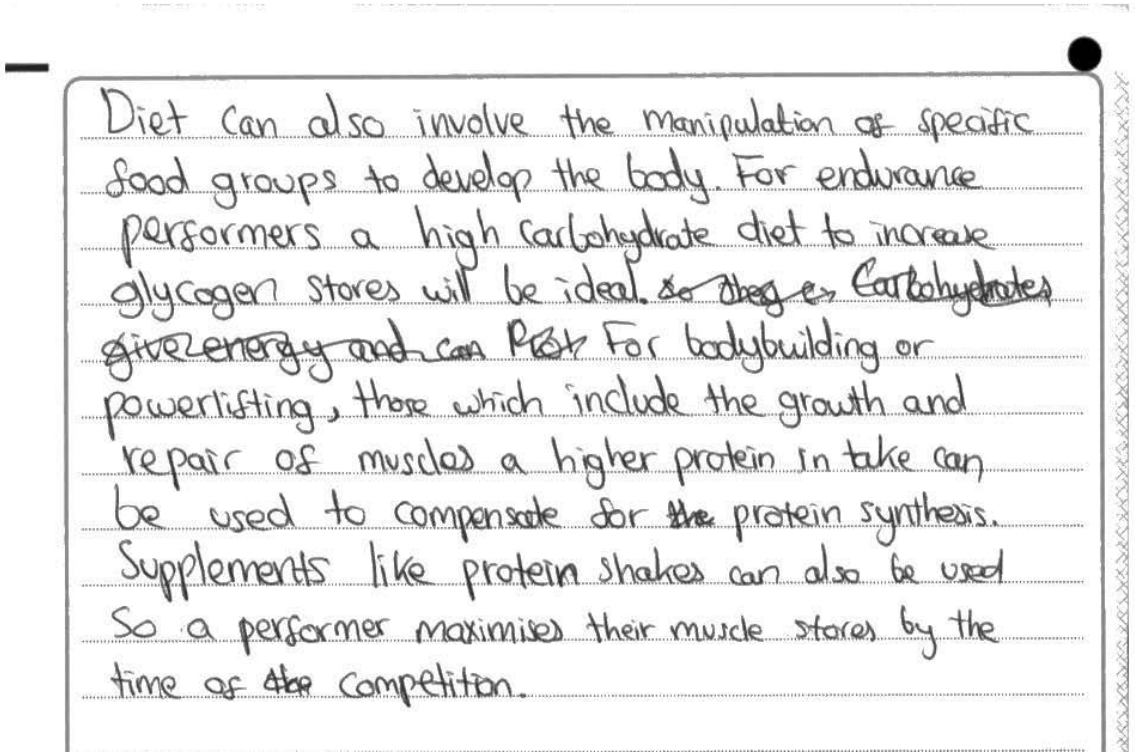
Competition phase (1 month) - During this phase the athlete will be reaching their full potential and training with heavy loads as well as periods of rest that accompany the high intensity to avoid injury.

These can be split up into macrocycles, mesocycles and microcycles depending on the desired achievement.

Diet can also be manipulated six months in advance relevant to specific performers. For boxers they may want to put on weight to step up a class or cut weight to step down. This can be achieved through manipulating this formula:

Energy expenditure > Energy intake (Cutting)

Energy expenditure < Energy intake (adding)


Diet can also involve the manipulation of specific food groups to develop the body. For endurance performers a high carbohydrate diet to increase glycogen stores will be ideal. ~~so they~~ Carbohydrates ~~give energy and can~~ For bodybuilding or powerlifting, those which include the growth and repair of muscles a higher protein in take can be used to compensate for ~~the~~ protein synthesis. Supplements like protein shakes can also be used So a performer maximises their muscle stores by the time of ~~the~~ competition.

In this paragraph, the candidate makes a number of valid A01 points and does gain some A03 for explaining the impact and this is the sort of answer that would reach the 2nd or 3rd band depending on the other paragraphs. In order to gain further A03s and get in to the top band, the candidate needs to evaluate the impact on performance. E.g. by increasing glycogen stores, the endurance athlete can work at a higher rate for longer without fatigue and therefore improve time/position in the race. Candidates would need to provide a number of such paragraphs across a range of strategies and evaluate the usefulness of each strategy in order to obtain a top band mark