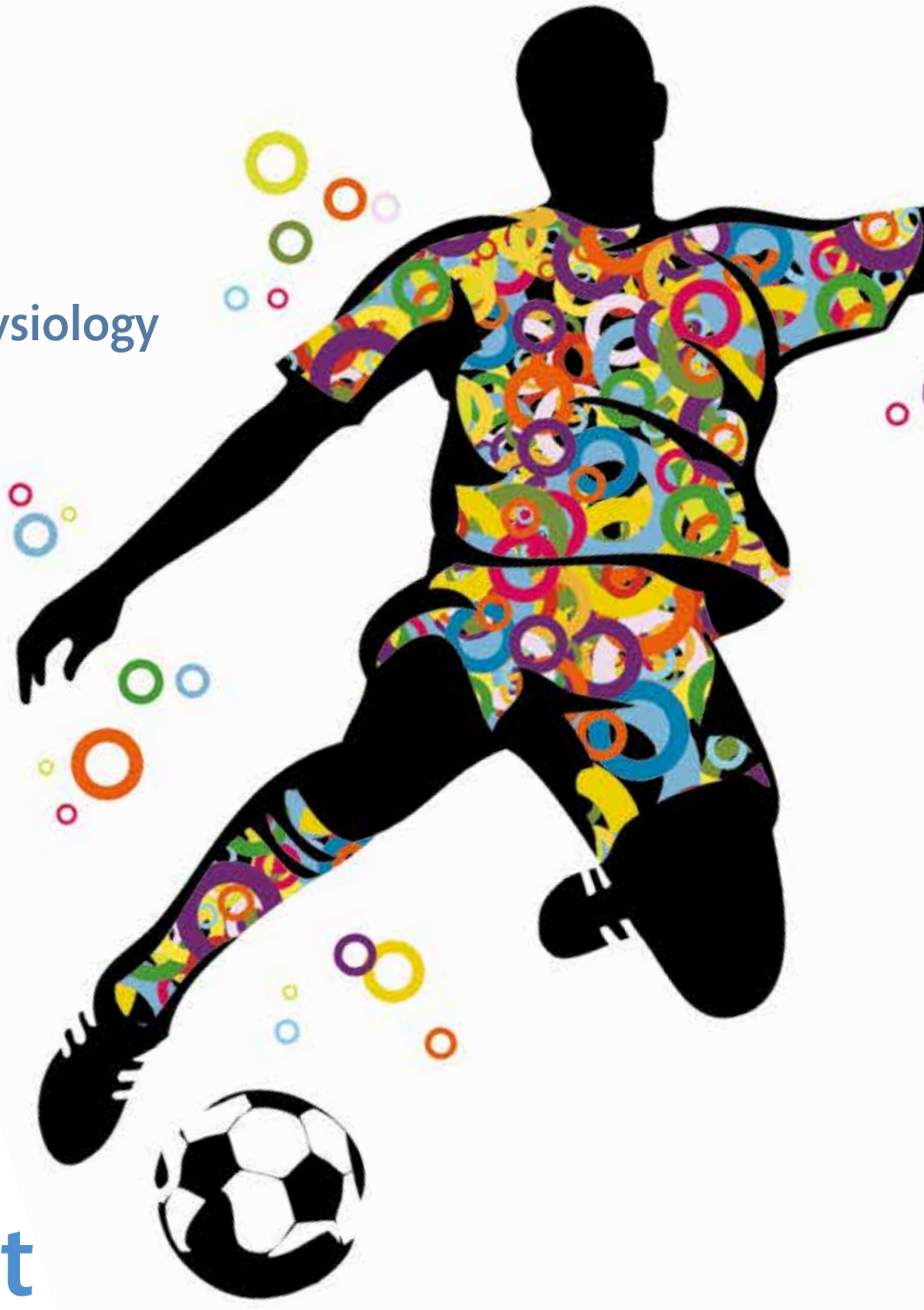
BTEC

Pearson BTEC Level 3 National in Sport

Unit 1: Anatomy & Physiology



Sample Assessment Materials (SAMs)

For use with Extended Diploma in Sport, Diploma in Sport, Diploma in Sport Fitness Services, Foundation Diploma in Sport, Extended Certificate in Sport and Certificate in Sport

First teaching from September 2016 **Issue 2**

Pearson

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Contents

This Sample Assessment Material has been updated by Pearson to improve the performance of the external assessment and improve the experience for learners undertaking the unit. These changes have been summarised below for ease of reference:

Summary of Sample Assessment Material changes

Question paper - Summary of changes made between previous issues and this current issue	**Page number**
Overall marks reduced from 90 to 80	
The length of the extended open response questions has been reduced throughout the question paper, and the marks for these questions reduced.	Pages 2 to 21

Mark scheme - Summary of changes made between previous issues and this current issue	**Page number**
The sample mark scheme has been changed to reflect changes to the question paper. The levels-based mark schemes have been reworded to make them clearer.	Pages 23 to 33

BTEC

Pearson BTEC Level 3 Nationals

Write your name here

Surname	**Forename**

Learner Registration Number | **Centre Number** | **Level 3**

Sport

Unit 1: Anatomy and Physiology

Certificate, Extended Certificate, Foundation Diploma, Diploma, Extended Diploma

Sample assessment material
Time: 1 hour 30 minutes

You do not need any other materials.

Total marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and learner registration number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – there may be more space than you need.

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in grey boxes
  – use this as a guide as to how much time to spend on each question.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Paper reference
XXXX/XX
S50001A

1/1/1/1/1/1

S 5 0 0 0 1 A 0 1 2 1

Turn over ▶

PEARSON

SECTION A: Skeletal System for Sports Performance

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

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

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Total for Question 1 = 2 marks

2 Name the bones labelled A–C in **Figure 1**.

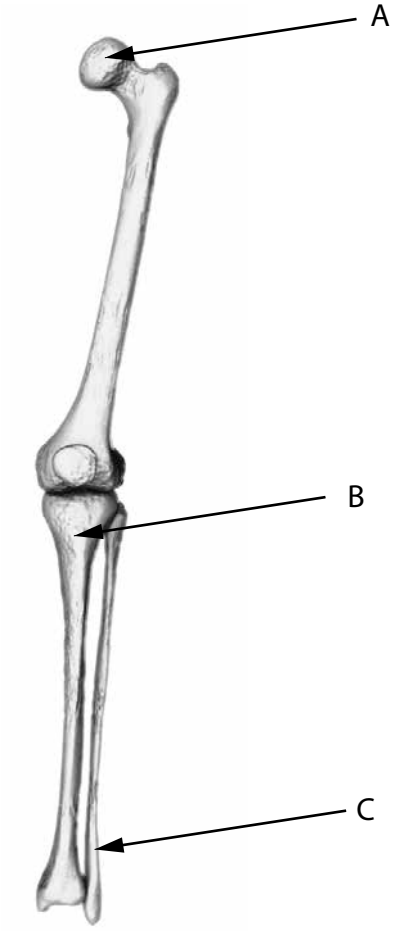

Figure 1

A .....

1 mark

B .....

1 mark

C .....

1 mark

Total for Question 2 = 3 marks

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

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

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

1 mark

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

3 marks

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Total for Question 3 = 4 marks

4 Explain how movements at the hip joint allow the gymnast to achieve the position shown in the picture.

(Source: © Olga Bogatvrenko/Shutterstock)

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Total for Question 4 = 3 marks
TOTAL FOR SECTION A = 12 MARKS

SECTION B: Muscular System for Sports Performance

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

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

(Source: © Syda Productions/Shutterstock)

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

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Total for Question 5 = 3 marks

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

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

1 mark

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

2 marks

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Total for Question 6 = 3 marks

7 Describe an eccentric contraction.

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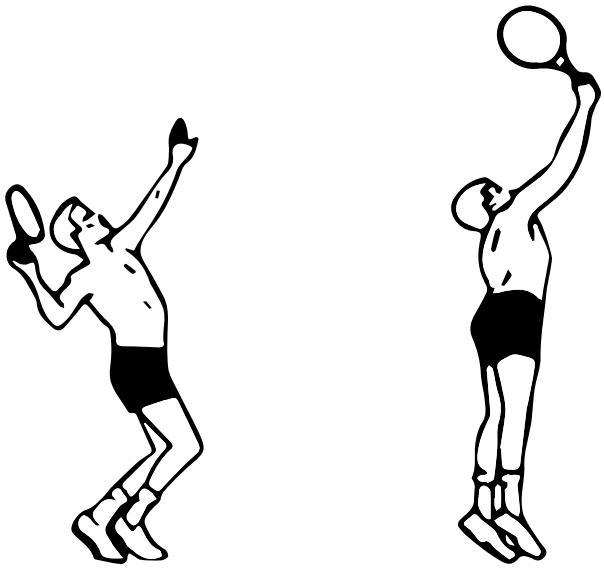
Total for Question 7 = 2 marks

8 Explain how the agonist muscles at the **elbow** allows the tennis player to complete the action in position A and position B.



Position A **Position B**

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Total for Question 8 = 3 marks
TOTAL FOR SECTION B = 11 MARKS

SECTION C: The Respiratory System for Sports Performance

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

Yannick is a rugby player.

9 State the meaning of the term **total lung volume**.

.....

.....

Total for Question 9= 2 marks

10 Give the total lung volume, including units, for an average healthy adult male.

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Total for Question 10 = 1 mark

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

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Total for Question 11 = 3 marks

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Endurance training results in adaptation to the respiratory system.

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

Total for Question 12 = 4 marks

Julie is an 18 year old swimmer and has asthma.

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

Total for Question 13 = 6 marks
TOTAL FOR SECTION C = 16 MARKS

SECTION D: The Cardiovascular System for Sports Performance

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

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

Total for Question 14 = 4 marks

15 State the function of the bicuspid valve.

Total for Question 15 = 1 mark

16 Explain how thermoregulation within the cardiovascular system helps to control body temperature during exercise.

Total for Question 16 = 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.

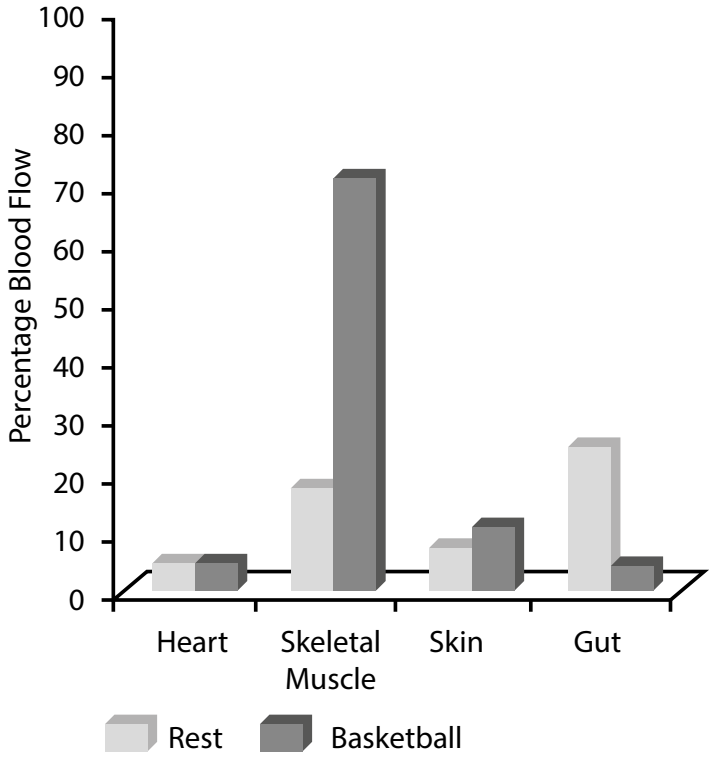
Resting Heart Rate (bpm)	Heart rate 1 minute before taking part in basketball (bpm)
70	80

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

4 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.

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



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

6 marks

Total for Question 17 = 10 marks
TOTAL FOR SECTION D = 19 MARKS

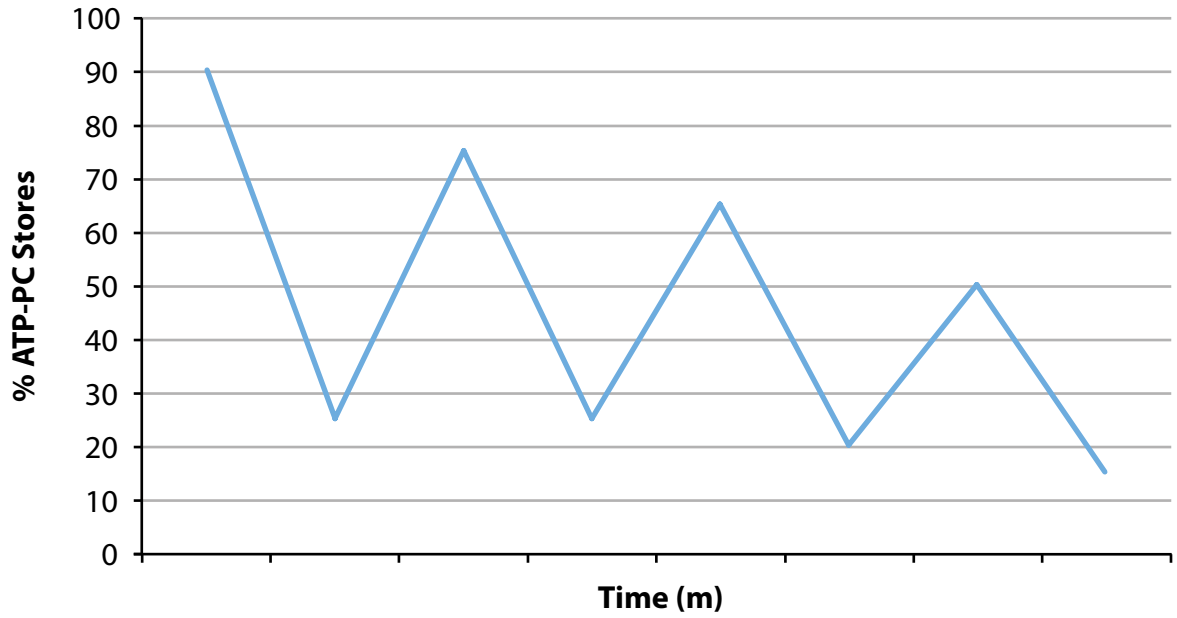
SECTION E: Energy Systems for Sports Performance

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

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

Total for Question 18 = 5 marks

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



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

Total for Question 19 = 3 marks

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

Total for Question 20 = 6 marks
TOTAL FOR SECTION E = 14 MARKS

SECTION F: Interrelationships between Body Systems for Sports Performance

Answer the question. Write your answer in the space provided.

Suky is training for a marathon.

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

END OF EXAM

Total for Question 21 = 8 marks
TOTAL FOR SECTION F = 8 MARKS
TOTAL FOR PAPER = 80 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)
2	Award one mark for correctly each labelling each bone. • Femur – A (1) • Tibia – B (1) • Fibula – C (1)	(3)
3a	Award one mark for providing an example of a type of 'weight-bearing exercise', e.g. running (1).	(1)
3b	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)
4	Award one mark for correctly identifying each movement and one further mark for expansion For a maximum of three marks. Flexion (1) and abduction (1) (movements are occurring at the hip) allowing the legs to be moved upwards and outwards (1) (into the pike position) Accept any other answer	(4)

Question number	Answer	Mark
5	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. 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).	(3)
6a	Award one mark for stating why training may cause DOMS. Micro-tears of muscle fibres (1). Accept other appropriate responses.	(1)
6b	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. Muscular hypertrophy occurs (1) as the short-term damage stimulates muscle growth (1).	(2)
7	Award up to two marks for describing an eccentric contraction. Tension in the muscle is created (1) as it lengthens/returns to original length (1) Accept any other appropriate answer.	(2)
8	Award one mark for identifying both agonist muscles and up to a maximum of two further marks for expansion Biceps and triceps are the agonists (1) and contract concentrically (1) to allow flexion and extension of the elbow (1) (in Position A and B)	(3)
9	Award up to two marks for stating the meaning of total lung. The amount of air that is left in the lungs after (1) after maximal expiration (1) Do not accept oxygen.	(2)
10	Award one mark for correctly identifying the average volume for a healthy adult male total lung volume (must have units). 6L / 6000 cm3(1)	(1)

Question number	Answer	Mark
11	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).	(3)
12	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).	(4)

Question number	Indicative content
13	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. Negative: 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. Positive: 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.

Level	Mark	Descriptor
Level 0	**0**	**No rewardable material**
1	1-2	Demonstrates isolated elements of Knowledge and Understanding Few of the points made will be relevant to the context in the question Limited discussion which contains generic assertions rather than links to the question
2	3-4	Demonstrates some accurate Knowledge and Understanding Some of the points made will be relevant to the context in the question, but the link will not always be clear Displays a partially developed and logical discussion that explores some aspects and investigates the issue(s) to some extent.
3	5-6	Demonstrates mostly accurate Knowledge and Understanding Most of the points made will be relevant to the context in the question, and there will be clear links Displays a developed and logical discussion that explores all aspects and investigates the issue(s) fully.

Question number	Answer	Mark
14	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. • 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). Accept other appropriate answers that fit into logical order/sequence.	(4)
15	Award one mark for function of bicuspid valve. To prevent back flow of blood between (left) ventricle and atrium.	(1)
16	Award up to two marks for explaining the role of thermoregulation during exercise and up to two additional marks for justifying/rationalising how the process helps control body temperature. During exercise vasodilation of the blood vessels occurs (1) this causes the diameter of the blood vessel to increase (1) this decreases the resistance of blood flow(1) and the heat in within the blood can be carried to the skins surface (1) Accept any other appropriate answer	(4)

Question number	Answer	Mark
17a	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. 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). Accept any other appropriate answer.	(4)

Question number	Indicative content
17b	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. • 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.

Level	Mark	Descriptor
Level 0	**0**	**No rewardable material**
1	1-2	Demonstrates isolated elements of Knowledge and Understanding Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question Limited analysis which contains generic assertions rather than interrelationships or linkages
2	3-4	Demonstrates some accurate Knowledge and Understanding Breaks the situation down into component parts and some of the points made will be relevant to the context in the question Displays a partially developed analysis which considers some interrelationships or linkages but not always sustained Chains of reasoning are not always sustained
3	5-6	Demonstrates mostly accurate Knowledge and Understanding Breaks the situation down into component parts and most of the points made will be relevant to the context in the question Displays a developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner Chains of reasoning are sustained

Question number	Answer	Mark
18	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. - 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). Accept other appropriate answers that fit into logical order/sequence.	(5)
19	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. 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). Accept other appropriate answers.	(3)

Question number	Indicative content
20	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. **Why aerobic system might not be considered important** • 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. **Why aerobic system might be considered important** • 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.

Level	Mark	Descriptor
Level 0	0	No rewardable material
1	**1-2**	Demonstrates isolated elements of Knowledge and Understanding Reviews information but few of the points made will be relevant to the context in the question Limited evaluation which contains generic assertions Conclusion if present is superficial or unsupported.
2	**3-4**	Demonstrates some accurate Knowledge and Understanding Reviews information and some of the points made will be relevant to the context in the question, but the link will not always be clear Displays a partially developed evaluation which considers some different aspects A partially supported conclusion is presented which considers some different competing points, although not always in detail.
3	**5-6**	Demonstrates mostly accurate Knowledge and Understanding Reviews information and most of the points made will be relevant to the context in the question, and there will be clear links Displays a developed and logical evaluation which clearly considers different aspects A supported conclusion is presented which considers different competing points in detail.

Question Number	Indicative content
21	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. Cardiorespiratory system • 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.

Level	Mark	Descriptor
Level 0	0	No rewardable material
1	**1-3**	Demonstrates isolated elements of Knowledge and Understanding Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question Limited analysis which contains generic assertions rather than interrelationships or linkages
2	**4-6**	Demonstrates some accurate Knowledge and Understanding Breaks the situation down into component parts and some of the points made will be relevant to the context in the question Displays a partially developed analysis which considers some interrelationships or linkages but not always sustained Chains of reasoning are not always sustained
3	**7-8**	Demonstrates mostly accurate Knowledge and Understanding Breaks the situation down into component parts and most of the points made will be relevant to the context in the question Displays a developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner Chains of reasoning are sustained

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