Mark Scheme (Results)

January 2021

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

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Unit 1: Anatomy and Physiology

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
1a	Award **one** mark for labelling each bone correctly. • A – Femur (1) • B – Patella (1) • C – Tibia (DNA Tibular) (1) Accept phonetic spelling. *DNA = Do not accept	3
1b	Award **one** mark for an example of a cartilaginous joint. • Vertebra(e)/cervical/thoracic/lumbar – (DNA sacrum/coccyx) • Ribs/sternum • Pubic symphysis Accept phonetic spelling. *DNA = Do not accept	1
2a	Award **one** mark for identifying why leverage and **one** mark for identifying why weight-bearing functions will help complete the training and **one** mark for explaining each reason. **Leverage** enables the bones to move (1) by providing sites for muscles to attach (1) The muscles pull on the bones (1) so the bones act as levers to move her legs (1) **Weight bearing** absorbs the shock (1) reducing the risk of injuries/shin splints (1) The skeleton is strong/can bear the weight of the body (1) and can hold the body upright (1) Accept any other appropriate answer.	4

2b	Award **one** mark for stating each function of the skeleton for a total of **two** marks. • Support/Supporting framework/shape (1) • Protection (1) • Attachment (for skeletal muscle) (1) • Blood Production/(Red) blood cell production/RBC production (1) • Reduce friction (across a joint) (1) Storage of minerals (1)	2
3	Award up to **three** marks for explaining the function of ligaments. Ligaments connect bone to bone (1) they provide strength/stability/support to the joint (1) by stopping any unwanted movement/reducing the risk of injury (1) Accept any other appropriate answer.	3
4	Award **one** mark for labelling each muscle correctly. • A – Gastrocnemius (1) (DNA Calf) • B – Soleus (1) • C – Tibialis anterior/Tibialis ant (1) Accept phonetic spelling. *DNA = Do not accept	3
5	Award **one** mark for each characteristic of type I muscle fibres, up to **three** marks. • Contract with little force (1) • Contract slowly (1) • Resistant to fatigue (1) • Small in size (1) • Red in colour (1) • Capillary density is high (1) • The number of mitochondria is high (1) • Oxidative (1) • High Myoglobin stores (1) Accept any other appropriate answer.	3

6	Award up to **two** marks for describing the role of a synergist. • Supports (1) the agonist to carry out the movement (1) and stabilises the joint/ (1) Accept any other appropriate answer.	2
7 (a)	Award **one** mark for identifying the response to lifting heavy weights and **one** mark for linked expansion. Causes microtears in the muscle fibres (1) due to the muscle being overloaded (1) Accept any other appropriate answer.	2
7 (b)	Award **one** mark for explaining muscular hypertrophy and up to **two** further marks for linked expansion. Increase in size/strength of Marcellous's muscles (1) will enable him to generate more power/force (1) and run a faster time (1) Accept any other appropriate answer.	3
8	Award **four** marks for describing the mechanism of inspiration at exercise. • Diaphragm contracts/external intercostal muscles contract with more force (1) • Additional muscles are used/scalene/sternocleidomastoid/SCM/pectoralis minor (1) • The volume of the thoracic cavity increases more/ribs move up and out more (1) • The pressure in the thoracic cavity is reduced (1) More air comes in (1)	4
9	Award **two** marks for describing the role of the internal intercostal muscles when expiring when exercising. Contract (1) to bring the ribs down and in quicker/reduce the volume of the thoracic cavity quicker (1)	2

10a	Award up to **four** marks for explaining the process of gaseous exchange of oxygen at the alveoli during exercise. Muscles are using <u>more</u> O_2 (1) therefore a lower partial pressure/ppO_2 in the capillaries near the alveoli (1). There is an <u>increased</u> breathing rate (1), which means more O_2 /higher partial pressure/ppO_2 is in the alveoli (1) which creates a steeper diffusion gradient (1) and O_2 moves quicker (from the alveoli) into the blood/capillaries (1)	4

10(b)	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. • **Increased strength of respiratory muscles**/Diaphragm and intercostal muscles • Will increase the force of contraction of respiratory muscles • Allowing for a greater expansion of the chest cavity/the lungs to expand more/increasing tidal volume • **Increased Vital capacity** • Maximum amount of air exhaled from the lungs following deepest breath/IRV + ERV +TV • Which enables more oxygen to be inhaled • Therefore greater volume of air expired • **Increase in Oxygen & Carbon Dioxide diffusion rates** • Increases the amount of oxygen that is diffused into the blood • Increases the amount of carbon dioxide that is diffused out of the body **Impact on Performance** • Dave can work at a higher intensity for longer/fatigue delayed, (e.g.) can maintain his shots and movement around the court late into the game • the delay of OBLA/lactate threshold is a result of Dave's increased VO2max, Accept any other appropriate answer.

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
Level 0	0	No rewardable material.
Level 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.
Level 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.
Level 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.

11	Award **one** mark for labelling each structure of the heart correctly. • A – Aorta (1) • B – Pulmonary artery/PA (1) • C – Right ventricle/RV (1) • D – Septum (1) Accept phonetic spelling.	4
12	Award up to **two** marks for describing the role of the semi-lunar valves. Control the flow of blood from the ventricles/to the aorta/to the pulmonary artery (1) prevent backflow (1)	2
13 (a)	Award **two** marks for explaining the impacts of increased blood volume and **two** marks for linked justification. (More blood increases) the ability to transfer <u>more</u> oxygen to the working muscle (1) and remove carbon dioxide (1) therefore enabling Steph to play at a higher intensity for a longer duration (1) and delay the onset of fatigue (1) Accept any other appropriate answer	4

13 (b)	Award **one** mark for stating the change in stroke volume in the game. Increases/Goes up/Higher/Greater (1)	1
13 (c)	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. **Cardiac Hypertrophy** • Cardiac hypertrophy is when the heart gets bigger and the left ventricle wall gets thicker • This results in a larger/more forceful contraction • Therefore SV will increase • Because the heart will be able to hold more blood • And cardiac output will increase during exercise • At rest, heart rate will decrease meaning that the heart will not need to work as hard **Capillarisation** • Increase in the number and size of blood vessels • More blood will go to the working muscles • More efficient delivery of oxygen and nutrients • Removal of waste products/CO_2 **Impact on performance** • Fatigue will occur later in the game • Maintaining a faster pace/higher intensity throughout the match (e.g. can run down the wing and recover)	6

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Level 0	0	No rewardable material.
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Level 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.
Level 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.

14	Award **one** mark for labelling each part of the graph correctly. • A – ATP-PC (1) • B – Lactate/lactic acid/LA (1) • C – Aerobic (1)	3
15	Award **one** mark for each aerobic adaptation and **one** mark for linked expansion/justification.	4

	• Increased storage of glycogen (1) enabling Crystal to keep cycling at a high intensity/complete races in a quicker time (1) Increased number of mitochondria (1) increases the ability to produce more (aerobic) energy and last the duration of the race (1)	

16	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. • ATP-PC is the main system used for the long jump • The long jump is an anaerobic activity • It fuels activity lasting up to 8–10 seconds • Uses explosive power/high intensity activity • Used when sprinting in the run up/jump phase • PC is broken down to release energy • Phosphocreatine stores are replenished in 2–4 minutes. Recovery time is short • Boris will be recovered ready for the next round	6

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
Level 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.
Level 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.

Level 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.

17	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. **Muscular** • Increased blood supply to the muscle • Increased pliability/elasticity of muscle tissue • Increases temperature of muscle • Decreases muscle viscosity • Increases speed and strength of contraction • This all results in increased flexibility and therefore reduces risk of injury muscle strains/pulls/tears in the game **Cardiovascular** • Increases heart rate/increases stroke volume/increases cardiac output/Q=SV*HR • Increases blood pressure to pump blood faster • Increases blood temperature, which reduces blood viscosity, which allows blood to get around the body quicker. • Therefore, more oxygenated blood to muscles and increased removal of carbon dioxide and waste products out of the blood stream • Activates vascular shunt mechanism/redirection of blood • Which redistributes blood from non-essential organs to the working muscles	8

	• Therefore, more oxygen can be supplied to sustain energy production during the netball game • Increases diffusion of oxygen from haemoglobin to muscles, which causes a steeper diffusion gradient and increased diffusion rate of oxygen into the blood stream • Enables the players to not experience the early feeling of being out of breath, because the heart rate is elevated to similar to the rate in the game	

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	1–3	• 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.
Level 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.
Level 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.

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