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BTEC

Mark Scheme (Results)

June 2024

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

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June 2024
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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.
- Mark 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 mark grid, not according to their perception of where the grade boundaries may lie.
- All marks on the mark grid should be used appropriately.
- All the marks on the mark 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 mark grid.
- Where judgement is required, a mark grid will provide the principles by which marks will be awarded.
- When examiners are in doubt regarding the application of the mark grid to a learner's response, a senior examiner should be consulted.

Specific marking guidance

The mark grids have been designed to assess learners' work holistically.

Rows in the grids identify the assessment focus/outcome being targeted. When using a mark 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.

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>1 - C</td><td>Award one mark for identifying each type of bone correctly.

<table><tr><th>Example</th><th>Type of bone</th></tr><tr><td>Cranium</td><td>Flat (1)</td></tr><tr><td>Tarsals</td><td>Short (1)</td></tr><tr><td>Ulna</td><td>Long (1)</td></tr><tr><td>Vertebrae</td><td>Irregular (1)</td></tr></table>
Accept phonetic spelling.</td><td>4</td></tr>
</table>

Question Number	Answer	Mark
2 - E	Award **one** mark for identifying the skeletal response and **one** mark for describing it for each function marks. By providing an attachment point for skeletal muscles (1) to enable them to pull on a bone to kick the ball. (1) By protecting (the vital organs) (1) the (cranium/skeleton) will protect the brain when heading the ball. (1) Accept any other appropriate answer.	4

Question Number	Answer	Mark
3a - C	Award **one** mark for movement occurring at the shoulder joint. • Circumduction Accept phonetic spelling.	1

Question Number	Answer	Mark
3b - C	Award **one** mark for stating the type of synovial joint at the shoulder. • Ball and socket	1

	• Accept phonetic spelling.	

Question Number	Answer	Mark
3c - E	Award **one** mark for identification of the function of articular cartilage and **two** further marks for appropriate expansion. Provides a cushion on the ends of bones (1) which helps reduce friction (1) and allows for free movement during the bowling action (1) as well as reducing the risk of injury (1). Accept any other appropriate answer.	3

Question Number	Answer	Mark
4 - C	Award **one** mark for labelling each muscle correctly. • A – Hip flexors (1) • B – Quadriceps (1) • C – Tibialis anterior (1) Accept phonetic spelling.	3

Question Number	Answer	Mark
5 - C (clipped together)	Award **one** mark for each response, up to **three** marks. Must be in the correct order.	3

	Upward phase	Upward phase
Agonist	(a) Deltoid	Triceps
Type of contraction	(b) Concentric	concentric
Antagonist	(c) Latissimus dorsi	Biceps

Question Number	Answer	Mark
6 - G	Award **one** mark for muscle mass will decrease and **one** mark for linked expansion. • Asim's muscle mass will decrease (sarcopenia) (1) this results in a loss of muscle strength/power (1). Accept any other appropriate answer/example.	2

Question Number	Answer	Mark
7 (a) - C	Award **one** mark for each response, up to **two** marks. • Increased blood supply (1) • Increased muscle temperature (1) • Increased muscle pliability (1) • Lactate build up (1) Accept any other appropriate answer.	2

Question Number	Answer	Mark
7 (b) - E	Award **one** mark for explaining that microtears cause swelling and up to **two** further marks for linked expansion. Microtears cause swelling in the muscle (1) supports the muscle to rest/repair/proteins help repair them/muscle chance to recovery (1) enabling the muscle to become stronger (1). Accept any other appropriate answer.	3

Question Number	Answer	Mark
8a - C	Award **one** mark for lung volume correctly identified. • A – Epiglottis • B – Trachea • C – Diaphragm Accept phonetic spelling	3

Question Number	Answer	Mark
8b - G	Award **one** mark for each descriptive point, up to a maximum of **two** marks. • The external intercostal muscles contract (1) which pulls the ribs up and out/increases the size of the thoracic cavity (1) which reduces the pressure. (1) Accept any other appropriate answer.	2

Question Number	Answer	Mark
9a - G	Award **one** mark for each descriptive point, up to a maximum of **two** marks. • A restriction of the airways (1) that causes a shortness of breath/harder for air to enter the body/wheezing (1). Accept any other appropriate answer.	2

Question Number	Answer	Mark
9 (b) - E	Award **one** mark for stating that oxygen and carbon dioxide diffusion rates would increase and **two** additional marks for linked expansions. Credit to a total of **three** marks. Oxygen and carbon dioxide diffusion rates will increase (1) therefore **more carbon dioxide** would be removed/**more oxygen** would be taken to the working muscle (1) to ensure that Destiny can work at a higher intensity for longer/fatigue will be delayed (1) Accept any other appropriate answer.	3

Question number	Indicative content
9(c) - E	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. **Lung volume changes** • Destiny's **respiratory rate will increase**, meaning that she will breathe more times in a minute • Her **tidal volume will also increase**, meaning that she will be breathing deeper • **Respiratory rate x tidal volume = Minute ventilation will increase** • Her **inspiratory reserve volume/IRV will decrease** • Due to this, Destiny's **expiratory reserve volume/ERV will decrease** • More oxygen is taken into the lungs/meaning that she can breathe out more carbon dioxide • **Residual volume and vital capacity do not change** **Impact on performance** • This means that she will be able to better utilise the increased oxygen coming into the body (through increased lung volumes) to sustain aerobic energy production for longer in the badminton match • So that she can work at a higher intensity for longer, e.g. can maintain movement around the court • The delay of fatigue will come later in the game, so that Destiny can maintain intensity of performance/reduction in lactic acid build up 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.

Question Number	Answer	Mark
10 - C	Award **one** mark for labelling each structure of the cardiovascular system correctly. • A – SA node/Sino-atrial node/SAN (1) • B – AV node/Atrioventricular node/AVN (1) • C – Bundle of His (1) • D – Purkinje fibres (1) Accept phonetic spelling.	4

Question Number	Answer	Mark
11 - G	Award **one** mark for slowing down heart rate and **one** mark for linked expansions. Parasympathetic nervous system slows down heart rate (1) to resting levels (1) Accept any other appropriate answer.	2

Question Number	Answer	Mark
12 - E	Award **one** mark for each descriptive point, up to a maximum of **three** marks. • CO_2 (1) is carried in plasma/blood (1) from the muscles to the lungs (1) where it is then breathed out (1) • Lactate (1) is carried in the plasma/blood (1) from the tissues to the liver/kidneys (1) this is then excreted out via sweat/urine (1) Accept any other appropriate answer.	3

Question Number	Answer	Mark
13 (a) - C	Award up to **two** marks for identifying cardiovascular responses. • Increase blood pressure (1) • Redirection of blood flow (1)	2

Question Number	Answer	Mark
13 (b) - E	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. **Knowledge** • HR – number of times the heart beat per minute/Q – the amount of blood pumped out of the heart per minute • Q = SV X HR • Increased HR/Q = increased blood flow to working muscles • therefore increased O_2 delivery to working muscles • Increased removal of waste products from working muscles **Performance** • (With more oxygen available) to the muscles they can work aerobically for longer/potential for greater energy production/recover more quickly/break down lactic acid • So he can maintain his pace/speed/high intensity and respond to people overtaking him if necessary/complete the race in a quicker time • The onset of fatigue will be delayed until later in the race Accept any other answer	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 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.

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>14 - C</td><td>Award one mark for each correct identification of the intensity duration and recovery time.

<table>
<tr><th></th><th>Lactate system</th></tr>
<tr><td>Intensity</td><td>(a) Moderate/Medium/High</td></tr>
<tr><td>Duration</td><td>(b) 10 seconds to 180 seconds</td></tr>
<tr><td>Recovery time</td><td>(c) 8-30 minutes</td></tr>
</table>
</td><td>3</td></tr>
</table>

Question Number	Answer	Mark
15 - E	Award **one** mark for causing a hypoglycaemic attack and up to **three** marks for linked expansions. Could cause a hypoglycaemic attack (1) because her (blood) sugar is too low (1) this could cause shakiness/trembling/sweating/confusion/loss of consciousness/dizziness (1) performance levels/intensity will reduce/drop/fatigue quicker (1). Accept any other appropriate answer	4

Question Number	Answer	Mark
16 - E	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 system used for the shot put • Anaerobic • It fuels activity lasting up to 8–10 seconds • Uses explosive power/high intensity activity • PC is broken down • By creatine kinase • Coupled reaction/ADP+P =ATP • Yield 1 ATP • Phosphocreatine stores are replenished in 2–4 minutes/recovery time is short/1 second work for 10 second recovery • so supported during breaks between throws/so Sam 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. • Provides little or no reference to the context in the question. • 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 2	3–4	• Demonstrates accurate knowledge and understanding. • Line(s) of argument occasionally supported through the application of relevant references to context in question.

		• Judgement is made from a partially-developed discussion, although the discussion may be imbalanced or superficial in places. Learners will produce some statements with development in the form of mostly accurate and relevant factual material leading to an assessment being presented. • The response may contain parts which lack clarity or organisation. There is evidence of correct technical language being used.
Level 3	5–6	• Demonstrates accurate knowledge and understanding. • Line(s) of argument supported throughout by sustained application of relevant references to context in the question. 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 these to reach a valid assessment. • Response demonstrates good organisation, clarity and use of technical language.

Question Number	Answer	Mark
17- E	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. **Respiratory system adaptations** • **Increased vital capacity** – Which will enable an increased and more efficient supply of oxygen to her working muscles • **Increased strength of the respiratory muscles** – The diaphragm and intercostal muscles increase in strength, allowing for greater expansion of the chest cavity • **Increased oxygen and carbon dioxide diffusion rates** – Allows oxygen and carbon dioxide to diffuse more rapidly • Thus supplying more oxygen to the working muscles and removing carbon dioxide quicker **Muscular system adaptations** • **Hypertrophy –** enables an increased force of contraction • **Increased tendon strength –** will reduce the risk of injury • **Increase in the size/number of mitochondria** – Which results in the muscles being able to produce more aerobic energy • **Increase in myoglobin stores** – Therefore, more oxygen can be transferred to the mitochondria and energy production will be increased • **Increased storage of glycogen** – To use as an energy source to fuel her during the ride • **Increased storage of fat** – Used as energy when carbohydrates are low/intensity is low • **Increased tolerance to lactate** – Due to an extended capillary network, which enables greater volumes of blood to enter the muscle **Impact on performance** • Mina can work at a higher intensity for longer, (e.g.) can maintain her pedal speed/cycle faster for longer • Be able to complete the race in a quicker time • the onset of fatigue for Mina will be delayed to later in the race/delay lactic acid build up Accept any other appropriate answer.	8

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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