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BTEC

Mark Scheme (Results)

January 2024

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.
- 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 and exemplification may be limited.
- 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.

Question Number	Answer	Mark
1	Award **one** mark for identifying each bone correctly. • A – Pelvis/Pelvic/Illium (1) • B – Patella (1) • C – Fibula (1) • D – Metatarsal (1)	4

Question Number	Answer	Mark
2	Award **one** mark for identifying the skeletal adaptation and **one** mark for a linked justification up to **two** marks for each adaptation. Increased bone strength/density (1) reduces the onset of osteoporosis/less likely to break (1) Increased ligament strength (1) helps keeps joints stable/reduces the risk of injury (1) Accept any other appropriate answer.	4

Question Number	Answer	Mark
3a	Award **one** mark for movement occurring at the elbow joint. • Flexion	1

Question Number	Answer	Mark
3b	Award **one** mark for stating the classification of joint found at the elbow. • Hinge	1

Question Number	Answer	Mark
3c	Award **one** mark for identification of the function of a bursa and **two** further marks for appropriate expansion. Provides a cushion (between bones and tendons) (1) which helps reduce friction (1) and allows for free (1) as well as reducing the risk of injury (1) Accept any other appropriate answer.	3

Question Number	Answer	Mark
4	Award **one** mark for labelling each muscle correctly. • A – Gluteal (1) • B – Hamstring (1) • C – Gastrocnemius (1)	3

Question Number	Answer	Mark
5 a & b	Award **one** mark for each response, up to **three** marks. Must be in the correct order.	3

Phase of movement	Agonist muscle	Type of contraction
Lifting the weight up	Bicep/bicep brachii	Concentric
Lowering the weight down	Bicep/bicep brachii	Eccentric

Question Number	Answer	Mark
6	Award **one** mark for involuntary contraction and **one** mark for linked expansion. • Involuntary muscle contraction (1) that causes Gareth to stop his running (1) Accept any other appropriate answer/example.	2

Question Number	Answer	Mark
7 (a)	Award **one** mark for each adaptation, up to **two** marks. • Hypertrophy (1) • Increased tendon strength (1) • Increase in myoglobin stores (1) • Increase in storage of glycogen (1) • Increase in storage of fat (1) • Increased tolerance/resistance to lactate (1) Accept any other appropriate answer.	2

Question Number	Answer	Mark
7 (b)	Award **one** mark for explaining that increasing the number and size of mitochondria will be beneficial and up to **two** further marks for linked expansion. Sites for aerobic respiration (1) allows for more (aerobic) energy production (1) enabling Steph to keep running around the court during a rally/delayed onset of fatigue (1) Accept any other appropriate answer.	3

Question Number	Answer	Mark
8	Award **one** mark for each descriptive point, up to a maximum of **four** marks. **Inspiration** • During inspiration the diaphragm contracts/flattens (1) this **increases** the volume of the thoracic cavity/**decreases** the pressure (1) **Expiration** • During expiration the diaphragm relaxes/domes (1) this **decreases** the volume of the thoracic cavity/**increases** the pressure (1)	4

Question Number	Answer	Mark
9(a)	Award **one** mark for lung volume correctly identified. • A – Minute ventilation • B – Residual volume • C – Tidal volume	3

Question Number	Answer	Mark
9 (b)	Award **one** mark for stating that vital capacity would increase and up to **two** additional marks for linked expansions. Credit to a total of **three** marks. Vital capacity would increase (1) therefore **more oxygen** would be taken in (1) to ensure that Jess can work for longer at a higher intensity (1) Accept any other appropriate answer.	3

Question number	Indicative content
9(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. **Immediate effects** • Air is at a lower pressure/less O_2 in air • which causes **hypoxia** • Jess may experience, dizziness/altitude sickness • The respiratory system works harder by increasing breathing rate • the concentration/diffusion gradient is reduced • Less oxygen is transported to the working muscles • This can result in lower capacity to train/performance declines **Long-term effects** • Increased strength of the respiratory muscles/increased vital capacity • Increased number of red blood cells • A greater capacity to carry oxygen to the working muscles • Increase oxygen diffusion rate **Impact on performance** • (Long term) Improved recovery times in the break between rounds 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	Award **one** mark for labelling each structure of the cardiovascular system correctly. • A – Aorta (1) • B – Vena cava (1) • C - Septum (1) • D – Left ventricle (1)	4

Question Number	Answer	Mark
11	Award **one** mark for the effect and **one** mark for linked expansion. • Causes a person to feel dizzy/fainting/tired (1) • Because of the restricted amount of **<u>oxygen</u>** reaching vital organs and muscles (1) Accept any other appropriate answer.	2

Question Number	Answer	Mark
12	Award **one** mark for each descriptive point, up to a maximum of **three** marks. • White blood cells (leukocytes) (1) are transported to the site of the infection (1) they **<u>destroy</u>** pathogens/substances/produce antibodies (1) Accept any other appropriate answer.	3

Question Number	Answer	Mark
13 (a)	Award up to **two** marks for identifying cardiovascular adaptations. • Increased stroke volume/increased SV (1) • Decreased **resting** heart rate (1) • Capillarisation of skeletal muscle and alveoli (1) • Reduction in **resting** blood pressure(1) • Decreased heart rate recovery time (1)	2

Question Number	Answer	Mark
13 (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. **Cardiac hypertrophy** • Is the enlargement of the heart/heart gets bigger/thicker • Heart walls get and stronger/can produce stronger contractions • More blood can be pumped from the heart per beat/increased stroke volume **Increased blood volume** • Blood volume increases due to capillarisation • More oxygen can be delivered (to the working muscles) • More waste products can be removed • Body temperature can be regulated more effectively during exercise **Impact on performance** • To maintain a high intensity for longer during the game • Enabling Billie to recover quicker between points • To delay the onset of fatigue/lactate accumulation (and maintain form in the later sets) 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*.		
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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</td><td>Award one mark for each correct identification of the number of ATP produced, up to three marks.

<table>
<tr><th>Aerobic energy system stage</th><th>Amount of ATP Produced</th></tr>
<tr><td>Aerobic glycolysis</td><td>2</td></tr>
<tr><td>Krebs cycle</td><td>2</td></tr>
<tr><td>Electron transport chain</td><td>34</td></tr>
</table>
</td><td>3</td></tr>
</table>

Question Number	Answer	Mark
15	Award **one** mark for lactic acid is produced as a by-product and up to **three** marks for linked expansions. Lactic acid is produced as a by-product (1) and builds up/accumulates in the blood/muscle (1) it then starts to cause fatigue/impedes muscle contraction (1) Paul's pace in the race will reduce (1) Accept any other appropriate answer.	4

Question Number	Answer	Mark
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. • First energy system used/immediate source of energy • Anaerobic • Takes place in the sarcoplasm • PC is the fuel/PC broken down to P + C • By creatine kinase • Coupled reaction/ADP + P = ATP • Yield of 1ATP • Creates energy for explosive/high intensity exercise • Duration up to 10 seconds • Fast recovery time – ratio 1:10-12s/3 minutes Accept reference to ATP system but maximum Band 1 2 marks	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.

Question Number	Answer	Mark
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 responses** • **Increased blood supply** due to a greater demand for oxygen/due to increased metabolic activity • Vasodilation occurs at blood vessels to allow more blood to enter the muscle to supply it with oxygen • **Increased muscle temperature** occurs due to the breakdown of energy • The higher the intensity of the exercise, the more heat is produced • **Increased muscle pliability** because of increased muscle temperature • Therefore, reduces the risk of an injury such as a muscle strain • This will also improve joint flexibility, enabling the muscles to stretch further/increased range of movement • **Increased lactate production** will occur during the race because the event is anaerobic **Cardiovascular responses** • **Increased heart rate** to enable more oxygenated blood to the working muscles/greater removal of waste products. • **Increased cardiac output** is the amount of blood pumped out of the heart per minute • HR X SV =Q • **Increased blood pressure,** systolic blood pressure increases because Claire's heart is working harder in the session • Diastolic blood pressure remains the same or decreases slightly due to less force on the arteries • **Redirection of blood flow** occurs to make sure it goes to the areas that need it most during the race • The body does this by using vasodilation to the working muscles and vasoconstriction to the non-	8

	essential organs **Impact on performance** • Work at a high intensity aerobically/for longer in the session • **(Pliability)** increase power in the stroke due to increased joint flexibility and muscle pliability • **Increased lactate production** will cause muscle fatigue if not removed/stop contractions • Fatigue will be delayed until later in the session (by increased oxygen supply/removal of waste) Accept any other appropriate answer.	

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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