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BTEC

Mark Scheme (Results)

June 2023

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.
- 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 labelling each bone correctly. • A – Clavicle (1) • B – Humerus (1) • C – Ulna (1) • D – Radius (1) Accept phonetic spelling.	4

Question Number	Answer	Mark
2a	Award **one** mark for identifying the postural deviation and **one** mark for describing it. **Two marks** for each deviation. Kyphosis (1) curve and can cause a hunchback appearance. (1) Scoliosis (1) abnormal curvature to the left or right (1) Accept any other appropriate answer.	4

Question Number	Answer	Mark
2b	Award **one** mark for stating the classification of joint found at the thoracic vertebrae. • Cartilaginous/Slightly moveable (1)	1

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

Question Number	Answer	Mark
3b	Award **one** mark for identifying synovial fluid lubricates the joint and up to **two** marks for linked expansion. Synovial fluid lubricates the joint (1) and reduces friction/prevents bones from rubbing together (1) to enable Emily to have a **greater** range of movement/power. (1) Accept any other appropriate answer.	3

Question Number	Answer	Mark
4	Award **one** mark for labelling each muscle type/example correctly. • A – Cardiac (1) • B – Intestines/stomach (1) • C – Skeletal (1)	3

Question Number	Answer	Mark
5	Award **one** mark for each response, up to **three** marks. • **Increased** blood supply (1) • **Increased** temperature (1) • Microtears (1) • Lactate **build up** (1)	3

Question Number	Answer	Mark
6	Award **one** mark for benefit and **one** mark for linked expansions. • Use fat as an (alternative) energy source (1) helps carbohydrate stores last longer in the race (1) Accept any other appropriate answer/example.	2

Question Number	Answer	Mark
7 (a)	Award **two** marks for identifying the antagonistic pair **and** describing their actions. The triceps is the agonist/contracts/working muscle (1) the biceps is the antagonist/relaxes to enable the agonist (triceps) to work. (1) Accept any other appropriate answer.	2

Question Number	Answer	Mark
7 (b)	Award **one** mark for explaining that muscular hypertrophy will be beneficial and up to **two** further marks for linked expansion. Increases the size/strength of his leg muscles (1) therefore he can create more force/power (1) enabling Mo to jump high to do a shot/defend (1) Accept any other appropriate answer.	3

Question Number	Answer	Mark
8	Award **one** mark for labelling each respiratory structure correctly. • A – Pharynx (1) • B – Larynx (1) • C – Bronchi (1) • D – Alveoli (1)	4

Question Number	Answer	Mark
9(a)	Award **three** marks for explaining why tidal volume increases. Due to an increased **demand/need** of O_2 within the muscles(1) therefore **more** O_2 **taken** in (1) CO_2 production has **increased** (1) therefore **more** CO_2 is **removed** (1) Accept any other appropriate answer.	3

Question Number	Answer	Mark
9 (b)	Award **one** mark for identifying the respiratory muscles and up to **two** additional marks for a linked expansion. Credit to a total of **three** marks. **Diaphragm/intercostal muscles** (increase in strength) (1) allowing expansion of the chest cavity/easier to take deeper breaths/more air/O_2 taken in (1) and more energy can be produced/delay fatigue/reduced lactate build up (1) Accept any other appropriate answer.	3

<table>
<tr><th>Question number</th><th>Indicative content</th></tr>
<tr><td>9(c)</td><td>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.

• (General) Diffusion rate is the speed of transfer of gases
• (General) Gases move from a high concentration to a low concentration
• The steeper the diffusion gradient the quicker the gases move
• An increased diffusion rate of oxygen would mean greater/more uptake of oxygen into the blood/delivery of oxygen to the muscles
• The greater/more removal of carbon dioxide will prevent CO_2 build up

Affects on Performance
• (With more oxygen available) to the muscles they can work aerobically for longer/recover more quickly/break down lactic acid
• so he can maintain his pace/(pedal) 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 appropriate answer.</td></tr>
<tr><td colspan="2">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*.</td></tr>
<tr><td colspan="2"><table>
<tr><th>Level</th><th>Mark</th><th>Descriptor</th></tr>
<tr><td>Level 0</td><td>0</td><td>No rewardable material.</td></tr>
<tr><td>Level 1</td><td>1–2</td><td>• 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.</td></tr>
<tr><td>Level 2</td><td>3–4</td><td>• 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.</td></tr>
<tr><td>Level 3</td><td>5–6</td><td>• 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.</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>10a & 10b
(Clip together)</td><td>Award one mark for each correct identification of the component of blood, up to a total of two marks.

Award one mark for each associated function, up to a total of two marks.

<table>
<tr><th></th><th>(a) - Component of blood</th><th>(b) – Function of component of blood</th></tr>
<tr><td>1</td><td>Red blood cells/ RBC (1)</td><td>Transport/deliver/carry oxygen (1)</td></tr>
<tr><td>2</td><td>Platelets (1)</td><td>Clot the blood (1) / prevent bleeding (1)</td></tr>
<tr><td>3</td><td>White blood cells/WBC (1)</td><td>Fight infection (1)</td></tr>
</table>
</td><td>2 + 2</td></tr>
</table>

Question Number	Answer	Mark
11	Award **one** mark for identifying what hyperthermia is and up to **one** mark for linked expansion. • Elevated body temperature above 38°C/100F/abnormally high body temperature (1) • due to failed thermoregulation/inability to sweat (1) Accept any other appropriate answer.	2

Question Number	Answer	Mark
12 (a)	Award up to **two** marks for explaining the changes in heart rate before the race. There is an anticipatory rise (1) due to adrenaline being released (1) Accept any other appropriate answer.	2

Question Number	Answer	Mark
12 (b)	Award up to **three** marks for explaining the changes in heart rate during the race. There is a rapid increase in heart rate in the first three minutes (1) due to increased demand of O2 (1) the heart rate then **plateaus** (1) because oxygen supply has met demand. (1) Accept any other appropriate answer.	3

Question Number	Answer	Mark
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. • Redistribution of blood is called the vascular shunt happens through vasoconstriction which is reduced blood flow • Vasodilation which is increased blood flow,(increased blood flow) greater supply of oxygen and nutrients to working muscles • (increased blood flow) for thermoregulation to cool the body (via evaporation of sweat) • (less blood flow) as the priority is movement rather than digestion **Impact on Performance** • Enable Kellis to play at a high intensity for a longer duration • Help Kellis withstand fatigue until later in the game 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</td><td>Award one mark for each correct identification of the chemical source, up to a total of two marks.

Award one mark for the amount of ATP produced, up to a total of two marks.

<table>
<tr><th>Energy system</th><th>Chemical source/fuel</th><th>Amount of ATP produced</th></tr>
<tr><td>ATP-PC</td><td>Phosphocreatine/PC/ creatine phosphate/CP (1)</td><td>1 ATP (1)</td></tr>
<tr><td>Lactate</td><td>Glycogen/glucose (1)</td><td>2 ATP (1)</td></tr>
</table>
</td><td>4</td></tr>
</table>

Question Number	Answer	Mark
15	Award **one** mark for each descriptive point, up to a maximum of **three** marks. • (The electron transport chain/ETC) occurs when oxygen is present/part of the aerobic system (1) • It occurs in the mitochondria (1) • It receives hydrogen ions (1) • 32–34 ATP are created (1) • Water is the by-product (1) Accept any other appropriate answer.	3

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. **ATP-PC system** • **(General)** System used for high intensity activity lasting up to 10 seconds/ Phosphocreatine stores are replenished in 2–4 minutes. • Used when hitting powerful shots (smash, drive, serve)/sprinting around the court to return shots • Breaks between points and games allow for recovery **Lactate system** • **(General)** Provides energy for moderate to high intensity activity, only lasts for 1–3 minutes • Will be used during long, intense rallies that last longer than 10 seconds • When recovery periods between points are short. **Aerobic system** • **(General)** Submaximal system (low/medium intensity) in exercise longer than 3 minutes/2-3 hours. • Used throughout the game to support the anaerobic systems • Fatigue later in the match/last the duration of the match • Works when intensity falls between points/games and helps the anaerobic systems/muscles recover. Accept any other appropriate 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 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	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. **Cardiovascular system** • Jesse's cardiovascular system will have adapted through **cardiac hypertrophy** • this **increases stroke volume** • giving him a greater maximal cardiac output • this will give Jesse a greater heart rate range to utilise when playing football • Jesse will also have an **increased blood volume** • **Capilliarisation around the alveoli and in the muscles** will increase the efficiency of gaseous exchange. • More oxygen is transported to his muscles • **Decreased heart rate recovery time** **Energy systems** • **Increased creatine stores**, providing more energy and supporting recovery from high intensity runs around the pitch • **Increased tolerance to lactate** will enable Jesse to clear out the lactate more efficiently due to larger oxygen consumption • **Increased use of fats as an energy source**, so that glycogen can be used later in the game • **Increased storage of glycogen** to provide energy for ATP production • **Increased number of mitochondria** will increase the amount of ATP production to support an increased demand for energy • More efficient energy systems. **Impact on performance** • He can work at a higher intensity for longer, e.g. can make high intensity runs around the pitch • Keep active around the pitch for longer before he starts feeling fatigued/will last the 90 minutes. 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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