

Mark Scheme

June 2019

Pearson BTEC Level 3 - Sport

Unit 1: Anatomy and Physiology  
(31524)

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## **Unit 1: Anatomy and Physiology – sample marking grid**

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### **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**

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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	<p>Award <b>one</b> mark for labelling each bone correctly.</p> <ul style="list-style-type: none"> <li>• A – Clavicle (1) (DNA collarbone)</li> <li>• B – Sternum (1) (DNA breastbone)</li> <li>• C – Ribs/Rib Cage (1)</li> </ul> <p><b>Accept phonetic spelling.</b></p> <ul style="list-style-type: none"> <li>• *DNA = Do not accept</li> </ul>	3

Question Number	Answer	Mark
2a	<p>Award <b>one</b> mark for an example of a fibrous joint.</p> <ul style="list-style-type: none"> <li>• Cranium – (DNA skull)</li> <li>• Pelvis – (DNA hips)</li> <li>• Sacrum – (DNA spine/vertebrae)</li> <li>• Coccyx – (DNA spine/vertebrae)</li> </ul> <p>Accept phonetic spelling. *DNA = Do not accept</p>	1

Question Number	Answer	Mark
2b	<p>Award <b>one</b> mark for each characteristic of a fibrous joint, up to a maximum of <b>two</b> marks.</p> <ul style="list-style-type: none"> <li>• Do not move/no movement (1)</li> <li>• Bones interlock/overlap (1)</li> <li>• The joints are held together with bands of fibrous/tough tissue (1)</li> </ul>	2

Question Number	Answer	Mark
3 (a)	<p>Award <b>one</b> mark for identifying why regular weight-bearing activities will help reduce osteoporosis and up to <b>three</b> marks for justifying that reason.</p> <p>The weight-bearing activities causes additional stress or damage to the bone/help make the bones stronger/denser (1) enabling osteoclasts to clear away old bone (1) increasing osteoblast activity to build new bone (1) allowing the bones to take up more calcium/minerals (1) and making them less likely to break/fracture in later life (1)</p> <p>Accept any other appropriate answer.</p>	4

Question Number	Answer	Mark
3 (b)	<p>Award up to <b>three</b> marks for explaining why weight training is not recommended for children.</p> <p>A child's bones are still growing (1) and too much force can damage the epiphyseal/growth plates (1) this can result in stunted growth/can stop growth (1)</p> <p>Accept any other appropriate answer.</p>	3

Question Number	Answer	Mark
4	<p>Award <b>one</b> mark for labelling each muscle correctly.</p> <ul style="list-style-type: none"> <li>• A – Pectorals/Pectoralis/Pectoralis Major/Pectorialis Minor (1) (DNA Pecs)</li> <li>• B – Trapezius (1) (DNA Traps)</li> <li>• C – Latissimus dorsi (1) (DNA Lats)</li> </ul> <p><b>Accept phonetic spelling.</b> *DNA = Do not accept</p>	3

Question Number	Answer	Mark
5	<p>Award <b>one</b> mark for each characteristic of type IIX muscle fibres, up to <b>three</b> marks.</p> <ul style="list-style-type: none"> <li>• Contract with a lot of force (1)</li> <li>• Contract quickly (1)</li> <li>• Not resistant to fatigue/tire quickly (1)</li> <li>• Large in size (1)</li> <li>• White colour (1)</li> <li>• Capillary density is low (1)</li> <li>• The number of mitochondria is small/few (1)</li> <li>• Glycolytic capacity is high (1)</li> <li>• Anaerobic (1)</li> <li>• Phosphocreatine levels are high (1)</li> </ul> <p>Accept any other appropriate answer.</p>	3

Question Number	Answer	Mark
6	<p>Award <b>one</b> mark for each characteristic of smooth muscle, up to maximum of <b>two</b> marks.</p> <ul style="list-style-type: none"> <li>• Involuntary (contractions) (1)</li> <li>• Slow speed of contraction (1)</li> </ul> <p>Accept any other appropriate example.</p>	2

Question Number	Answer	Mark
7 (a)	<p>Award <b>one</b> mark for identifying why an increase in glycogen is beneficial to performance and <b>one</b> mark for linked expansion.</p> <p>Provide readily available energy in the muscle (1) enabling her to run faster for longer/work at a higher intensity for longer/withstand fatigue for longer (1)</p> <p>Accept any other appropriate answer.</p>	2

Question Number	Answer	Mark
7 (b)	<p>Award <b>one</b> mark for explaining what causes muscle temperature to increase and up to <b>two</b> further marks for linked expansion.</p> <p>Temperature increases because muscles need energy (1) fats and carbohydrates are broken down/breakdown of fuel/food (1) and produce heat as a waste product (1)</p> <p>Do not award – any reference to flexibility, Accept any other appropriate answer.</p>	3

Question Number	Answer	Mark
8	<p>Award <b>four</b> marks for describing the mechanism of expiration at rest.</p> <ul style="list-style-type: none"> <li>• Diaphragm relaxes / <u>external</u> intercostal muscles relax (1)</li> <li>• The volume of the thoracic cavity decreases/ribs move <u>down and in</u> (1)</li> <li>• The pressure in the thoracic cavity is increased (1)</li> <li>• and air comes out (1)</li> </ul>	4

Question Number	Answer	Mark
9 (a)	Award <b>one</b> mark for providing a definition of vital capacity. <ul style="list-style-type: none"> <li>• <u>Maximum</u> amount of <u>air</u> expired after <u>maximum</u> inhalation (1)</li> </ul> Do not accept - oxygen/carbon dioxide.	1

Question Number	Answer	Mark
9(b)	Award <b>one</b> mark for stating the effect. <ul style="list-style-type: none"> <li>• It increases/speeds it up/makes it faster</li> </ul>	1

Question Number	Answer	Mark
10 (a)	<p>Award <b>two</b> marks for identifying the effects and <b>two</b> marks for linked expansion.</p> <p>More CO<sub>2</sub> leaves the body (1) and more oxygen taken in (to the working muscles) (1). These maintain the intensity/speed of her running (1) and delay fatigue/enabling her to run a faster time (1)</p> <p>Accept any other appropriate answer.</p>	4

Question number	Indicative content	
10(b)	<p>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.</p> <ul style="list-style-type: none"> <li>• Can be controlled through neural and chemical control</li> <li>• Chemoreceptors detect a change in the partial pressure of the gases in Shelly's body</li> <li>• Low levels/low partial pressure of oxygen/O<sub>2</sub></li> <li>• High levels/high partial pressure of carbon dioxide/CO<sub>2</sub>/low pH</li> <li>• These messages are sent to the medulla oblongata as the respiratory centre/RCC in the brain</li> <li>• Messages are then relayed to the respiratory muscles</li> <li>• Causing the diaphragm and intercostal muscles to work faster/harder</li> <li>• Enabling more oxygen to enter the lungs/bloodstream</li> <li>• More carbon dioxide to be removed from the bloodstream/body</li> <li>• That enables Shelly's muscles to receive more oxygen and work aerobically.</li> </ul> <p>Accept any other appropriate answer.</p>	
<p><b>Mark scheme (award up to 6 marks)</b> refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.</p>		
Level	Mark	Descriptor
Level 0	0	No rewardable material.
Level 1	1–2	<ul style="list-style-type: none"> <li>• Demonstrates isolated elements of knowledge and understanding.</li> <li>• Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question.</li> <li>• Limited analysis which contains generic assertions rather than interrelationships or linkages.</li> </ul>
Level 2	3–4	<ul style="list-style-type: none"> <li>• Demonstrates some accurate knowledge and understanding.</li> <li>• Breaks the situation down into component parts and some of the points made will be relevant to the context in the question.</li> <li>• Displays a partially developed analysis which considers some interrelationships or linkages but not always sustained.</li> </ul>
Level 3	5–6	<ul style="list-style-type: none"> <li>• Demonstrates mostly accurate knowledge and understanding.</li> <li>• Breaks the situation down into component parts and most of the points made will be relevant to the context in the question.</li> <li>• Displays a developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner.</li> </ul>

Question Number	Answer	Mark
11	<p>Award <b>one</b> mark for naming each structure correctly.</p> <ul style="list-style-type: none"> <li>• A – Aorta (1)</li> <li>• B – Vena cava (1)</li> <li>• C – Coronary artery (1)</li> <li>• D – Semi-lunar/aortic/pulmonary valve(s) (1)</li> </ul>	4

Question Number	Answer	Mark
12	<p>Award up to <b>two</b> marks for describing sudden arrhythmic death syndrome.</p> <p>Disruption to the rhythm of the heart (1) which can cause the heart to stop beating / which could lead to death (1)</p>	2

Question Number	Answer	Mark
13 (a)	<p>Award <b>one</b> mark for the effects decreased heart rate recovery time has on performance, up to <b>two</b> marks.</p> <p>This allows Imran to recover following periods of (high intensity) work quickly (1) and therefore able to tackle/run again quicker (1)</p> <p>Accept any other appropriate answer.</p>	2

Question Number	Answer	Mark
13 (bi)	<p>Award <b>one</b> mark for stating the change in cardiac output correctly.</p> <ul style="list-style-type: none"> <li>• It increases (1)</li> </ul>	1

Question Number	Answer	Mark
13 (bii)	<p>Award <b>one</b> mark for identifying each component correctly, for a maximum <b>two</b> marks</p> <ul style="list-style-type: none"> <li>• Anticipatory rise (1)</li> <li>• Heart rate/HR (1)</li> <li>• Stroke volume/SV (1)</li> </ul>	2

Question Number	Answer	Mark
13 (c)	<p>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.</p> <ul style="list-style-type: none"> <li>• Vasoconstriction of blood vessels/arterioles to areas where blood is not required</li> <li>• Vasodilation of blood vessels/arterioles to areas where blood is required, which results in increased blood flow to skeletal muscle</li> <li>• More blood is required to supply oxygen and nutrients to working muscles</li> <li>• Increased blood supply to remove waste products</li> <li>• Increased blood flow to the skin for thermoregulation to cool the body via evaporation of sweat</li> <li>• Less blood flow to the non-essential organs as the focus during exercise is for increased blood flow to support the body with movement rather than digestion</li> <li>• Redistribution of blood is called the vascular shunt mechanism</li> <li>• Redistribution of blood is controlled by the medulla</li> </ul>	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	<ul style="list-style-type: none"> <li>• Demonstrates isolated elements of knowledge and understanding.</li> <li>• Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question.</li> <li>• Limited analysis which contains generic assertions rather than interrelationships or linkages.</li> </ul>
Level 2	3-4	<ul style="list-style-type: none"> <li>• Demonstrates some accurate knowledge and understanding.</li> <li>• Breaks the situation down into component parts and some of the points made will be relevant to the context in the question.</li> <li>• Displays a partially developed analysis which considers some interrelationships or linkages but not always sustained.</li> </ul>

Level 3	5-6	<ul style="list-style-type: none"> <li>• Demonstrates mostly accurate knowledge and understanding.</li> <li>• Breaks the situation down into component parts and most of the points made will be relevant to the context in the question.</li> <li>• Displays a developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner.</li> </ul>
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Question Number	Answer	Mark
14	<p>Award <b>one</b> mark for each descriptive point, up to a maximum of <b>four</b> marks.</p> <ul style="list-style-type: none"> <li>• (The electron transport chain/ETC) only occurs when oxygen is present (1)</li> <li>• It occurs in the mitochondria (1)</li> <li>• It receives hydrogen ions/hydrogen from the Krebs cycle (1)</li> <li>• 32-34 ATP are created (1)</li> <li>• Water is the by-product (1)</li> </ul> <p>Accept an ATP value between 32 to 34. Accept any other appropriate answer.</p>	4

Question Number	Answer	Mark
15	<p>Award <b>one</b> mark for each descriptive point, up to a maximum of <b>three</b> marks.</p> <ul style="list-style-type: none"> <li>• Glycogen/glucose is converted into pyruvate/pyruvic acid (1)</li> <li>• There is oxygen present (1)</li> <li>• The pyruvate/pyruvic acid goes into the Krebs cycle (1)</li> <li>• This reaction yields 2 ATP molecules (1)</li> <li>• This takes place in the sarcoplasm (1)</li> </ul>	3

Question Number	Answer	Mark
16	<p>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.</p> <ul style="list-style-type: none"> <li>• All three systems work together to provide the energy.</li> </ul> <p><b>ATP-PC system</b></p> <ul style="list-style-type: none"> <li>• System used for activity lasting 8-10 seconds and the main system used in tennis</li> <li>• Used when hitting powerful shots/smash/serve</li> <li>• Sprinting around the court to return shots</li> <li>• Phosphocreatine stores are replenished in 2-4 minutes, so supported during breaks between points and games.</li> </ul> <p><b>Lactate system</b></p> <ul style="list-style-type: none"> <li>• Provides energy for moderate to high intensity activity</li> <li>• Only lasts for 1-3 minutes</li> <li>• Will be used during long, intense rallies that last longer than 10 seconds</li> <li>• When recovery periods between points are short.</li> </ul> <p><b>Aerobic system</b></p> <ul style="list-style-type: none"> <li>• Submaximal system in exercise longer than 1 minute</li> <li>• Helps support the anaerobic systems during the game</li> <li>• To supply the energy when the match is long</li> <li>• Works when intensity falls between points/games and helps the muscles recover.</li> </ul>	6
<b>Mark scheme (award up to 6 marks)</b> refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.		
<b>Level</b>	<b>Mark</b>	<b>Descriptor</b>

Level 1	1-2	<ul style="list-style-type: none"> <li>• Demonstrates isolated elements of knowledge and understanding.</li> <li>• Provides little or no reference to the context in the question.</li> <li>• A conclusion may be presented, but will be generic and the supporting evidence will be limited. Limited attempt to address the question.</li> <li>• Response is likely to lack clarity, organisation and the required technical language.</li> </ul>
Level 2	3-4	<ul style="list-style-type: none"> <li>• Demonstrates accurate knowledge and understanding.</li> <li>• Line(s) of argument occasionally supported through the application of relevant references to context in question.</li> <li>• 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.</li> <li>• The response may contain parts which lack clarity or organisation. There is evidence of correct technical language being used.</li> </ul>
Level 3	5-6	<ul style="list-style-type: none"> <li>• Demonstrates accurate knowledge and understanding.</li> <li>• 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.</li> <li>• 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.</li> <li>• Response demonstrates good organisation, clarity and use of technical language.</li> </ul>

Question Number	Answer	Mark
17	<p>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.</p> <p><b>Cardiovascular system</b></p> <ul style="list-style-type: none"> <li>• Callum's cardiovascular system will have adapted through cardiac hypertrophy</li> <li>• this increases stroke volume and reduces the need for the heart to beat so many times thus slowing the cardiac cycle</li> <li>• this will give Callum a greater heart rate range to utilise when playing hockey</li> <li>• giving him a greater maximal cardiac output</li> <li>• Callum will also have an increased blood volume</li> <li>• meaning more oxygen is transported to his muscles</li> <li>• More efficient and his recovery time will be reduced</li> <li>• Capillarisation around the alveoli and in the muscles will increase the efficiency of gaseous exchange</li> </ul> <p><b>Respiratory system</b></p> <ul style="list-style-type: none"> <li>• Callum's respiratory muscles will increase in strength</li> <li>• contributing to an increased vital capacity to increase the volume of air moving into and out of the lungs</li> <li>• this means that he will be able to better utilise the increased oxygen coming into the body (through increased lung volumes) to sustain aerobic energy production for longer</li> <li>• so he is able to play hockey for sustained periods</li> <li>• there will be an increase in oxygen and carbon dioxide diffusion rates</li> <li>• Callum's increased ability to utilise oxygen breathed into the body will mean that more oxygen is available to break down lactic acid</li> </ul> <p><b>Application to Performance</b></p> <ul style="list-style-type: none"> <li>• e.g. Maintain man marking for longer</li> <li>• e.g. Recover from a run down the wing quicker</li> <li>• e.g. Make more repeated sprints to chase the ball</li> <li>• the delay of OBLA/lactate threshold is a result of Callum's increased VO<sub>2</sub>max, i.e. the maximal amount of oxygen Callum is able to utilise per minute, so we can see that Callum's continuous training sessions resulted in an increased VO<sub>2</sub> max, increasing Callum's fitness for hockey</li> </ul>	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	<ul style="list-style-type: none"> <li>• Demonstrates isolated elements of knowledge and understanding.</li> </ul>

		<ul style="list-style-type: none"> <li>• Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question.</li> <li>• Limited analysis which contains generic assertions rather than interrelationships or linkages.</li> </ul>
Level 2	4-6	<ul style="list-style-type: none"> <li>• Demonstrates some accurate knowledge and understanding.</li> <li>• Breaks the situation down into component parts and some of the points made will be relevant to the context in the question.</li> <li>• Displays a partially developed analysis which considers some interrelationships or linkages but not always sustained.</li> </ul>
Level 3	7-8	<ul style="list-style-type: none"> <li>• Demonstrates mostly accurate knowledge and understanding.</li> <li>• Breaks the situation down into component parts and most of the points made will be relevant to the context in the question.</li> <li>• Displays a developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner.</li> </ul>

