

Mark Scheme (Final)

January 2020

Pearson BTEC Level 3 – Sport

Unit 1: Anatomy and Physiology  
(31524H)

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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	Award <b>one</b> mark for labelling each bone correctly. <ul style="list-style-type: none"><li>• A – Tibia (1) (DNA Tibula)</li><li>• B – Fibula (1) (DNA Fibia)</li><li>• C – Metatarsals (1)</li></ul> Accept phonetic spelling. *DNA = Do not accept	3

Question Number	Answer	Mark
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2 (a) & (b)	Award <b>one</b> mark for each identification of a joint type, up to a total of <b>two</b> marks.		2+2	
	Award <b>one</b> mark for each associated movement, up to a total of <b>two</b> marks.			
		(a) joint type		(b) movement
	Knee	Hinge		Flexion
	Hip	Ball and socket	Flexion	
Accept phonetic spelling.				

Question Number	Answer	Mark
3	<p>Award up to <b>two</b> marks for a description of the range of movement at the ankle.</p> <ul style="list-style-type: none"> <li>• The movement is from dorsiflexion (1) to plantarflexion (1)</li> <li>• The movement is from plantarflexion (1) to dorsiflexion (1)</li> </ul> <p>Accept phonetic spelling.</p>	2

Question Number	Answer	Mark
4	<p>Award up to <b>one mark</b> for releases synovial fluid and <b>one</b> mark for linked expansions.</p> <ul style="list-style-type: none"> <li>• Releases synovial fluid (1) which lubricates the joint/absorbs impact/that protects the joint/reduces friction (1)</li> </ul> <p>Accept any other appropriate answer.</p>	2

Question Number	Answer	Mark
5	<p>Award <b>one</b> mark for identifying that bones grow through ossification and up to <b>two</b> marks for linked expansion.</p> <p>Bones start as cartilage and harden through ossification (1) Osteoblasts build new bone/change cartilage to bone (1) Osteoclasts break down bone (1) and epiphyseal plates/growth plates seal off once bone is fully grown (1)</p> <p>Accept any other appropriate answer.</p>	3

Question Number	Answer	Mark									
6 (a) & (b)	<p>Award <b>one</b> mark for each identification of an agonist muscle, up to a total of <b>two</b> marks.</p> <p>Award <b>one</b> mark for each identification of a type of contraction, up to a total of <b>two</b> marks.</p> <table border="1"> <thead> <tr> <th>Joint movement</th> <th>(a) Agonist</th> <th>(b) Type of contraction</th> </tr> </thead> <tbody> <tr> <td>Knee extension (lead leg)</td> <td>Quadriceps</td> <td>Concentric</td> </tr> <tr> <td>Knee flexion (trail leg)</td> <td>Hamstrings</td> <td>Concentric</td> </tr> </tbody> </table> <p>Accept phonetic spelling. DNA abbreviated versions of the muscle.</p>	Joint movement	(a) Agonist	(b) Type of contraction	Knee extension (lead leg)	Quadriceps	Concentric	Knee flexion (trail leg)	Hamstrings	Concentric	2 + 2
Joint movement	(a) Agonist	(b) Type of contraction									
Knee extension (lead leg)	Quadriceps	Concentric									
Knee flexion (trail leg)	Hamstrings	Concentric									

Question Number	Answer	Mark
7	<p>Award <b>one</b> mark for identification of a characteristic of skeletal muscle.</p> <ul style="list-style-type: none"> <li>Skeletal muscle is voluntary (1)</li> </ul> <p>Accept any other appropriate answer.</p>	1

Question Number	Answer	Mark
8(a)	<p>Award <b>one</b> mark for identification of the agonist and <b>one</b> mark for identification of the antagonist. Award up to <b>one</b> additional mark for each linked descriptive point about the respective action. Credit to a total of <b>four</b> marks.</p> <ul style="list-style-type: none"> <li>The abdominals are the agonist/contract (1) to cause flexion (of the trunk) (1) the erector spinae is the antagonist/relax (1) to allow/support contraction of the agonist/abdominals (1)</li> </ul> <p>Accept any other appropriate answer.</p>	4

Question Number	Answer	Mark
8(b)	<p>Award <b>one</b> mark for describing cramp and <b>one</b> mark for impact on performance.</p> <ul style="list-style-type: none"> <li>Cramp is an involuntary sustained muscle contraction (1) that prevents continuation of play (1)</li> </ul> <p>Accept any other appropriate answer.</p>	2

Question Number	Answer	Mark
8(c)	<p>Award <b>one</b> mark for explanation of why type IIa muscle fibres are used in basketball and up to <b>two</b> further marks for linked expansion.</p> <ul style="list-style-type: none"> <li>Type IIa are used during any high intensity prolonged work/medium or moderate intensity (1) such as running back down the court after losing the ball (1) because they contract with more force than type I/slower to fatigue than type IIx (1)</li> </ul> <p>Accept any other appropriate answer.</p>	3

Question Number	Answer	Mark
9	<p>Award <b>one</b> mark for labelling each respiratory structure correctly.</p> <ul style="list-style-type: none"> <li>1- Pharynx</li> <li>2- Larynx</li> <li>3- Trachea (DNA Windpipe)</li> <li>4- Bronchioles</li> </ul> <p>Accept phonetic spelling. *DNA = Do not accept</p>	4

Question Number	Answer	Mark
10	<p>Award <b>one</b> mark for stating the role of chemoreceptors.</p> <ul style="list-style-type: none"> <li>To detect chemical changes in the blood (1)</li> </ul> <p>Also accept examples of chemical changes, e.g. detect increase in CO<sub>2</sub>/drop in pH/increase in acidity.</p>	1

Question Number	Answer	Mark
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11	<p>Award <b>one</b> mark for identifying that gas exchange occurs through diffusion and up to <b>three</b> marks for linked expansion.</p> <ul style="list-style-type: none"> <li>• Occurs due to diffusion (1) Oxygen in the alveoli is at a <b>high</b> concentration (1) oxygen in the blood/capillaries is at a <b>low</b> concentration (1) so oxygen moves from the alveoli into the blood/capillaries (1)</li> <li>• Occurs due to diffusion (1) Carbon dioxide in the alveoli is at a <b>low</b> concentration (1) carbon dioxide in the blood/capillaries is at a <b>high</b> concentration (1) so carbon dioxide moves from the blood/capillaries into the alveoli (1)</li> </ul> <p>Accept any other appropriate answer.</p>	4
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Question number	Indicative content
12	<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>Vital capacity</b></p> <ul style="list-style-type: none"> <li>• Maximum amount of air exhaled from the lungs following deepest breath</li> <li>• IRV + ERV +TV</li> <li>• Increases the amount of oxygen that is diffused into the working muscle</li> <li>• Increases the amount of carbon dioxide that is diffused out of the body</li> </ul> <p><b>Increased strength of respiratory muscles</b></p> <ul style="list-style-type: none"> <li>• Diaphragm and intercostal muscles will increase in strength/greater force of contraction of respiratory muscles</li> <li>• Allowing for a greater expansion of the chest cavity/the lungs to expand more</li> <li>• Therefore, increasing tidal volume</li> <li>• Which enables more oxygen to be delivered to the working muscles</li> <li>• Therefore, greater volume of air expired</li> </ul> <p><b>Impact on performance</b></p> <ul style="list-style-type: none"> <li>• Play at a higher intensity, later into the game, still be able to make runs</li> <li>• Withstand fatigue/delay the onset of fatigue/recover quicker when off the ball</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> </ul>
		<ul style="list-style-type: none"> <li>• Displays a developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner.</li> </ul>

Question Number	Answer	Mark
13	Award <b>one</b> mark for naming each structure correctly. <ul style="list-style-type: none"> <li>• A – Vena cava (1)</li> <li>• B – Pulmonary vein (1)</li> <li>• C – Left ventricle (1)</li> </ul>	3

Question Number	Answer	Mark
14	Award <b>one</b> mark for identifying what hyperthermia is and up to <b>two</b> marks for linked expansion. <ul style="list-style-type: none"> <li>• Body temperature is elevated beyond normal/37.5°C (1) due to the body not being able to release enough heat (1) because of failed thermoregulation (1)</li> </ul> Accept any other appropriate answer.	3

Question Number	Answer	Mark
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15 (a)	<p>Award <b>one</b> mark for lack of hypertrophy and up to <b>two</b> marks for linked expansion.</p> <p>Smaller heart muscle /lack of hypertrophy of heart (1) resulting in a lower stroke volume (1) therefore required to beat more to maintain resting cardiac output (1)</p> <p>Accept any other appropriate answer.</p>	3
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Question Number	Answer	Mark
15 (b)	<p>Award <b>one</b> mark for explaining why Beth's heart rate increases before she starts to exercise and <b>one</b> mark for linked expansion.</p> <ul style="list-style-type: none"> <li>This is anticipatory rise (1) due to the release of adrenalin (1)</li> </ul>	2

Question Number	Answer	Mark
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15 (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> <p><b>Sympathetic</b></p> <ul style="list-style-type: none"> <li>• Sympathetic nervous system increases heart rate during exercise</li> <li>• Messages sent down the accelerator nerve</li> <li>• Which increases the firing rate/number of impulses of the sinoatrial node/SA node/SAN, causing the atria to contract more</li> <li>• Sending more impulses to the atrioventricular node/AV node/AVN/to the bundle of His and Purkinje fibres</li> <li>• Causing more contractions of the ventricles</li> <li>• To enable more blood/oxygen to be delivered to the working muscles during exercise</li> </ul> <p><b>Parasympathetic</b></p> <ul style="list-style-type: none"> <li>• After the exercise session heart rate decreases</li> <li>• Initiated by the parasympathetic nervous system</li> <li>• Message sent down the vagus nerve</li> <li>• Which decreases the firing rate/number of impulses of the sinoatrial node/SA node/SAN, causing the atria to contract less</li> <li>• Sending less impulses to the atrioventricular node/AV node AV/to the bundle of His and Purkinje fibres</li> <li>• Causing less contractions of the ventricles and bringing her heart rate down to rest</li> <li>• Due to less demand for oxygen after exercise</li> </ul>	6
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**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> </ul>

	<ul style="list-style-type: none"> <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												
16(a)+(b)	<p>Award <b>one</b> mark for each identification of a stage of the aerobic system, up to a total of <b>three</b> marks.</p> <p>Award <b>one</b> mark for amount of ATP produced during each process, up to a total of <b>three</b> marks.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>(a) Name of process</th> <th>(b) Amount of ATP produced</th> </tr> </thead> <tbody> <tr> <td>Process 1</td> <td>aerobic glycolysis</td> <td>2</td> </tr> <tr> <td>Process 2</td> <td>Krebs cycle</td> <td>2</td> </tr> <tr> <td>Process 3</td> <td>Electron transport chain/ETC</td> <td>32/34</td> </tr> </tbody> </table>		(a) Name of process	(b) Amount of ATP produced	Process 1	aerobic glycolysis	2	Process 2	Krebs cycle	2	Process 3	Electron transport chain/ETC	32/34	3+3
	(a) Name of process	(b) Amount of ATP produced												
Process 1	aerobic glycolysis	2												
Process 2	Krebs cycle	2												
Process 3	Electron transport chain/ETC	32/34												

Question Number	Answer	Mark
17	Answers will be credited according to the learner's demonstration of knowledge and understanding of the	6

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

**Lactate system**

- Provides energy for moderate to high intensity activity
- Large parts of the race is anaerobic
- Used for activities that are 1–3 minutes and the run is completed in 2 minutes
- Will be used during long, intense runs that last longer than 10 seconds.
- Energy is required to go quickly to the working muscles
- So produced through anaerobic glycolysis
- The ATP/PC system is not predominant as runs out after 10 seconds
- Aerobic system cannot produce energy fast enough to keep up with high intensity required
- Oxygen cannot be supplied quickly enough so lactate system is used as anaerobic.

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 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> </ul>

	<ul style="list-style-type: none"><li>• Arrives at a supported judgement from a welldeveloped 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>
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Question Number	Answer	Mark
18	<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>Movement from position A to B</b></p> <ul style="list-style-type: none"> <li>• Wrist joint is a hinge joint,</li> <li>• Movement taking place is wrist extension to flexion/held neutral</li> <li>• The agonist muscle is the wrist flexors and the antagonist the wrist extensors</li> <li>• The wrist flexors are contracting concentrically, and the wrist extensors are relaxing</li> <li>• Elbow is a hinge joint</li> <li>• The movement taking place is elbow flexion to extension</li> <li>• The agonist muscle is the triceps and the antagonist is the biceps</li> <li>• The triceps is contracting concentrically, and the biceps is relaxing</li> <li>• Shoulder is a ball and socket joint</li> <li>• The movement taking place is abduction to adduction/extension to flexion</li> <li>• The agonist muscle is the pectorals/deltoid and the antagonist is the latissimus dorsi/deltoid</li> <li>• The pectorals/deltoid are contracting concentrically, and the latissimus dorsi/deltoid are relaxing</li> <li>• eccentrically/relaxing</li> <li>• Skeletal muscles attach to bones via tendons and when they contract, they pull on the bone causing movement to take place when Ted serves</li> </ul> <p>Accept any other appropriate answer.</p>	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> <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> </ul>
		<ul style="list-style-type: none"> <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> </ul>

		<ul style="list-style-type: none"> <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>

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