



Mark Scheme – Final

June 2018

Pearson BTEC Level 3 - Sport

Unit 1: Anatomy and Physiology  
(31524H)

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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.
- 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 (a)	<p>Award <b>one</b> mark for naming each component correctly.</p> <ul style="list-style-type: none"> <li>• Joint capsule – A</li> <li>• (Articular/Hyaline) cartilage – B</li> <li>• Ligament – C</li> </ul> <p>Accept phonetically spelt answers.</p>	3

Question Number	Answer	Mark
1 (b)	<p>Award <b>one</b> mark for each function of synovial fluid identified to a maximum <b>three</b> marks.</p> <ul style="list-style-type: none"> <li>• Provides lubrication for the joint (1)</li> <li>• Provides nutrients/nourishes the cartilage (1)</li> <li>• Reduces friction between the bones / preventing bones from rubbing together (1)</li> <li>• Used as a shock absorber (1)</li> <li>• Increases the range of movement of a joint(1)</li> </ul> <p>Accept any other appropriate answer.</p>	3

Question Number	Answer	Mark												
2	<p>Award <b>one</b> mark for each correct identification of the postural deviation in Column A and <b>one</b> mark for giving an appropriate characteristic in Column B of each.</p> <table border="1"> <thead> <tr> <th></th> <th>Column A</th> <th>Column B</th> </tr> </thead> <tbody> <tr> <td>a</td> <td>Type of postural deviation</td> <td>Characteristic of postural deviation</td> </tr> <tr> <td>1</td> <td>Kyphosis (1)</td> <td>the rounding of the upper back/shoulders/thoracic region/Hunched back (1)</td> </tr> <tr> <td>2</td> <td>Scoliosis (1)</td> <td>his spine has a sideways curve in the shape of an S or a C (1)</td> </tr> </tbody> </table> <p>Accept any other appropriate answer.</p>		Column A	Column B	a	Type of postural deviation	Characteristic of postural deviation	1	Kyphosis (1)	the rounding of the upper back/shoulders/thoracic region/Hunched back (1)	2	Scoliosis (1)	his spine has a sideways curve in the shape of an S or a C (1)	4
	Column A	Column B												
a	Type of postural deviation	Characteristic of postural deviation												
1	Kyphosis (1)	the rounding of the upper back/shoulders/thoracic region/Hunched back (1)												
2	Scoliosis (1)	his spine has a sideways curve in the shape of an S or a C (1)												

Question Number	Answer	Mark
3a	<p>Award <b>one</b> mark identifying the appropriate example of a flat bone</p> <ul style="list-style-type: none"> <li>• Ribs (1)</li> <li>• Cranium (1)</li> <li>• Sternum (1)</li> <li>• Pelvis (1)</li> <li>• Scapula (1)</li> </ul>	1

Question Number	Answer	Mark
3b	<p>Award <b>one</b> mark stating the function of a flat bone</p> <ul style="list-style-type: none"> <li>• Protection for vital organs from damage/(e.g) ribs protect the lungs (1)</li> <li>• Provide a site for muscle attachment (1)</li> </ul> <p>Accept any appropriate answer</p>	1

Question Number	Answer	Mark
4	<p>Award <b>one</b> mark for each characteristic of cardiac muscle up to maximum of <b>two</b> marks.</p> <ul style="list-style-type: none"> <li>• Non-fatiguing (1)</li> <li>• Involuntary (contractions) (1)</li> <li>• Found only in the heart (1)</li> </ul> <p>Accept any other appropriate example.</p>	2

Question Number	Answer	Mark
5a	<p>Award <b>one</b> mark for giving the meaning of an isometric contraction</p> <ul style="list-style-type: none"> <li>• A muscle contraction where no movement takes place/remains the same length under tension (1)</li> </ul> <p>Accept any other appropriate example.</p>	1

Question Number	Answer	Mark
5b	<p>Award <b>one</b> mark for giving an example of a sporting action that requires an isometric contraction</p> <ul style="list-style-type: none"> <li>• Gymnasts body when on the rings (crucifix position) (1)</li> <li>• Skiers' legs when holding the crouched position (1)</li> <li>• A rock climber when holding a position on the wall/rock (1)</li> </ul> <p>Accept any other appropriate example.</p>	1

Question Number	Answer	Mark
6 (a)(i)	<p>Award <b>one</b> mark for stating the function of mitochondria.</p> <p>To produce energy (1)</p> <p>Accept any other appropriate answers.</p>	1

Question Number	Answer	Mark
6 (a)(ii)	<p>Award <b>one</b> mark for identification of why increasing the number of mitochondria will be beneficial to performance and up to <b>three</b> marks for linked justification/reasoning</p> <ul style="list-style-type: none"> <li>• More energy can be produced <b>aerobically</b> (1)</li> </ul> <p><b>+any three from</b></p> <ul style="list-style-type: none"> <li>• which reduces the requirement for anaerobic energy production (1) therefore less lactic acid would be produced/delayed OBLA (1)</li> <li>• Jane can work at a higher intensity/maintain faster speed for longer in the 800 m (1)</li> <li>• therefore finishing the race in a quicker time/delaying fatigue until later in the race (1)</li> </ul> <p>Accept any other appropriate answers.</p>	4

Question Number	Answer	Mark
6 (b)	<p>Award <b>one</b> mark for identifying a reason why type IIa muscle fibres are important to an 800m runners performance and <b>two</b> marks for linked justification/reasoning.</p> <p>Type IIa are used because they are fast contracting/they can produce great force (1) so enabling Jane to work at a high intensity (1) so Jane can keep running fast/maintain her pace to the end of the race/run race quicker (1)</p> <p>Accept any other appropriate answers.</p>	3

Question Number	Answer	Mark
7	<p>Award <b>one</b> mark for naming each structure.</p> <ul style="list-style-type: none"> <li>• Epiglottis – A</li> <li>• Trachea – B</li> <li>• Bronchioles – C</li> </ul>	3

Question Number	Answer	Mark
8	<p>Award up to <b>two</b> marks for identifying the role of the diaphragm during inspiration and expiration and up to a maximum of two marks for linked justification/reasoning.</p> <ul style="list-style-type: none"> <li>• When inspiring/breathing in the diaphragm <b>contracts/flattens/is forced downwards</b> (1) to increase the size/decrease the pressure of the thoracic cavity (1)</li> <li>• When expiring/breathing out the diaphragm <b>relaxes/rises/domes/moves up</b> (1) to decrease the size/increase the pressure of the thoracic cavity (1)</li> </ul>	4

Question Number	Answer	Mark
9 (a)	<p>Award <b>one</b> mark for giving the meaning of tidal volume.</p> <ul style="list-style-type: none"> <li>• The volume of air breathed in and out with each breath (1)</li> </ul>	1

Question Number	Answer	Mark
9 (b)	Award <b>one</b> mark for providing a respiratory system response <ul style="list-style-type: none"> <li>Increased breathing rate (1)</li> </ul>	1

Question number	Answer	Mark - 6
10	<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 learners should be rewarded for other relevant answers.</p> <p><b>Immediate effects</b></p> <ul style="list-style-type: none"> <li>Immediate effects will be seen when training at altitude (above 3000 m)</li> <li>Could get altitude sickness so unable to train, limiting improvements to the respiratory system</li> <li>There is a reduced partial pressure of oxygen so there is less oxygen available for respiration, which leads to hypoxia</li> <li>Decrease in air pressure causes an increase in breath frequency/ventilation rate</li> <li>Partial pressure/volume of oxygen in the air is less, therefore oxygen supply to the alveoli is less</li> <li>Reduces the concentration/diffusion gradient of oxygen at the alveoli, therefore less oxygen diffuses into the blood</li> <li>Less oxygen combines with haemoglobin, therefore less oxygen is transported in the blood</li> <li>Reduces the concentration/diffusion gradient of oxygen at the muscle tissue</li> <li>Performance at altitude deteriorates and fatigue sets in sooner</li> </ul> <p><b>Long-term effects</b></p> <ul style="list-style-type: none"> <li>Long-term effects will be seen when returning to sea level</li> <li>Increase in EPO levels</li> <li>Increased number of red blood cells, therefore a greater capacity to carry oxygen</li> <li>Increased concentration gradient of oxygen at sea level</li> <li>Be able to cycle for a longer time without fatiguing</li> <li>Improved recovery times after exercise</li> </ul> <p>Accept any other appropriate answer.</p>	
<p><b>Mark scheme (sub max 4 / 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, there will be major gaps or omissions</li> <li>• Few of the points made will be relevant to the context in the question</li> <li>• Limited discussion which contains generic assertions rather than considering different aspects and the relationship between them</li> </ul>
Level 2	3-4	<ul style="list-style-type: none"> <li>• Demonstrates some accurate knowledge and understanding, with only minor gaps or omissions</li> <li>• Some of the points made will be relevant to the context in the question, but the link will not always be clear</li> <li>• Displays a partially developed discussion which considers some different aspects and some consideration of how they interrelate, but not always in a sustained way</li> </ul>
Level 3	5-6	<ul style="list-style-type: none"> <li>• Demonstrates mostly accurate and detailed knowledge and understanding</li> <li>• Most of the points made will be relevant to the context in the question, and there will be clear links</li> <li>• Displays a well-developed and logical discussion which clearly considers a range of different aspects and considers how they interrelate, in a sustained way</li> </ul>

Question Number	Answer	Mark
11	<p>Award up to <b>four</b> marks for describing how oxygen is delivered from the lungs through the heart. Flow diagram accepted.</p> <p>Oxygenated blood enters the left atrium (1) before being pushed through the bicuspid valve (1) into the left ventricle (1). From here the blood passes through the semi-lunar valves/ into the aorta (1).</p> <p>Accept any other appropriate answer.</p>	4

Question Number	Answer	Mark
12	<p>Award <b>one</b> mark for naming each of the blood vessels correctly.</p> <ul style="list-style-type: none"> <li>• Artery/Arteriole – A</li> <li>• Capillary – B</li> <li>• Venule/Vein – C</li> </ul> <p>Accept specific examples (e.g. Pulmonary Artery/Pulmonary Vein)</p>	3

Question Number	Answer	Mark
13	<p>Award <b>one</b> mark for identifying how vasodilation helps performance in exercise and <b>one</b> mark for linked justification/reasoning.</p> <p>Award <b>one</b> mark for identifying why vasoconstriction helps performance in exercise and <b>one</b> mark for linked justification/reasoning.</p> <p>Vasodilation</p> <ul style="list-style-type: none"> <li>• Increased blood flow to the muscles/skin (1) allowing Nadia to maintain her intensity in the run/preventing her overheating (1)</li> </ul> <p>Vasoconstriction</p> <ul style="list-style-type: none"> <li>• Decreased blood flow to the non-essential organs/skin(1) allowing the blood to be <b>redirected</b> to the muscles/maintain core body temperature (during swim) (1)</li> </ul> <p>Accept any other appropriate answer</p>	4

Question Number	Answer	Mark
14	<p>Award <b>one</b> mark for identifying that cardiac output increases and <b>two</b> marks for appropriate expansion.</p> <ul style="list-style-type: none"> <li>• As exercise intensity increases, cardiac output will increase (1)</li> <li>• this occurs because <b>stroke volume increases</b> (1) and <b>heart rate increases</b> (1)</li> <li>• <math>Q/\text{Cardiac output} = SV \times HR</math> (1)</li> </ul>	3

Question Number	Answer	Mark
15	<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 learners should be rewarded for other relevant answers.</p> <ul style="list-style-type: none"> <li>• Cardiac hypertrophy is when the heart gets bigger and the left ventricle wall gets thicker</li> <li>• This results in a larger/more forceful contraction</li> <li>• Therefore SV will increase</li> <li>• Because the heart will be able to hold more blood</li> <li>• And cardiac output will increase during exercise</li> <li>• More blood will go to the working muscles enabling intensity to remain high</li> <li>• Fatigue will occur later than if she was untrained</li> <li>• Maintaining a faster pace throughout the event</li> <li>• (During transitions/between stages), heart rate will decrease quicker</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>

Question Number	Answer	Mark
16	<p>Award up to <b>three</b> marks for a logical describing breakdown of ATP in providing energy for muscular contraction.</p> <p>Award <b>one</b> mark for resynthesis</p> <ul style="list-style-type: none"> <li>• The process is supported by an enzyme ATPase (1) the final phosphate breaks off (1) and releases energy (1)</li> <li>• ATP can be resynthesised through a reversible reaction/<math>ADP + P = ATP</math> (1)</li> </ul> <p>Accept any other appropriate answers.</p>	4

Question Number	Answer	Mark
17	<p>Award up to <b>three</b> marks for describing anaerobic glycolysis.</p> <p>Glycogen is converted into glucose (1) glucose is broken down into pyruvic acid (1) pyruvate is then converted into lactic acid/lactate (1) and this reaction yields 2ATP (1) molecules/enzymes LDH/PFK (1)</p>	3

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 learners should be rewarded for other relevant answers.</p> <ul style="list-style-type: none"> <li>• In the 100 m Joe will predominately use the ATP-PC system to create ATP</li> <li>• Because the race is maximum intensity and short duration</li> <li>• This is because the ATP-PC can create ATP for only 8–10 seconds</li> <li>• Joe runs his race in 11:50 seconds so extra energy is required</li> <li>• Further energy towards the end of the race is provided from the breakdown of glucose using the anaerobic glycolysis system/lactate/lactic acid system</li> <li>• The aerobic energy system is working in the background with very little contribution within the race</li> </ul>	6

	<ul style="list-style-type: none"> <li>• The aerobic system is unable to supply energy quickly enough due to high intensity short duration activity</li> <li>• The aerobic system will be used to recover after the race</li> <li>• Approximately 95% anaerobic and 5% aerobic</li> <li>• The race will be approximately 85% ATP-PC, 10% lactate system and 5% aerobic system</li> </ul>	
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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 knowledge and understanding, there be major gaps or omissions</li> <li>• Few of the points made will be relevant to the context in the question</li> </ul> <p>Limited assessment which contains generic assertions rather than considering the factors or events and their relative importance, leading to a conclusion which is superficial or unsupported</p>
Level 2	3-4	<ul style="list-style-type: none"> <li>• Demonstrates some accurate knowledge and understanding, with few minor omissions/any gaps or omissions are minor</li> <li>• Some of the points made will be relevant to the context in the question, but the link will not always be clear</li> </ul> <p>Displays a partially developed assessment which considers some of the factors or events and their relative importance leading to a partially supported conclusion.</p>
Level 3	5-6	<ul style="list-style-type: none"> <li>• Demonstrates mostly accurate and thorough/detailed knowledge and understanding</li> <li>• Most of the points made will be relevant to the context in the question, and there will be clear links</li> <li>• Displays a well-developed and logical assessment which clearly considers the factors or events and their relative importance, leading to a supported conclusion</li> </ul>

Question Number	Answer	Mark
19	<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 learners should be rewarded for other relevant answers.</p> <p><b>Leading leg</b></p> <ul style="list-style-type: none"> <li>• Hip is a ball and socket joint, the movement taking place is flexion</li> <li>• (Hip flexion) the agonist muscle is the hip flexor (iliopsoas) and the antagonist is the gluteus maximus</li> <li>• (Hip flexion) the hip flexor (iliopsoas) is contracting concentrically and the gluteals are contracting eccentrically/relaxing</li> <li>• Knee is a hinge joint, the movement taking place is knee flexion</li> <li>• (Knee flexion) the agonist muscle is the hamstrings and the antagonist is the quadriceps</li> <li>• (Knee flexion) the hamstrings are contracting concentrically and the quadriceps are contracting eccentrically/relaxing</li> <li>• Ankle joint is a hinge joint and is in plantar flexion</li> <li>• (Plantar flexion) the agonist muscle is the gastrocnemius and the antagonist is the tibialis anterior</li> <li>• (Plantar flexion) the gastrocnemius is contracting concentrically and the tibialis anterior is contracting eccentrically/relaxing</li>   <li>• Skeletal muscles attach to bones via tendons and when they contract they pull on the bone producing movement when Joe runs</li> <li>• The muscle fibres being used within the 100 m race are type IIX, which can generate a maximum force but only last a short duration</li> </ul>	8
<p><b>Mark scheme (award up to 8 marks)</b> refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.</p>		
<b>Level</b>	<b>Mark</b>	<b>Descriptor</b>
Level 0	0	No rewardable material.
Level 0	0	<ul style="list-style-type: none"> <li>• No rewardable material.</li> </ul>
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>

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