

# Mark Scheme

## Additional Sample Assessment Materials

Pearson BTEC Level 3 – Sport

Unit 1: Anatomy and Physiology  
(31524)

## **BTEC Qualifications**

BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at [www.btec.co.uk](http://www.btec.co.uk) for our BTEC qualifications.

### **Pearson: helping people progress, everywhere**

Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: [www.pearson.com/uk](http://www.pearson.com/uk)

Additional Sample Assessment Materials

Publications Code xxxxxxxx\*

All the material in this publication is copyright

© Pearson Education Ltd 2018

---

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

### **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**

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 bone. Credit to a total <b>three</b> marks.</p> <ul style="list-style-type: none"> <li>• A – Tarsals (1)</li> <li>• B – Meta Tarsals (1)</li> <li>• C – Phalanges (1)</li> </ul>	3

Question Number	Answer	Mark
1 (b)	<p>Award <b>one</b> mark for describing the function of each bone type. Credit to a total <b>three</b> marks.</p> <ul style="list-style-type: none"> <li>• Long bones – provide leverage for movement / provide strength structure and movement / red blood cell production (1)</li> <li>• Short bones – weight bearing/provide support and stability (1)</li> <li>• Flat bones – protection and / or provide large surface for muscle attachment (1)</li> </ul>	3

Question Number	Answer	Mark
2 (a)	<p>Award <b>one</b> mark identifying the type of movement at the ankle joint.</p> <ul style="list-style-type: none"> <li>• Plantar flexion (1)</li> </ul>	1

Question Number	Answer	Mark
2 (b)	<p>Award <b>one</b> mark for explaining the function of ligaments within a synovial joint. Credit to a total <b>two</b> marks.</p> <ul style="list-style-type: none"> <li>• Attaches articulating bones to form a joint (1)</li> <li>• Provides stability at a joint (1)</li> </ul> <p>Accept other appropriate answers.</p>	2

Question Number	Answer	Mark
2 (c)	<p>Award <b>one</b> mark for explaining how participation in netball will impact on the chances of contracting arthritis. Credit to a total <b>three</b> marks.</p> <ul style="list-style-type: none"> <li>• Reduced risk of developing arthritis in later life (1) because the joints are healthier due to increase in the thickness of articular cartilage (1) therefore the bones will not rub together (1) Increased thickness of cartilage reduces chance of injury because of greater ability to shock absorb (1) Better lubrication of joints with synovial fluid (1)</li> </ul> <p>Accept other appropriate answers.</p>	3

Question Number	Answer	Mark
3 (a)	<p>Award <b>one</b> mark for naming each muscle. Credit to a total <b>three</b> marks.</p> <ul style="list-style-type: none"> <li>• A – gastrocnemius (1)</li> <li>• B – soleus (1)</li> <li>• C – tibialis anterior (1)</li> </ul>	3

Question Number	Answer	Mark
3 (b)	<p>Award <b>one</b> mark for describing the type of activity that type IIx muscle fibres will be used and <b>two</b> marks for how it will benefit performance in football. Credit to a total <b>three</b> marks.</p> <ul style="list-style-type: none"> <li>• <b>(Type IIx)</b> Fast twitch glycolytic contract producing high force (1) so are used in football for speed / power based movements (1) such as taking a shot / jumping for a header (1)</li> </ul> <p>Accept other appropriate answers.</p>	3

Question Number	Answer	Mark
3(c)	<p>Award up to <b>four</b> marks for explaining the benefits of having an increased tolerance to lactate. Credit to a total <b>four</b> marks.</p> <p>Makes the body more efficient at reprocessing the waste products (lactic acid)(1) and transporting oxygen to his blood (1) which means it will allow him to run at maximal speed (1) for a longer period of time (1) whilst delaying the onset of fatigue (1)</p> <p>Accept other appropriate answers.</p>	4

Question Number	Answer	Mark
4	<p>Award up to <b>three</b> marks for explaining how the antagonistic pairs allow the bicep curl to be completed. Credit to a total <b>three</b> marks.</p> <p><b>Downward (Lowering) phase</b></p> <ul style="list-style-type: none"> <li>• The agonist during the lowering phase is the bicep as it counteracts the weight (1)</li> <li>• The bicep eccentrically contracts as it gets longer even though it is contracting or the weight would drop (1)</li> <li>• The antagonist muscle is the tricep (brachii) which relaxes to permit contraction of the agonist (1)</li> </ul> <p>Accept other appropriate answers.</p>	3

Question Number	Answer	Mark
5	<p>Award <b>one</b> mark for naming each part of the lungs. Credit to a total <b>three</b> marks.</p> <ul style="list-style-type: none"> <li>• A – Lungs</li> <li>• B – Bronchioles</li> <li>• C – Alveoli</li> </ul>	3

Question Number	Answer	Mark
6 (a)	<p>Award up to <b>two</b> marks for identifying the contraction of the key respiratory muscles and up to <b>three</b> additional marks for describing how this results in inspiration during exercise. Credit to a total <b>four</b> marks.</p> <p><u>External intercostal muscles</u> and <u>diaphragm</u> contract/flatten with <u>greater force</u> (than at rest) (1) which moves the rib cage upwards and outwards <u>further</u> (1) which results in a <u>greater</u> increase in the volume of the thoracic cavity (1) so there is a <u>greater</u> decrease in pressure within the thoracic cavity (1) causing <u>more</u> air to rush into the lungs (1)</p> <p>Accept other appropriate answers.</p>	4

Question Number	Answer	Mark
6 (b)	<p>Award up to <b>four</b> marks for explanation of how neural factors regulate breathing during exercise. Credit to a total <b>four</b> marks.</p>	4

	<p>Increased CO<sub>2</sub> is produced by the body in response to exercise (1) CO<sub>2</sub> is dissolved in the blood and detected by chemoreceptors (1) these send a message to the medulla oblongata / respiratory control centre / RCC (1) which responds by sending nervous signals to the respiratory system to increase the tidal volume / depth <u>and</u> breathing rate / frequency (1)</p> <p>Accept other appropriate answers.</p>	
--	--	--

Question number	Indicative content	
6 (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>Effects of altitude on the respiratory system</b></p> <ul style="list-style-type: none"> <li>• Could get altitude sickness so unable to train</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>• Could result in hyperventilation and short, rapid ineffective breaths are taken.</li> <li>• Performance at altitude deteriorates and fatigue sets in sooner.</li> </ul> <p>Do not accept answers relating to long term effects of altitude training.</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	<b>5-6</b>	<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
7	<p>Award up to <b>three</b> marks for describing the structure of a capillary.</p> <ul style="list-style-type: none"> <li>• Connective blood vessel between an arteriole and venule (1)</li> <li>• A network of capillaries providing a large surface area that surrounds the muscle / alveoli (1)</li> <li>• It has a one cell thick / endothelial / semi permeable membrane (1)</li> </ul>	3

Question Number	Answer	Mark
8	<p>Award <b>one</b> mark for correctly stating a function of the right atria. Credit to a total <b>two</b> marks.</p> <ul style="list-style-type: none"> <li>• To receive deoxygenated blood returning to the heart from the vena cava (1)</li> <li>• Facilitates circulation by contraction of the atrial walls sending blood to the right ventricle (1)</li> </ul> <p>Accept other appropriate answers.</p>	2

Question Number	Answer	Mark
9	<p>Award up to <b>one</b> mark for explaining the role of the atrio-ventricular node (AVN) in supporting nervous control of the heart in response to an exercise session. Credit to a total <b>three</b> marks.</p> <p>The AVN receives increased stimulation of impulses from the sinoatrial node (SAN) (1) the AVN slows down the impulse to allow for complete contraction of the atria (1) relays the impulse down the bundle of His / sends impulse to allow ventricular contraction (1)</p> <p>Accept other appropriate answers.</p>	3

Question Number	Answer	Mark
10(a)	<p>Award <b>one</b> mark for explaining how increased stroke volume could have an impact on 5000m performance. Credit a total of <b>four</b> marks.</p> <p>Performance would improve because the heart would pump more blood per beat to the working muscles (1) resulting in more effective O<sub>2</sub> transport, that could be used for aerobic energy production (1) enabling an increased running speed whilst producing energy aerobically (1) and delaying the lactate threshold point / point of fatigue (1)</p> <p>Accept other appropriate answers.</p>	4

Question Number	Answer
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> <p><b>Rest:</b></p> <ul style="list-style-type: none"> <li>• Cardiac output (Q) at rest is a relatively stable value for Joe, this will remain the same following the six week training programme.</li> <li>• Cardiac output (Q) has to be sufficient to maintain the body's core functioning enable the body systems to work – temperature control, energy production, organ function</li> <li>• (After) Due to increased resting stroke volume and increased resting venous return, Joe's resting heart rate will be lower and therefore more efficient.</li> </ul> <p><b>Race</b></p> <ul style="list-style-type: none"> <li>• Large increase in cardiac output (Q) due to significant rise in exercise intensity (nearing / reaching maximum) during the race</li> <li>• Substantial vasodilation and vasoconstriction occurs to provide more blood to the working muscles, diverting away from other body functions</li> <li>• (After) Increase in venous return following the six week programme, therefore more blood enters the right atrium</li> <li>• (After) This increases the end-diastolic volume (EDV), so less blood remains in the atria following contraction</li> </ul>

	<ul style="list-style-type: none"> <li>• More blood will enter the ventricle, which causes it to stretch and recoil with greater force</li> <li>• Therefore increasing stroke volume / more blood pumped out per beat</li> <li>• (After) O<sub>2</sub> delivery and CO<sub>2</sub> removal is more efficient</li> <li>• (After) Joe can run at a higher intensity for a longer duration and therefore improving his times</li> <li>• Due to sustained effort during the race Joe is crossing the anaerobic threshold at a later point, thus delaying the onset of fatigue/OBLA.</li> </ul>
--	--

**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\*.

<b>Level</b>	<b>Mark</b>	<b>Descriptor</b>
Level 0	0	<b>No rewardable material</b>
Level 1	<b>1-2</b>	<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	<b>5-6</b>	<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 up to <b>two</b> marks for explaining why a marathon runner would benefit from increased storage of glycogen.</p> <p>It will enable her to produce ATP at a fast enough rate (1) to maintain her pace throughout the marathon (1)</p> <p>Accept other appropriate answers.</p>	2

Question Number	Answer	Mark
12	<p>Award <b>one</b> mark for explaining how the body uses oxygen to recover following intense exercise. Credit a total of <b>four</b> marks</p> <p>Increased delivery of O<sub>2</sub> immediately after exercise due to raised heart rate (1) oxygen is required to restore muscle myoglobin (1) and phosphocreatine stores (1) oxygen required for the removal / metabolisation of lactic acid (1) and to restore body temperature to resting levels (1)</p> <p>Accept other appropriate answers.</p>	4

Question Number	Answer
13	<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>• Low intensity activity</li> <li>• Main source of energy during breaks in play, jogging, covering positions</li> <li>• Recovery of phosphocreatine stores</li> <li>• Provides energy for recovery</li> <li>• Removal of lactic acid</li> <li>• Enables the player to provide energy during the whole match</li> <li>• High ATP yield no by products</li> <li>• Metabolises fat stores (spares carbohydrate stores)</li> </ul> <p>The more developed the system the faster the player can run without producing lactic acid</p> <ul style="list-style-type: none"> <li>• Aerobic system is not useful when sprinting down the wing / making a tackle, this would be better suited to the ATP-PC system.</li> </ul>

**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>• Few of the points made will be relevant to the context in the question</li> <li>• Limited evaluation which contains generic assertions leading to a conclusion that is superficial or unsupported</li> </ul>
Level 2	3-4	<ul style="list-style-type: none"> <li>• Demonstrates some accurate Knowledge and Understanding</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 evaluation which considers some different aspects leading to a conclusion which considers some different competing points, although not always in detail</li> </ul>
Level 3	5-6	<ul style="list-style-type: none"> <li>• Demonstrates mostly accurate 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 developed and logical evaluation which clearly considers different aspects leading to a conclusion which considers different competing points in detail</li> </ul>

Question Number	Answer
14	<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</p>

should be rewarded for other relevant answers.

**Interval training (anaerobic system) adaptations:**

- Increased lactate tolerance
- Increased force production
- Muscular hypertrophy type IIa/IIx

**Long distance running (aerobic system) related adaptations:**

- Increased myoglobin store in the muscle
- Increased mitochondria density / size
- Raising / Increasing of the anaerobic / lactate threshold
- Muscular hypertrophy type I

**Application to performance level badminton**

- Multiple sprint based sport, so aerobic system is not the main source of energy production / cannot provide energy at a fast enough rate to meet the needs of the activity
- The high intensity interval training will develop the lactic acid system, which is the predominant source of energy in this sport
- Increased delivery of O<sub>2</sub> (through an increase in capillarisation)
- Enables faster recovery of phosphocreatine stores
- Enhanced removal of lactic acid
- Mitochondrial density / size can use the increased O<sub>2</sub> to support recovery in between rallies
- Increase in lactate tolerance will enable player to keep moving quickly around the court once she is fatigued
- Increase force production will enhance power, movement speed and agility

Accept other appropriate answers

**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> <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>

Pearson Education Limited. Registered company number 872828  
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE

Ofqual



Llywodraeth Cynulliad Cymru  
Welsh Assembly Government

