



Mark Scheme (Final)

June 2019

Pearson BTEC Level 3 – Sport and
Exercise Physiology

Unit 1: Sport and Exercise Physiology
(31813)

BTEC Qualifications from Pearson

BTEC qualifications 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 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

June 2019

Publications Code xxxxxxxx*

All the material in this publication is copyright

© Pearson Education Ltd 2019

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- All marks on the mark scheme should be used appropriately.
- All marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if a candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt about applying the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed-out work should be marked UNLESS the candidate has replaced it with an alternative response.
- Phonetic spelling should be accepted.

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.

BTEC Next Generation Mark Scheme

Sport and Exercise Physiology Unit 1 Series 1906

Question Number	Answer	Mark						
1 (a)	<p>Award one mark for each correct identification of muscle fibre type.</p> <table border="1"> <thead> <tr> <th>Event</th> <th>Fibre type</th> </tr> </thead> <tbody> <tr> <td>100 m sprint</td> <td>type IIx</td> </tr> <tr> <td>10,000 m race</td> <td>type I</td> </tr> </tbody> </table> <p>Accept other appropriate responses.</p>	Event	Fibre type	100 m sprint	type IIx	10,000 m race	type I	(2)
Event	Fibre type							
100 m sprint	type IIx							
10,000 m race	type I							

Question Number	Answer	Mark
1 (b)	<p>Award one mark for correct identification of meaning of the term.</p> <ul style="list-style-type: none"> • Increase in muscle fibre number (1) • Splitting of muscle cells resulting in growth of new fibres (1) <p>Accept other appropriate responses.</p>	(1)

Question Number	Answer	Mark
1 (c)	<p>Award one mark for identification of the advantage and one mark for each related explanation up to two additional marks.</p> <p>For example:</p> <ul style="list-style-type: none"> • The mitochondria are the site of aerobic energy production/site of aerobic respiration (1), therefore there is more energy available (1) which means that fatigue is delayed (1) <p>Accept other appropriate responses.</p>	(3)

Question Number	Answer	Mark
1 (d) (i)	<p>Award one mark for identifying the reason and one additional mark for a related explanation. Credit to a maximum of two marks.</p> <ul style="list-style-type: none"> • The 100 m uses the ATP-PC system for energy production (1) this system can be replenished in 2–3 minutes so energy is available to run again after a few minutes (1) <p>Accept other appropriate responses.</p>	(2)

Question Number	Answer	Mark
1 (d) (ii)	<p>Award one mark for identifying the reason and one additional mark for a related explanation. Credit to a maximum of two marks.</p> <ul style="list-style-type: none"> • The 10,000m runner will use the aerobic system (1) which takes 24-48 hours to replenish (1) • The 10,000m runner will deplete their energy stores/glycogen stores completing their event (1) these stores can take a day to replenish (1) <p>Accept other appropriate responses.</p>	(2)

Question number	Indicative content
1 (e)	<p>Answers will be credited according to the learner's demonstration of knowledge and understanding of the material using the indicative content and levels 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>Knowledge and understanding (cardiovascular system)</p> <ul style="list-style-type: none"> • Anticipatory rise before exercise • Increased cardiac output/stroke volume/heart rate once started • Redistribution of blood flow/vascular shunt • Increased a-vO₂ diff • Thermoregulation during the race <p>Application to question context, ie the race</p> <ul style="list-style-type: none"> • Anticipatory rise will speed up oxygen transport for the race • Increased cardiac output helps removal of CO₂ /waste products produced during the race • Blood is redistributed to active areas so these areas receive more oxygen/sufficient oxygen/nutrients for exercise • Oxygen is used for energy/aerobic respiration during race • Increased heart rate means sufficient oxygen to break down lactate • Thermoregulation is necessary as exercise generates heat • Blood vessels near the skin vasodilate to allow heat loss through the skin <p>Analysis</p> <ul style="list-style-type: none"> • Increased heart rate means sufficient nutrients/oxygen are transported for energy during the race so Shelly takes longer to fatigue/Shelly is able to delay fatigue • Without redistribution of blood flow, the active muscles would not receive enough oxygen for aerobic energy production leading to OBLA/anaerobic respiration and therefore a drop in performance • During exercise there will be increased CO₂ production. Therefore, if the heart rate did not increase it wouldn't be transported to the lungs for removal at a fast enough rate and Shelly would fatigue at a quicker rate/have to slow down due to increased acidity of the blood • If heat was not allowed to escape from the blood Shelly would overheat resulting in fatigue and therefore she would be unable to maintain her race pace

Level	Mark	Descriptor (Analyse)
Level 0	0	No rewardable material.
Level 1	1-3	<ul style="list-style-type: none"> • Demonstrates isolated elements of knowledge and understanding. • Breaks the situation down into component parts and a few 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.

Question Number	Answer	Mark
2 (a)	<p>Award one mark for correct identification of value of minute volume.</p> <ul style="list-style-type: none"> • 6 litres • 6 • 6 l/min • six • 6000ml <p>Accept other appropriate responses.</p>	(1)

Question Number	Answer	Mark
2 (b) Expert	<p>Award one mark for identification of the additional skeletal muscle and one additional mark for each related explanation. Credit to a maximum of four marks.</p> <p>Inspiration</p> <ul style="list-style-type: none"> • sternocleidomastoid (1) raises the chest/thoracic cavity (1) <p>Expiration</p> <ul style="list-style-type: none"> • rectus abdominus (1) contracts to force more air out of the lungs (1) <p>Accept other appropriate responses.</p>	(4)

Question Number	Answer	Mark
2 (c)	<p>Award one mark for identification of why there is an increase in strength and one mark for each related explanation up to two additional marks.</p> <ul style="list-style-type: none"> • Micro-tears (1) stimulates <u>protein</u> delivery to <u>repair</u> fibre/protein synthesis (1) therefore fibres adapt (1) <p>Accept other appropriate responses.</p>	(3)

Question Number	Answer	Mark
2 (d)	<p>Award one mark for identification of the effect on blood pressure and one additional mark for related explanation.</p> <ul style="list-style-type: none">• Blood pressure increases (1)• as the blood vessels are constricted when the muscles contract to lift the weights (1) <p>Accept other appropriate responses.</p>	(2)

Question number	Indicative content
2 (e)	<p>Answers will be credited according to the learner's demonstration of knowledge and understanding of the material using the indicative content and levels 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>Knowledge and understanding of nutritional strategy</p> <ul style="list-style-type: none"> • Protein intake should be relative to body weight • Protein for growth/repair • Protein intake throughout the day/immediately after training • Use of protein/dietary supplements • Carbohydrate intake for energy • Use of carbohydrate dietary supplements • Timing of intake – within two hours of activity • Increased protein/CHO than RDA due to training <p>Applied points related to strength training</p> <ul style="list-style-type: none"> • Strength training will result in micro-tears/is high intensity, so protein needed for repair of muscle • Protein intake should be spread throughout the day in small amounts so could consider protein supplements/eating protein bar or shake <p>Applied points related to aerobic training</p> <ul style="list-style-type: none"> • Needs to take in enough carbohydrates to replenish glycogen used in the aerobic training session • Jack should eat carbohydrate as soon as possible after the aerobic session as quicker to convert CHO into glycogen • Jack could use dietary supplements such as carbohydrate drinks or gels as these are easier to consume immediately after exercise <p>Assessment of importance to recovery and future performance</p> <ul style="list-style-type: none"> • Without sufficient protein in his diet Jack's muscle tissue will not be able adapt to the training, therefore he will not see the strength gains he needs to be more effective in the game for tackling/lifting • Without sufficient protein in his diet Jack's muscle tissue will not be able to repair therefore he will have increased risk of injury stopping him from training • Without sufficient carbohydrate intake glycogen stores will be low as only limited stores, therefore Jack will not have the necessary energy to prevent fatigue • Jack must eat an appropriate amount of carbohydrate based on his activity level as too much and he will gain weight, making it harder for him to work at the required intensity and duration

Level	Mark	Descriptor (Assess)
Level 0	0	No rewardable material.
Level 1	1–3	<ul style="list-style-type: none"> • 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	4–6	<ul style="list-style-type: none"> • Demonstrates some 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	7–8	<ul style="list-style-type: none"> • Demonstrates mostly 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
3 (a)	<p>Award one mark for identification of advantage and one mark for each related explanation up to two additional marks.</p> <ul style="list-style-type: none"> • Lubricates (1) to reduce friction (at the joint) (1) allowing pain free movement /full range of movement for a better technique (1) <p>Accept other appropriate responses.</p>	(3)

Question Number	Answer	Mark
3 (b)	<p>Award one mark for identification of action of ventricles and one additional mark for each linked descriptive point. Credit to a maximum of four marks.</p> <p>Ventricular systole</p> <ul style="list-style-type: none"> • The ventricles contract (1) forcing blood out of the heart/pump blood into aorta/pulmonary artery (1). <p>Ventricular diastole</p> <ul style="list-style-type: none"> • The ventricles relax (1) and fill with blood (1) <p>Accept other appropriate responses.</p>	(4)

Question Number	Answer	Mark
3 (c)	<p>Award one mark for identification of the effect and one mark for each related description up to two additional marks.</p> <ul style="list-style-type: none"> • She will have increased stroke volume (1) caused by greater venous return (1) during diastole/when the heart is relaxing (1) <p>Accept other appropriate responses.</p>	(3)

Question number	Indicative content
3 (d)	<p>Answers will be credited according to the learner's demonstration of knowledge and understanding of the material using the indicative content and levels 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>Knowledge and understanding (Isolated elements of knowledge re recovery)</p> <ul style="list-style-type: none"> • Collagen in tendons/ligaments • Replacement of calcium for bones • Repair to micro-tears in muscles • Time to recover from delayed onset of muscle soreness (DOMS) <p>Application to question context</p> <ul style="list-style-type: none"> • Chloe needs the collagen in her tendons so they are strong enough to withstand the force of the water against the oars as she rows • Chloe needs the collagen in her ligaments so they are strong enough to hold her joints in place as she uses a wide range of movement to get a better rowing technique • Calcium is required to increase the strength of bones/bone density/for remodelling. • If Chloe's bones do not have sufficient calcium they will become fragile and more susceptible to being broken/fractured <p>Applied logical chains of reasoning/judgement (Assessment)</p> <ul style="list-style-type: none"> • Insufficient rest and recovery time will mean Chloe is at greater risk of making an injury worse/getting an overuse injury • She is risking overtraining which could mean stopping training due to injury • Overtraining will decrease her immune function, so she is more likely to become ill/unhealthy forcing her to reduce training intensity • Adequate rest is vital otherwise she will suffer imbalances in her hormone system, for example increased adrenaline and cortisol production, which will make her feel tired and unwilling to train. • Chloe needs to exercise for her body to adapt and improve but without appropriate rest she will not gain these benefits <p>Accept other appropriate responses.</p>

Level	Mark	Descriptor (Assess)
Level 0	0	No rewardable material.
Level 1	1–3	<ul style="list-style-type: none"> • 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	4–6	<ul style="list-style-type: none"> • Demonstrates some 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	7–8	<ul style="list-style-type: none"> • Demonstrates mostly 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
4 (a)	<p>Award one mark for identification of how initiated and one additional mark for a linked descriptive point. Credit to a maximum of two marks.</p> <ul style="list-style-type: none"> • Increase frequency of stimulation (1) so more motor units stimulated/bigger motor units stimulated • Increase number of motor neurons stimulated (1) to increase number of motor units activated (1) <p>Accept other appropriate responses.</p>	(2)

Question Number	Answer	Mark
4 (b)	<p>Award one mark for each correct identification of each stage. Credit to a maximum of two marks.</p> <ul style="list-style-type: none"> • Krebs cycle (1) • Electron transport chain (1) <p>Accept other appropriate responses.</p>	(2)

Question Number	Answer	Mark
4 (c) Expert	<p>Award one mark for identification of method of heat loss and one additional mark for each linked descriptive point. Credit to a maximum of four marks.</p> <ul style="list-style-type: none"> • Conduction (1) through direct contact (1) <p>OR</p> <ul style="list-style-type: none"> • Conduction (1) through transfer of heat from the skin to the water (1) <p>OR</p> <ul style="list-style-type: none"> • Conduction (1) peripheral blood vessels vasodilating (1) <p>AND</p> <ul style="list-style-type: none"> • Convection (1) through air currents taking heat away from body (1) <p>Accept other appropriate responses.</p>	(4)

Question number	Indicative content
<p>4 (d)</p> <p>Expert</p>	<p>Answers will be credited according to the learner's demonstration of knowledge and understanding of the material using the indicative content and levels 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>Knowledge and understanding (Isolated elements of knowledge of adaptations to excessive heat)</p> <ul style="list-style-type: none"> • Earlier onset of sweating • Increased sweat production • Reduced electrolyte concentration in sweat • Increased blood plasma volume <p>Application/Impact</p> <ul style="list-style-type: none"> • Earlier onset of sweating means that Kieran can begin to cool down at a lower body temperature • Increased sweat production so Kieran can benefit from a greater cooling effect from the evaporation of sweat from the skin during the cycle and run • Reduced electrolyte concentration in sweat means water level is regulated/that Kieran is able to retain more water so less likely to become dehydrated • Increased blood plasma volume so there is more water in Kieran's plasma that he can use to produce sweat/better oxygen transport <p>Assessment</p> <ul style="list-style-type: none"> • These adaptations allow her to work at higher intensities. <p>NB Must have stated an adaptation to award this conclusion.</p> <p>Accept other appropriate responses.</p>

Level	Mark	Descriptor (Assess)
Level 0	0	No rewardable material.
Level 1	1–3	<ul style="list-style-type: none"> • 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	4–6	<ul style="list-style-type: none"> • Demonstrates some 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	7– 8	<ul style="list-style-type: none"> • Demonstrates mostly 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.

Ofqual



Llywodraeth Cynulliad Cymru
Welsh Assembly Government



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