

Mark Scheme (Final)

January 2018

**Pearson BTEC Level 3 – Sport and
Exercise Science**

Unit 2: Functional Anatomy (31814H)



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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 response 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 judgment 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.

Mark Scheme

Question	Response	Mark
1	<p>Award 1 mark for each identification of a function of the respiratory system. Up to a maximum of 2 marks.</p> <ul style="list-style-type: none"> Breathing mechanism/inspiration/expiration Gaseous exchange Lung volumes (vital capacity, residual volume, tidal volume) 	2

Question	Response	Mark
2a	<p>Award 1 mark for stating the meaning of the anatomical term posterior.</p> <p>The back of the body</p> <p>Accept any other appropriate response.</p>	1
2b	<p>Award 1 mark for stating the meaning of the anatomical term inferior.</p> <p>Situated below</p> <p>Accept any other appropriate response.</p>	1

Question	Response	Mark
3	<p>Award 1 mark for the identification of the function of platelets, and 1 further mark for appropriate expansion.</p> <ul style="list-style-type: none"> The function of platelets is to stop bleeding (1) by forming a clot/by plugging the damaged blood vessels (1) 	2

Question	Response	Mark
4	<p>Award 1 mark for identification of a function, and 1 further mark for appropriate expansion. Up to a maximum of 4 marks.</p> <ul style="list-style-type: none"> Provides attachment for tendons/muscles (1) from bony landmarks e.g. condyles (1) Movement of the body (1) as muscles/quadriceps attaches to the bone/tibia and pull on them to create movement (1) 	4

Question	Response	Mark
5	<p>Award 1 mark for identifying the importance of the skeleton and up to 2 further marks for the appropriate expansion.</p> <p>The skeleton is important as it contains bone marrow which is the site of red blood cell production (1) as RBCs have to be continually produced due to their short life span (1) in order to maintain oxygen transportation around the body (1)</p> <p>The skeleton is important as it contains bone marrow which is the site of red blood cell production (1) specifically in the long bones/flat bones (1) in order to maintain RBC</p>	3

Question	Response	Mark
6	<p>Answer should contain five linked points, which in combination, provide a logical description of the neural control of the cardiac cycle.</p> <p>The sinoatrial node (SAN) initiates the electrical/cardiac impulse (1) which travels through the atria and causes them to contract (1). The impulse reaches the atrioventricular node (AVN) found in the right atrium/septum (1) which passes the impulse down the bundle of His found in the septum (1) this then branches into the ventricle walls via a network of Purkinje fibres, which causes the ventricles to contract</p>	5

Question Number	Response	Mark
7	<p>Award 1 mark for identification of the feature, and 1 further mark for related function.</p> <p>Capillaries are narrow (1) to decrease the speed that blood travels through them (to maximise gaseous exchange) (1)</p> <p>Capillary walls are 1 cell thick/ semi-permeable (1) to allow oxygen/carbon dioxide to diffuse through the capillary wall (1)</p>	4

Question	Response	Mark
8 (a)	<p>Award 1 mark for each identification</p> <p>Nasal cavity - A</p> <p>Epiglottis - B</p>	2

Question	Response	Mark
8 (b)	<p>Award 1 mark for the description of the function and 1 further mark for expansion.</p> <p>Epiglottis - closes over the trachea when swallowing food (1) to prevent food going into the lungs (1)</p> <p>Accept any other appropriate response.</p>	2

Question	Response	Mark
9	<p>Award 1 mark for each explanatory point.</p> <p>During the downward phase the triceps eccentrically contract (1) as they are the agonist (1) and they lengthen under tension (1) controlling the lowering of the body (1)</p>	4

Question Number	Response	Mark
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 of descriptors below. The indicative content that follows is not prescriptive. Responses may cover some/all of the indicative content but learners should be rewarded for other relevant responses.</p> <p>Interpretation of the table</p> <ul style="list-style-type: none"> • Blood flow to the skeletal muscles is low at rest and increases during exercise. • Delivery of blood taking nutrients and oxygen to the working muscles changes from rest to exercise <p>Anatomy of blood vessels</p> <ul style="list-style-type: none"> • Arterioles – contain smooth muscle, which has the ability to relax and contract. • Smooth muscle is an involuntary muscle and not under conscious control. <p>Control of blood flow</p> <ul style="list-style-type: none"> • Smooth muscles relax/contract in the arterioles to control blood flow. • Lumen of arterioles dilate/ constrict • Vasoconstriction/vasodilation and resulting changes to blood flow. • Pre-capillary sphincters relax/contract to vary 	8
Level	Mark	Descriptor
	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 of the points made will be relevant to the context in
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.
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.

Question Number	Response	Mark																				
11	<p>Learners are expected to provide responses in line with the information in the table, for stated phase of the movement. Interrelationships in the phase are expected to be provided, with full written analysis of how the skeletal and muscular system are working together to perform the movement. Additional information demonstrating knowledge of the skeletal and muscular system can be provided, to show a deeper understanding of the interrelationship between the two systems. Marks will be awarded in relation to the detail and depth of coverage of movement.</p> <p>Preparation to execution phase</p> <table border="1" data-bbox="268 801 1329 1093"> <thead> <tr> <th>Joint</th> <th>Type of</th> <th>Bones</th> <th>Planes</th> <th>Joint</th> </tr> </thead> <tbody> <tr> <td>Shoulder</td> <td>Ball and</td> <td>Scapula</td> <td>Sagittal</td> <td>Flexion</td> </tr> <tr> <td>Trunk</td> <td>Gliding/ cartilagin</td> <td>Vertebral column</td> <td>Sagittal</td> <td>Flexion</td> </tr> <tr> <td>Wrist</td> <td>Condyloid</td> <td>Radius</td> <td>Sagittal</td> <td>Extension</td> </tr> </tbody> </table> <p>All three joints are synovial joints, allowing a specific range of movement. The bones of each joint are held together securely by ligaments, to provide stability at to the joint. Structure of the synovial joint.</p> <p>Shoulder</p> <ul style="list-style-type: none"> • The shoulder joint forms part of the appendicular skeleton. • It is a ball and socket joint which allows movement in every plane due to the shape of the articulating bones. • The movement is flexion at the shoulder. • Very wide range of movement due to shape of the joint and the ligaments. <p>Trunk</p> <ul style="list-style-type: none"> • The trunk forms part of the axial skeleton • The trunk is formed by the articulation of the vertebrae in the vertebral column. Movement is possible in 3 planes. • Unlike synovial joints, there is limited movement at gliding joints/cartilaginous in order to limit injury of the spinal column <p>Wrist</p> <ul style="list-style-type: none"> • The wrist joint forms part of the appendicular skeleton • The wrist is a condyloid joint and movement is possible in two planes – flexion/extension, adduction/abduction. • The movement is extension of the wrist as from the anatomical standing position the joint has extended 	Joint	Type of	Bones	Planes	Joint	Shoulder	Ball and	Scapula	Sagittal	Flexion	Trunk	Gliding/ cartilagin	Vertebral column	Sagittal	Flexion	Wrist	Condyloid	Radius	Sagittal	Extension	8
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Level	Mark	Descriptor
	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 of the points made will be relevant to the context in the question. • Limited analysis which contains generic assertions
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
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

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12	<p>Learners are expected to provide responses in line with the information in the table for the movement shown.</p> <p>Interrelationships are expected to be provided, with full written analysis of how the skeletal and muscular system are working together to perform the movement. Additional information demonstrating knowledge of the skeletal and muscular systems can be provided, to show a deeper understanding of the interrelationships between the two systems.</p> <p>Marks will be awarded in relation to the detail and depth of coverage the movement.</p> <p>Range of movement permitted at the synovial joints due to shape of articulating bones and associated ligaments, can also be explored.</p> <table border="1" data-bbox="323 674 1501 1019"> <thead> <tr> <th>Joint</th> <th>Type of joint</th> <th>Bones</th> <th>Joint movement</th> <th>Plane of movement</th> <th>Muscles</th> <th>Muscle Contraction</th> </tr> </thead> <tbody> <tr> <td>Elbow</td> <td>Hinge</td> <td>Humerus Radius Ulna</td> <td>Flexion</td> <td>Sagittal</td> <td>Agonist – biceps Antagonist - triceps</td> <td>Concentric</td> </tr> <tr> <td>Hip</td> <td>Ball and socket</td> <td>Femur Pelvis</td> <td>Flexion</td> <td>Sagittal</td> <td>Agonist – hip flexors Antagonist – gluteals</td> <td>Concentric</td> </tr> <tr> <td>Knee</td> <td>Hinge</td> <td>Femur Tibia</td> <td>Flexion</td> <td>Sagittal</td> <td>Agonist – hamstring Antagonist - quadriceps</td> <td>Concentric</td> </tr> </tbody> </table> <p>Additional factors responsible for movement</p> <p>Joint shape determines range of motion, due to shape of articulating surfaces and arrangement of other structures supporting the joint, e.g. ligaments.</p> <p>Elbow</p> <ul style="list-style-type: none"> • Hinge joint • The joint formed by the articulation of the humerus, radius and ulna. • As the elbow is a hinge joint, movement is only possible in one plane, the sagittal plane. • The muscles that bring about flexion of the elbow are the biceps. • The biceps are the agonist muscle. In order for the biceps to contract, the antagonist, in this case the triceps, must relax. • The biceps contract concentrically, as they shorten, pulling on the bone attached to the muscle's insertion point allowing the elbow to flex. <p>Hip</p> <ul style="list-style-type: none"> • Ball and socket joint • The joint is formed by the articulation of the femur and pelvis • A large range of movement is possible at the hip, due to the shape made by the articulating bones. the movement in the picture is flexion of the hip to 	Joint	Type of joint	Bones	Joint movement	Plane of movement	Muscles	Muscle Contraction	Elbow	Hinge	Humerus Radius Ulna	Flexion	Sagittal	Agonist – biceps Antagonist - triceps	Concentric	Hip	Ball and socket	Femur Pelvis	Flexion	Sagittal	Agonist – hip flexors Antagonist – gluteals	Concentric	Knee	Hinge	Femur Tibia	Flexion	Sagittal	Agonist – hamstring Antagonist - quadriceps	Concentric	14
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	<ul style="list-style-type: none"> The iliopsoas contracts concentrically, as they shorten, pulling on the bone attached to the muscle's insertion point to flex the hip. <p>Right Knee</p> <ul style="list-style-type: none"> Hinge joint The joint formed by the articulation of the femur and tibia. As the knee is a hinge joint, movement is only possible in one plane, the sagittal plane. Flexion and extension occurs in the sagittal plane. In the picture, we can see the athlete flexes at the knee joint to allow for force transformation to step up. In order for the hamstrings to contract, the antagonist, the quadriceps must relax. As the hamstrings contract, they shorten, pulling on the bone attached to the muscle insertion point. <p>Flexion and extension occur in the sagittal plane. The athlete performing the step up flexes the elbow joint to help propel them upwards.</p> <p>Additional factors in the analysis of movement</p> <p>The role of the fixator, types of contraction and examples in the joints and in the movement.</p> <p>The role of the synergist, types of contraction and examples in the joints and in the movement.</p> <p>Stability at joints and mobility at joints.</p>	
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	0	No rewardable material.
Level 1	1-5	<ul style="list-style-type: none"> Demonstrates isolated elements of knowledge and understanding. Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question. Limited analysis which contains generic assertions
Level 2	6-10	<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
Level 3	11-14	<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

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