Mark Scheme

January 2020 (Final)

Pearson BTEC Level 3 – Sport and Exercise Science

Unit 2: Functional Anatomy

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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 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.

BTEC Next Generation Mark Scheme Template

Functional Anatomy Unit 2 2001

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>1</td><td>Award one mark for the identification of each classification of joint and the location, up to a maximum of four marks.

Accept responses in any order

<table>
<tr><th>Classification of joint</th><th>Location in the body</th></tr>
<tr><td>Fibrous</td><td>Cranium</td></tr>
<tr><td>Cartilaginous/slightly movable (1)</td><td>Vertebrae / Trunk (1)</td></tr>
<tr><td>Synovial/freely movable (1)</td><td>Knee (1)</td></tr>
</table>

Accept <u>all areas</u> where synovial joints are found but not named bones.</td><td>4</td></tr>
</table>

Question Number	Answer	Mark
2a Grad	Award **one** mark for stating the meaning of anterior. Towards the front of the body (1) Accept any other appropriate response.	1
2b Grad	Award **one** mark for stating the meaning of lateral. Body part that is further from the centre/away from the midline of the body OR The side of the body (1) Accept any other appropriate response.	1

Question Number	Answer	Mark
3	Award **one** mark for identification of the function and **one** further mark for linked descriptive point. It provides a site for attachment (1) as it has a raised bump/ridge/bone protrusion Accept any other appropriate responses.	2

Question Number	Answer	Mark
4	Award for the description of pronation, up to **two marks.** The palm/hand (1) is facing downwards (1) The tarsals (1) turn the foot inwards (1) Accept any other appropriate answers.	2

Question Number	Answer	Mark
5	Award **one** mark for identifying the plane of movement and up to **two** further marks for linked descriptive points. Frontal plane (1) dividing the body into front and back (1) allowing for sideways movement (1) so that abduction/adduction movements can occur (1) Accept any other appropriate answers.	3

Question Number	Answer	Mark
6a	Award **one** mark for each identification of heart anatomy. A -Right Atrium B - Bicuspid valve/mitral valve C – Septum	3

Question Number	Answer	Mark
6b	Award **one** mark for identification of a function and **one** further mark for a linked descriptive point. To prevent backflow of blood (1) <u>into</u> the ventricles/<u>from</u> the aorta/pulmonary artery (1) To open to let blood through (1) <u>from</u> the ventricles/<u>into</u> the aorta/pulmonary artery (1) Accept any other appropriate answers.	2

Question Number	Answer	Mark
7a	Award **one** mark for the identification of the joint. Saddle	1
7b	Award **one** mark for identification of the type of joint and **one** mark for each explanatory point, up to **three** marks. The type of joint is a pivot joint (1) therefore allowing rotational movement (1) as it is a circular bone as it fits over another/such as the atlas and axis in the neck Accept any other appropriate answer.	3

Question Number	Answer	Mark
8	Answer should contain **four** linked points, which, in combination, provide a logical description of the function of the external intercostal muscles during inspiration. External intercostal muscles contract (1) and lift the ribs upwards and outwards (1) increasing the volume of the thoracic cavity (1) decreasing the pressure (1) drawing the air into the lungs (1) Accept any other appropriate answer.	4

Question Number	Answer	Mark
9	Award **one** mark for each descriptive point. • Transportation of lymph (1) • Is a clear watery fluid (1) • Contains a network of vessels / lymphoid organs / lymph nodes (1) • Acts as a drainage system (1) • It collects fluids from the body's tissues (1) • Part of the immune system / antibodies (1) • To help fight infection (1) • The system contains white blood cells / lymphocytes (1) • To get rid of/remove waste products / bacteria / pathogens (1) Accept any other appropriate answer.	4

Question Number	Answer (Analyse)	Mark
10	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. Answers may cover some/all of the indicative content, but learners should be rewarded for other relevant answers. **Identify** **A-** Delivery of oxygen and nutrients **B-** Removal of waste products **C-** Fight infection **D-** Clot blood **Description (1 max for each function)** **AD** – Through red blood cells/haemoglobin/erythrocytes - Plasma for nutrients such as glucose **BD** – Carbon dioxide is transported back to the lungs to be expelled during breathing / Lactic acid is diffused into the blood **CD** - White blood cells are transported to the site of infection **DD** – Platelets/thrombocytes in the bloodstream join together to form a plug **Link to exercise – max 2 per function** **AL** - Increased demand for oxygen for muscle contraction - To produce energy at the working muscles/energy production - To prevent lactate accumulation for <u>prolonged/continued</u> exercise **BL** – More CO2 is created as a result of exercise/increases blood acidity - Lactic acid can lead to fatigue **CL**- When exercising with a virus there could be a drop-in performance/feel healthy to train **DL** - A blood vessel will be repaired quickly so exercise can continue Accept any other appropriate answer.	8

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–3	• Demonstrates isolated elements of knowledge and understanding. • Provides little or no reference to the question context. • Generic statements may be presented, rather than linked factors/components being identified and explored in the context of the question. Limited attempt is made to address the question. • Response is likely to lack clarity, organisation and the required technical language.
Level 2	4–6	• Demonstrates mostly accurate knowledge and understanding. • Provides references to relevant information in relation to the question context. • Learners will identify linked factors/components, with some development in the form of mostly accurate and relevant factual material, in the context of the question. The accuracy in the detail on the factors identified is likely to vary. • The response may contain parts that lack clarity or proper organisation. There will be evidence of correct technical language being used.
Level 3	7–8	• Demonstrates accurate knowledge and understanding. • Provides sustained references to relevant information, in relation to the question context. • A contextualised analysis is developed using mostly coherent chains of reasoning, leading to a range of factors/components being present. Learners will demonstrate understanding of linkages and relationships. • Response demonstrates good organisation, clarity and use of technical language.

<table>
<tr><th>Question Number</th><th>Answer (Analyse)</th><th>Mark</th></tr>
<tr><td>11</td><td>
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. Answers may cover some/all of the indicative content, but learners should be rewarded for other relevant answers.

Learners are expected to provide answers in line with the information in the tables for the movement shown. Interrelationships are expected to be provided, with full written analysis of the skeletal system. Additional information demonstrating knowledge of the skeletal system can be provided, to show a deeper understanding.
Marks will be awarded in relation to the detail and depth of coverage the movement.

<table>
<tr><td>Joint/area of body</td><td>Type of joint</td><td>Bones</td><td>Joint movement</td><td>Plane of movement</td></tr>
<tr><td>Trunk</td><td>Gliding/ cartilaginous</td><td>Vertebral column</td><td>Lateral flexion</td><td>Frontal</td></tr>
<tr><td>Hip</td><td>Ball and socket</td><td>Pelvis
Femur</td><td>Abduction</td><td>Frontal</td></tr>
<tr><td>Ankle</td><td>Hinge</td><td>Tibia
Tarsals
(Fibula)
(Talus)</td><td>Dorsiflexion/ Plantarflexion</td><td>Sagittal</td></tr>
</table>

Additional factors responsible for movement
Joint shape determines range of motion, due to shape of articulating surfaces and arrangement of other structures supporting the joint, e.g. ligaments.

Trunk
• Gliding/cartilaginous joint.
• The joint is formed by the articulation of the vertebrae.
• The range of movement is possible at the trunk due to the structure of the articulating bones. To achieve the lean in the stretch, the movement is lateral flexion of the trunk. This movement takes place in the frontal plane.

Hip
• Ball and socket joint.
• The joint is formed by the articulation of the pelvis and femur.
• Although a great range of movement is possible at the hip due to the shape made by the articulating bones, to achieve the stretch shown, the movement is abduction of the hip, as the leg has moved away from the body. This movement takes place in the frontal plane.
</td><td>8</td></tr>
</table>

	Ankle • Hinge. • The joint is formed by the articulation of the tibia and tarsals. • As the ankle is a hinge joint, joint movement is possible in only one plane, that of the sagittal plane. • In the picture, we can see the athlete's ankle is in dorsiflexion as the joint angle at the hinge has decreased in order to allow them to lower to the floor or plantarflexion in order for the athlete to point their feet out to the side	

Level	**Mark**	**Descriptor**
	0	No rewardable material.
Level 1	1–3	• 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 rather than interrelationships or linkages.
Level 2	4–6	• 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 rather than interrelationships or linkages.
Level 3	7-8	• 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.

<table>
<tr><th>Question Number</th><th>Answer (Analyse)</th><th>Mark</th></tr>
<tr><td>12</td><td>
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. Answers may cover some/all of the indicative content, but learners should be rewarded for other relevant answers.

Learners are expected to provide answers 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
Preparation to execution phase

<table>
<tr><th>Joint</th><th>Type of joint</th><th>Bones</th><th>Planes of movement</th><th>Joint movement</th><th>Muscles</th><th>Muscle contraction</th></tr>
<tr><td>Knee</td><td>Hinge</td><td>Femur
Tibia
(Fibula)</td><td>Sagittal</td><td>Flexion</td><td>Agonist – Hamstrings

Antagonist – Quadriceps</td><td>Concentric</td></tr>
<tr><td>Shoulder</td><td>Ball and socket</td><td>Humerus
Scapula
(Clavicle)</td><td>Sagittal

Frontal</td><td>Flexion
Elevation

Abduction</td><td>Agonist – Anterior /Medial deltoid

Antagonist – Posterior deltoid / Latissimus dorsi</td><td>Concentric</td></tr>
<tr><td>Elbow</td><td>Hinge</td><td>Humerus
Radius
(Ulna)</td><td>Sagittal</td><td>Extension</td><td>Agonist – Triceps

Antagonist – Biceps</td><td>Concentric</td></tr>
</table>

All three joints are synovial joints, allowing a specific range of movement.
The muscles that work across each joint are connected to the bone via tendons.
The bones of each joint are held together securely by ligaments, to provide stability at the joint.

Knee

• 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 occur in the sagittal plane. In the picture, we can see the athlete flexes at the knee joint to allow them to step up onto the next grip of the wall.
• The muscles that bring about flexion at the knee are the hamstrings. The hamstrings are the agonist muscle. In order for the hamstrings to contract, the antagonist, in this case the quadriceps, must lengthen.
</td><td>14</td></tr>
</table>

	• As the hamstrings contract, they shorten, pulling on the bone attached to the muscle insertion point. The quadriceps are lengthening and relaxing. • As there is movement at the knee, in this phase the hamstrings are contracting concentrically. **Shoulder** • Ball and socket joint. • The joint is formed by the articulation of the humerus and scapula. • A full range of movement is possible at the shoulder due to the shape made by the articulating bones, the movement is flexion of the joint in order to reach up higher to climb up the wall • The muscle that brings about flexion of the shoulder is the anterior deltoid. The anterior deltoid is the agonist muscle. In order for the anterior deltoid to contract, the antagonist, in this case the posterior deltoid, must relax. • As there is movement at the shoulder when performing the movement, the type of contraction is concentric. • The movement takes place in the sagittal plane. **Elbow** • Hinge joint. • The joint is formed by the articulation of the humerus and radius. • As the elbow is a hinge joint, movement is only possible in one plane, the sagittal plane. • Flexion and extension occur in the sagittal plane. In the picture, we can see the athlete is performing extension at the elbow joint to allow for a maximum reach onto the next grip on the wall. • The muscles that bring about extension at the elbow are the triceps. They are the agonist muscles. In order for them to contract, the antagonist, in this case the biceps, must lengthen. • As the triceps contracts they shorten, pulling on the bone attached to the muscle insertion point. • As there is movement at the elbow, in this phase the triceps are contracting concentrically.	

Level	Mark	Descriptor
0	0	• No rewardable material.
1	1–5	• 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 rather than interrelationships or linkages.
2	6–10	• 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.
3	11–14	• 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.

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