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## **Unit 2: Functional Anatomy**

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### **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	<p>Award 1 mark for the identification of a function of the cardiovascular system. Up to a maximum of 2 marks.</p> <ul style="list-style-type: none"> <li>• Delivery of oxygen and nutrients</li> <li>• Removal of waste products – carbon dioxide and lactate</li> <li>• Control of blood flow – vasoconstriction, vasodilation of blood vessels</li> <li>• Fight Infection</li> <li>• Clot Blood</li> </ul> <p><b>Accept any other appropriate response.</b></p>	2

Question Number	Answer	Mark
2a	<p>Award 1 mark for stating the meaning of the anatomical term Distal</p> <p>Situated away from the centre 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 Prone</p> <ul style="list-style-type: none"> <li>• the body lying face down</li> <li>• palm facing down.</li> </ul> <p><b>Accept any other appropriate response.</b></p>	1

Question Number	Answer	Mark
3	<p>Award 1 mark for the identification of the function of a red blood cell, and 1 further mark for appropriate expansion.</p> <ul style="list-style-type: none"> <li>• The key function of red blood cells is to carry oxygen (1) as the oxygen binds to the haemoglobin within the red blood cells (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p>	2

Question Number	Answer	Mark
4	<p>Answers should contain 4 linked points, which in combination, provides a logical description of the process of systole.</p> <p>The atria contract (1) and blood moves into the ventricles (1) ventricles contract (1) and eject blood into the aorta/pulmonary vein (1)</p> <p><b>Accept any other appropriate response.</b></p>	4

Question Number	Answer	Mark
5	<p>Award 1 mark for identifying the muscle tissue location and up to two further marks for the appropriate expansion.</p> <p>Smooth muscle is found in the walls of blood vessels (1) when it contracts it results in vasoconstriction which reduces the flow of blood to the tissues (1) when it relaxes it results in vasodilation which increase blood flow to the tissues (1)</p> <p><b>Accept any other appropriate response.</b></p>	3

Question Number	Answer	Mark
6	<p>Answer should contain 5 linked points, which in combination, provides a logical description of the mechanism of expiration.</p> <p>The diaphragm relaxes and moves upwards (1) the internal intercostal muscles contract and lower the rib cage (1) abdominal muscles contract pushing against the diaphragm/raising the abdominal pressure (1) decreasing the volume of the thoracic cavity (1) increasing the pressure in the lungs so air is forced out of the lungs (1)</p> <p><b>Accept any other appropriate response.</b></p>	5

Question Number	Answer	Mark
7	<p>Award one mark for description of tidal volume and a further 3 marks for the appropriate expansion.</p> <p>Tidal volume is the volume of air breathed in / out within a single breath (1) this increases during exercise as demand for oxygen increases (1) which is detected by the medulla oblongata/respiratory centre in the brain (1) resulting in an increase in rate / depth of breathing (1)</p> <p><b>Accept any other appropriate response.</b></p>	4

Question Number	Answer	Mark
8	<p>Award <b>one</b> 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"> <li>• Storage of minerals (1) for example the bones store calcium/phosphorous (1)</li> <li>• Protection from injury (1) for example the cranium protect the brain (1)</li> </ul> <p><b>Accept any other appropriate response.</b></p>	4

Question Number	Answer	Mark
9	<p>Award one mark for each explanatory point</p> <p>Osteoclasts break down bone (1) during the resorption phase by removing calcium / transporting enzymes and acids to the old bone (1)</p> <p>Osteoblasts are cells which form new bone (1) by replacing collagen / depositing minerals (1)</p> <p><b>Accept any other appropriate response.</b></p>	4

Question Number	Answer	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. Answers may cover some/all of the indicative content but learners should be rewarded for other relevant answers.</p> <p><b>Type I</b></p> <ul style="list-style-type: none"> <li>• produces low intensity contractions</li> <li>• sustained contractions/fatigue resistant</li> <li>• take approximately three times longer to contract than fast twitch fibres after receiving stimulus.</li> <li>• Used during on a continuous flat part of the cycle race</li> </ul> <p><b>Type IIa</b></p> <ul style="list-style-type: none"> <li>• Produces fast contraction</li> <li>• Demonstrates properties of both fast and slow twitch muscle fibre types</li> <li>• Training can influence the fibre type properties</li> <li>• recruited as demands of the race begin to increase to a moderate intensity such as climbing up a sustained incline, preparing to sprint.</li> </ul> <p><b>Type IIx</b></p> <ul style="list-style-type: none"> <li>• produces very fast, explosive contractions</li> <li>• quick to fatigue</li> <li>• Quickest response to nervous stimuli</li> <li>• Used when sprinting to overtake/to finish line or cycling up a short steep hill</li> </ul> <p><b>Muscle fibre type recruitment</b></p> <ul style="list-style-type: none"> <li>• recruitment at different levels of intensity of exercise</li> <li>• Ramping effect of muscle fibre type recruitment in response to different intensity demands of the race.</li> </ul>	10

	<p><b>Neuromuscular control of muscle contraction</b></p> <ul style="list-style-type: none"> <li>• nerve impulse and action potential</li> <li>• neuromuscular junction (synapses)</li> <li>• neurotransmitter (acetylcholine)</li> </ul> <p><b>Accept any other appropriate response.</b></p>	
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Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–3	<ul style="list-style-type: none"> <li>• Demonstrates isolated elements of knowledge and understanding.</li> <li>• Provides little or no reference to the question context.</li> <li>• 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.</li> <li>• Response is likely to lack clarity, organisation and the required technical language.</li> </ul>
Level 2	4–7	<ul style="list-style-type: none"> <li>• Demonstrates mostly accurate knowledge and understanding.</li> <li>• Provides references to relevant information in relation to the question context.</li> <li>• 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.</li> <li>• The response may contain parts that lack clarity or proper organisation. There will be evidence of correct technical language being used.</li> </ul>
Level 3	8–10	<ul style="list-style-type: none"> <li>• Demonstrates accurate knowledge and understanding.</li> <li>• Provides sustained references to relevant information, in relation to the question context.</li> <li>• 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.</li> <li>• Response demonstrates good organisation, clarity and use of technical language.</li> </ul>

Question Number	Answer	Mark																				
11	<p>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 how the skeletal system performs the movement. Additional information demonstrating knowledge of the skeletal system can be provided, to show a deeper understanding.</p> <p>Marks will be awarded in relation to the detail and depth of coverage the movement.</p> <table border="1" data-bbox="411 613 1225 943"> <thead> <tr> <th data-bbox="411 613 560 674">Joint/are a of body</th> <th data-bbox="566 613 730 674">Type of joint</th> <th data-bbox="737 613 863 674">Bones</th> <th data-bbox="869 613 1054 674">Joint movement</th> <th data-bbox="1061 613 1225 674">Plane of movement</th> </tr> </thead> <tbody> <tr> <td data-bbox="411 683 560 734">Hip</td> <td data-bbox="566 683 730 734">Ball and socket</td> <td data-bbox="737 683 863 734">Femur pelvis</td> <td data-bbox="869 683 1054 734">Flexion</td> <td data-bbox="1061 683 1225 734">Sagittal</td> </tr> <tr> <td data-bbox="411 743 560 848">Knee</td> <td data-bbox="566 743 730 848">Hinge</td> <td data-bbox="737 743 863 848">Femur Fibula Tibia</td> <td data-bbox="869 743 1054 848">Flexion</td> <td data-bbox="1061 743 1225 848">Sagittal</td> </tr> <tr> <td data-bbox="411 857 560 943">Ankle</td> <td data-bbox="566 857 730 943">Hinge</td> <td data-bbox="737 857 863 943">Tibia Fibula Tarsals</td> <td data-bbox="869 857 1054 943">Dorsi Flexion</td> <td data-bbox="1061 857 1225 943">Sagittal</td> </tr> </tbody> </table> <p><b>Hip</b></p> <ul data-bbox="459 1077 1174 1290" style="list-style-type: none"> <li>• The hip joint forms part of the appendicular skeleton.</li> <li>• A ball and socket joint allows movement in every plane due to the shape of the articulating bones.</li> <li>• The movement is flexion at the hip, as the hips have moved posterior to the anatomical position.</li> </ul> <p><b>Knee</b></p> <ul data-bbox="459 1357 1222 1720" style="list-style-type: none"> <li>• The knee joint forms part of the appendicular skeleton</li> <li>• The knee is a hinge joint, movement is only possible in one plane.</li> <li>• The movement is flexion of the knee, as the knee joint has moved anterior to the anatomical position.</li> <li>• The movement is limited at the knee due to the shape of the joint.</li> <li>• Ligaments support the joint to prevent any unwanted rotation.</li> </ul> <p><b>Ankle</b></p> <ul data-bbox="459 1787 1214 2000" style="list-style-type: none"> <li>• The ankle joint forms part of the appendicular skeleton</li> <li>• The ankle is a hinge joint, movement is only possible in one plane.</li> <li>• The movement is dorsiflexion of the ankle, as the joint has moved anterior to the anatomical position.</li> </ul>	Joint/are a of body	Type of joint	Bones	Joint movement	Plane of movement	Hip	Ball and socket	Femur pelvis	Flexion	Sagittal	Knee	Hinge	Femur Fibula Tibia	Flexion	Sagittal	Ankle	Hinge	Tibia Fibula Tarsals	Dorsi Flexion	Sagittal	10
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<b>Level</b>	<b>Mark</b>	<b>Descriptor</b>
	0	No rewardable material.
Level 1	1–3	<ul style="list-style-type: none"> <li>• Demonstrates isolated elements of knowledge and understanding.</li> <li>• Provides little or no reference to the question context.</li> <li>• 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.</li> <li>• Response is likely to lack clarity, organisation and the required technical language.</li> </ul>
Level 2	4–7	<ul style="list-style-type: none"> <li>• Demonstrates mostly accurate knowledge and understanding.</li> <li>• Provides references to relevant information, in relation to the question context.</li> <li>• 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.</li> <li>• The response may contain parts which lack clarity or proper organisation. There will be evidence of correct technical language being used.</li> </ul>
Level 3	8–10	<ul style="list-style-type: none"> <li>• Demonstrates accurate knowledge and understanding.</li> <li>• Provides sustained coverage of relevant information, in relation to the question context. Might demonstrate the ability to integrate and synthesise relevant information.</li> <li>• 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.</li> <li>• Response demonstrates good organisation, clarity and use of technical language.</li> </ul>

Question Number	Answer	Mark																								
12	<p>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.</p> <p>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="392 741 1233 1167"> <thead> <tr> <th>Joint</th> <th>Type of joint</th> <th>Bones</th> <th>Planes of movement</th> <th>Joint movement</th> <th>Muscles</th> </tr> </thead> <tbody> <tr> <td>Trunk</td> <td>Gliding/ cartilaginous</td> <td>Vertebral column</td> <td>Sagittal</td> <td>Flexion</td> <td>Agonist – Rectus Abdominis Antagonist – Erector Spinae</td> </tr> <tr> <td>Knee</td> <td>hinge</td> <td>Femur Fibula Tibia</td> <td>Sagittal</td> <td>Extension</td> <td>Agonist – Quadriceps  Antagonist – Hamstrings</td> </tr> <tr> <td>Ankle</td> <td>hinge</td> <td>Tibia Fibula Tarsals</td> <td>Sagittal</td> <td>Plantarflexion</td> <td>Agonist – Gastrocnemius  Antagonist – Tibialis Anterior</td> </tr> </tbody> </table> <p>All three joints are synovial joints, allowing a specific 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.</p> <p><b>Trunk</b></p> <ul style="list-style-type: none"> <li>• There is limited movement at gliding joints/cartilaginous in order to provide stability therefore limiting injury.</li> <li>• In order for the rectus abdominis to contract, the antagonist, the erector spinae must relax.</li> <li>• As the rectus abdominis contracts it shortens, pulling on the bone attached to the muscle insertion point.</li> <li>• Movement efficiency is achieved through correct transfer of movement across body segments. Flexion of the trunk allows forward movement in order to clear the hurdle at a low level.</li> </ul>	Joint	Type of joint	Bones	Planes of movement	Joint movement	Muscles	Trunk	Gliding/ cartilaginous	Vertebral column	Sagittal	Flexion	Agonist – Rectus Abdominis Antagonist – Erector Spinae	Knee	hinge	Femur Fibula Tibia	Sagittal	Extension	Agonist – Quadriceps  Antagonist – Hamstrings	Ankle	hinge	Tibia Fibula Tarsals	Sagittal	Plantarflexion	Agonist – Gastrocnemius  Antagonist – Tibialis Anterior	20
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	<p><b>Knee</b></p> <ul style="list-style-type: none"> <li>• At a hinge joint, the joint shape only allows flexion and extension</li> <li>• In order for the quadriceps to contract, the antagonist, the hamstrings must relax.</li> <li>• As the quadriceps contract, they shorten, pulling on the bone attached to the muscle insertion point.</li> <li>• The hurdler extends at the knee joint, in order to stretch the leg as far forward as possible to clear the hurdle.</li> </ul> <p><b>Ankle</b></p> <ul style="list-style-type: none"> <li>• At a hinge joint, the joint shape only allows flexion and extension</li> <li>• In order for the gastrocnemius to contract, the antagonist, the tibialis anterior must relax.</li> <li>• As the gastrocnemius contracts, it shortens, pulling on the bone attached to the muscles insertion point.</li> <li>• The hurdler plantarflexes at the ankle in preparation for landing and forced transfer</li> </ul>	
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Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-5	<ul style="list-style-type: none"> <li>• Demonstrates isolated elements of knowledge and understanding.</li> <li>• Provides little or no reference to the question context.</li> <li>• 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.</li> <li>• Response is likely to lack clarity, organisation and the required technical language.</li> </ul>
Level 2	6-10	<ul style="list-style-type: none"> <li>• Demonstrates mostly accurate knowledge and understanding.</li> <li>• Provides references to relevant information, in relation to the question context.</li> <li>• 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.</li> <li>• The response may contain parts which lack clarity or proper organisation. There will be evidence of correct technical language being used.</li> </ul>

Level 3	11–15	<ul style="list-style-type: none"> <li>• Demonstrates accurate knowledge and understanding.</li> <li>• Provides sustained coverage of relevant information, in relation to the question context. Might demonstrate the ability to integrate and synthesise relevant information.</li> <li>• 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.</li> <li>• Response demonstrates good organisation, clarity and use of technical language.</li> </ul>
Level 4	16–20	<ul style="list-style-type: none"> <li>• Demonstrates accurate and thorough knowledge and understanding.</li> <li>• Provides sustained references to relevant information, in relation to the question context. Demonstrates the ability to integrate and synthesise relevant information, in relation to the question context.</li> <li>• Displays a well-developed contextualised analysis, containing logical chains of reasoning throughout. Learners will demonstrate thorough understanding of linkages and relationships.</li> <li>• Response demonstrates good organisation and clarity and the correct use of technical language throughout.</li> </ul>

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Welsh Assembly Government

