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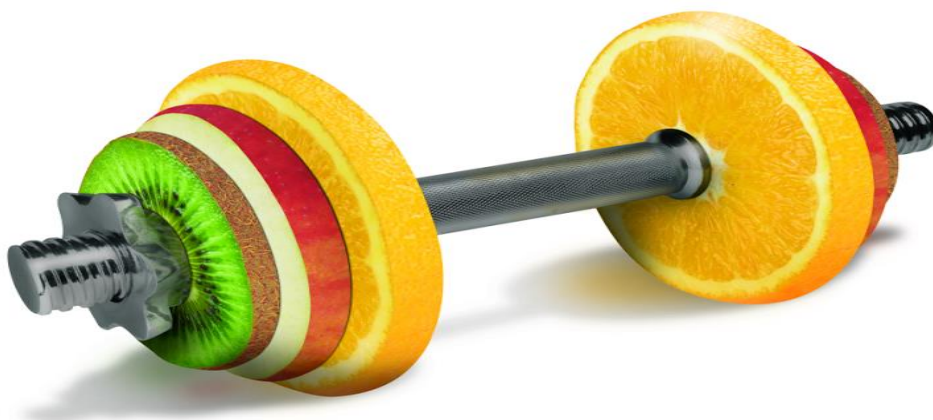


Examiners' Report/
Lead Examiner Feedback

January 2018

BTEC Level 3 Nationals in Sport and Exercise
Science

Unit 2: Functional Anatomy (31814H)



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Grade Boundaries

What is a grade boundary?

A grade boundary is where we set the level of achievement required to obtain a certain grade for the externally assessed unit. We set grade boundaries for each grade (Distinction, Merit, Pass and Near Pass). The grade awarded for each unit contributes proportionately to the overall qualification grade and each unit should always be viewed in the context of its impact on the whole qualification.

Setting grade boundaries

When we set grade boundaries, we look at the performance of every learner who took the assessment. When we can see the full picture of performance, our experts are then able to decide where best to place the grade boundaries – this means that they decide what the lowest possible mark should be for a particular grade.

When our experts set the grade boundaries, they make sure that learners receive grades which reflect their ability. Awarding grade boundaries is conducted to ensure learners achieve the grade they deserve to achieve, irrespective of variation in the external assessment.

Variations in external assessments

Each test we set asks different questions and may assess different parts of the unit content outlined in the specification. It would be unfair to learners if we set the same grade boundaries for each test, because then it would not take into account that a test might be slightly easier or more difficult than any other.

Grade boundaries for this, and all other papers, are on the website via this link: qualifications.pearson.com/gradeboundaries

Unit 2: Functional Anatomy

Grade	Unclassified	Near Pass	Pass	Merit	Distinction
Boundary Mark	0	12	21	30	40

Introduction

This is the second series of external examinations with regards to the new specification. The method of assessment was via examination as opposed to centre based internal assessment as employed within the old specification.

Centres and learners should be acknowledged for their preparation. There were some changes to the assessment format from the first series. Overall, most learners were prepared and knowledgeable on various content from the specification for this assessment

The paper was divided into 12 questions. The questions were designed to progress from the lowest number of marks gained to the highest marks, in order to develop learner confidence whilst progressing through the paper. Questions 1 – 9 allowed learners to address questions from 2 to 5 marks, whilst question 10 to 12 ranged from 8 to 14 marks gained; requiring an extended response from the learners. Each question was based on functional anatomy, allowing the learner to demonstrate knowledge and understanding of a range of specification content. Questions 1 to 10 generally addressed sections A to E of the specification; whilst questions 11 and 12 allowed the learner to demonstrate their knowledge and understanding of the interrelationships of the muscular and skeletal systems in movement analysis.

Questions 1 to 9 on the paper were assessed using a traditional points based approach, where a mark was given for each appropriate point (more information can be found below in the individual question section of the report).

Questions 10 to 12 required an extended response, and these were marked using a 'levels based' approach to assessment where the overall quality of the response was considered rather than number of facts stated alone. There were some changes to these questions with an overall reduction of ten marks. Questions 10 and 11 were reduced from ten marks each in the previous series to eight marks each this time. While Question 12 was reduced from twenty marks in the previous series to 14 marks this time.

Individual Questions

The following section considers each question on the paper, providing examples of learner responses and a brief commentary of why the responses gained the marks they did. This section should be considered with the live external assessment and corresponding mark scheme.

Q1

This was a very accessible question with the vast majority of learners achieving at least one mark for stating one correct function. A large number of learners achieved two marks for correctly stating two functions of the respiratory system.

The most common two functions stated were

- Inhalation / Exhalation
- Intake of Oxygen / Removal of Carbon Dioxide

This response gained 2 marks

Answer ALL questions. Write your answers in the spaces provided.

1 State **two** functions of the respiratory system.

(i) To inhale oxygen needed for working muscles

(ii) To exhale any waste products such as carbon dioxide.

(Total for Question 1 = 2 marks)

Two marks gained for correctly stating two functions of the respiratory system.

This response gained 1 mark

Answer ALL questions. Write your answers in the spaces provided.

1 State **two** functions of the respiratory system.

(i) To deliver oxygen to the muscles

(ii) Allows gaseous exchange to happen in the alveoli

(Total for Question 1 = 2 marks)

One mark for correctly identifying gaseous exchange as a function of the respiratory system.

Delivery of oxygen to the muscles is a function of the cardiovascular system so did not gain a mark. Identification of functions of the cardiovascular system was a common error amongst learners only gaining one mark or not gaining any marks.

Q2(a)

This question was answered well, with a high proportion of learners gaining one mark for giving the meaning of the anatomical term posterior.

This response gained 1 mark

2 Give the meaning of the following anatomical terms.

(a) posterior

Towards the back of the body

(1)

One mark gained for correctly stating towards the back of the body.

This response gained 0 marks

2 Give the meaning of the following anatomical terms.

(a) posterior

At the bottom

(1)

For the learners that did not gain a mark, the majority displayed poor or incorrect knowledge as in this example. Another common error was to use the term “behind” and offer an incorrect reference point such as “behind the body”.

Q2(b)

This question was answered well. Learners should have achieved one mark for this question for giving the meaning of the anatomical term inferior. A high proportion of learners accurately gave an answer referencing below or lower.

This response gained 1 mark

(b) inferior. (1)

meaning below. For example the tibia is inferior to the femur

(Total for Question 2 = 2 marks)

One mark gained for correctly stating the meaning of the anatomical term inferior. This learner has then reinforced this knowledge by accurately referencing an example.

This response gained 0 marks

(b) inferior. (1)

lying face down below the mid-line of the
body

(Total for Question 2 = 2 marks)

This learner has correctly stated that inferior means below. However, they have given the midline of the body as a point of reference and consequently this response is incorrect. This was a common error amongst some learners. Other incorrect references included below the waist, below the bottom half and at the bottom.

Q3

This question was very accessible to learners. The vast majority achieved one mark for correctly identifying the function of platelets. A significant number of learners were also able to gain a second mark for further appropriate expansion to fully describe the function of platelets.

This response gained 2 marks

3 Describe the function of platelets.

Plateles are in the blood to create clots. ~~When~~ An example of when platelets will be used is when you cut yourself and start bleeding. The platelets will go to the cut and clot the wound, therefore stopping further bleeding.

(Total for Question 3 = 2 marks)

One mark gained for correctly stating that the function of platelets is to stop bleeding. A further mark was gained for the appropriate expansion, correctly describing platelets being used to form a clot.

This response gained 0 marks

3 Describe the function of platelets.

The function of platelets is to prevent blood clotting and are found just below the skin in the blood stream.

(Total for Question 3 = 2 marks)

This learner has incorrectly stated that platelets prevent blood clotting, so a mark has not been gained. A common error was to describe platelets as being responsible for fighting infection.

Q4

This question asked learners to explain two functions of the skeletal system. The level of demand was increased as the question stem identified a number of the functions of the skeletal system found in the specification. Learners were therefore required to identify and explain the two remaining functions, movement and attachment for skeletal muscle.

A high proportion of learners were able to identify the appropriate functions of the skeletal system. As the command verb for this question is explain, learners are required to expand upon each of these functions in order to gain full marks.

This response gained 3 marks

The skeletal system has many functions, including blood cell production, providing a supportive framework, storage of minerals, and protection.

4 Explain, using examples, **two other** functions of the skeletal system.

(i) The skeletal system allows for attachment of skeletal muscles.
For example the bicep can attach to the scapula.

(ii) The final function is movement. The skeletal system aids movement as bones join together for movement to occur. For example the femur connects to the tibia and fibula to allow movement in the leg.

(Total for Question 4 = 4 marks)

Movement
Support
Blood
Attachment
Protection
Storage

For one mark, this learner has identified attachment of skeletal muscle as a function of the skeletal system. They have expanded upon this identification by providing an accurate example to gain a second mark.

The learner has identified movement as another function of the skeletal system for a third mark. They have attempted to expand upon this point by using an example, this time referencing the bones found in a particular joint. This expansion is insufficient to

gain the fourth mark. To be gained this final expansion mark the learners require a more accurate explanation of the anatomical role of bones in movement, namely that muscles pull upon bones in order to create movement.

This response gained 1 mark

The skeletal system has many functions, including blood cell production, providing a supportive framework, storage of minerals, and protection. ^{or} come back

4 Explain, using examples, two other functions of the skeletal system.

(i) support weight-bearing activities, such as walking, running, etc.

(ii) Allows a range of movement, such as kicking, jumping, twisting.

(Total for Question 4 = 4 marks)

One mark is gained for the identification of movement as a function of the skeletal system.

This learner has also identified weight-bearing as another function of the skeletal system. This was a common error amongst learners, identifying a range of functions that are not included on the specification for this unit. Leverage, shape and structure were other popular examples of this. Some learners also made reference to functions that had already been included in the question stem.

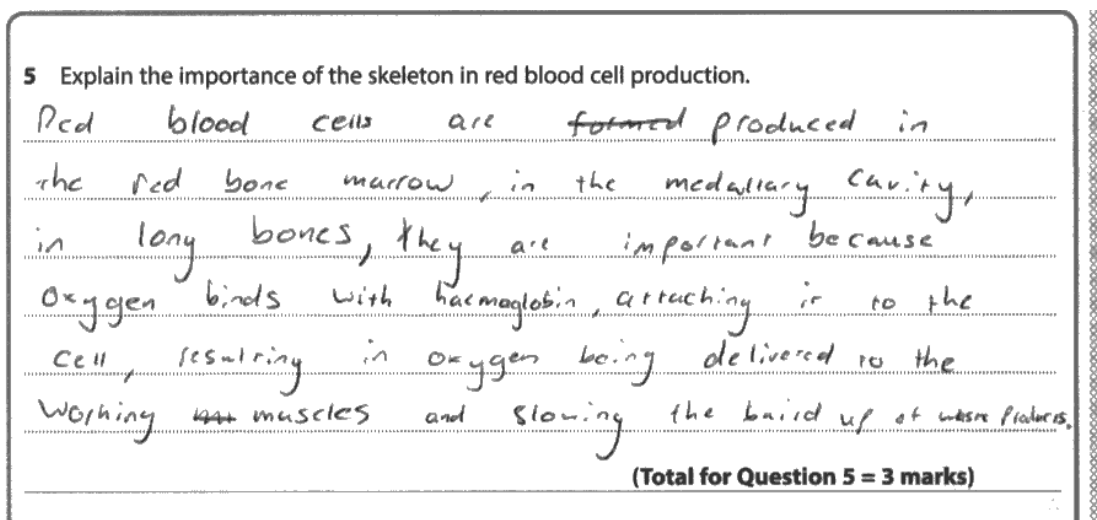
The expansions for both of these functions in this response do not gain marks as they are insufficiently detailed and do not reference appropriate anatomical knowledge.

Q5

This question assessed the learners' knowledge and understanding of the role of the skeletal system in red blood cell production. This is again related to the functions of the skeletal system but requires more detailed anatomical knowledge in a particular area of focus. The command verb for this question is explain. To gain full marks learners are required to identify the importance of the skeletal system and provide two further appropriate expansion points.

The mark scheme provides two slightly different routes for learners to use to answer the question. They used both of these routes and often a combination of the two. There are some accessible marks here and a high proportion of learners managed to gain at least one mark. The identification of bone marrow and the role of red blood cells in the delivery of oxygen were the marks most commonly accessed.

This response gained 3 mark



5 Explain the importance of the skeleton in red blood cell production.

Red blood cells are formed produced in the red bone marrow, in the medullary cavity, in long bones, they are important because oxygen binds with haemoglobin, attaching it to the cell, resulting in oxygen being delivered to the working ~~muscles~~ muscles and slowing the build up of waste products.

(Total for Question 5 = 3 marks)

For one mark the learner has identified that red blood cells are produced in the bone marrow. The learner has gained a second mark for expanding upon this point and explaining that this takes place in the medullary cavity within the long bones. The third and final mark has been gained for further expansion explaining the role of red blood cells in the delivery of oxygen.

This response gained 1 mark

5 Explain the importance of the skeleton in red blood cell production.

The skeleton is important in red blood cell production because they are created in the bone marrow. Therefore, without the skeleton red blood cells would not be created for the body and plasma, and platelets would not be created so they would not protect cuts.

(Total for Question 5 = 3 marks)

For one mark this learner has identified that red blood cells are produced in the bone marrow. The subsequent expansion points lack the sufficient knowledge of anatomical structure or function required in order to gain any further marks.

Q6

This question assessed learners' knowledge and understanding of the neural control of the cardiac cycle. The command verb for this question is describe. Consequently in order to gain marks learners are required to go beyond just identifying the four components that are listed within the specification. In order to gain full marks, learners should provide a logical description of the process that includes all four of these key components, in the correct order, detailing appropriate anatomical information for each.

Examples of appropriate anatomical information would include the location, structure or particular function of each of these component parts. The mark scheme does not provide an exhaustive list of these acceptable responses but should instead be viewed as an example answer, highlighting some examples of possible anatomical information that could be attached to the components.

This response gained 4 marks

6 Describe the neural control of the cardiac cycle.

SABPV

The medulla oblongata will get a signal to speed up or slow down heart rate. This will trigger a signal to be sent down the sympathetic (to speed up) or parasympathetic (to slow) nervous system to the sinoatrial node which is the ^{located at the top of the right atrium} pace maker of the heart. This signal then spreads across the atria ^{so it} ~~also~~ contracts ~~them~~ and ~~also~~ the signal will ^{also} reach the atrioventricular node. This signal is then sent down the septum through the bundle of His, which then leads to the Purkinje fibres which triggers the ventricular systole where the ventricles contract.

(Total for Question 6 = 5 marks)

One mark for describing the sinoatrial node being located in the right atrium. Another mark for describing the SAN sending a signal through the atria causing them to contract.

The learner has then described the signal arriving at the atrioventricular node. No mark is gained here though. The learner has identified a correct component in the correct order, but has not offered any of the further anatomical knowledge required to gain a mark.

The learner has gained a third mark for describing the signal then travelling through the bundle of His, located in the septum. The fourth and final mark is gained for a description of the Purkinje fibres triggering contraction of the ventricles.

This response gained 0 marks

6 Describe the neural control of the cardiac cycle.

This is controlled by the medulla oblongata. If the heart rate wants to speed up, adrenaline is released. If it wants to slow down, cortisol is released. Baroreceptors detect changes in blood pressure. They can send messages saying to increase heart rate if blood pressure gets too low and ~~increase it if~~ decrease it if it gets too high.

(Total for Question 6 = 5 marks)

This learner did not gain any marks as they have not made any reference to the components associated with neural control of the cardiac cycle. They appear to have confused the subject of the question with a different area of the specification related to control of breathing by the respiratory system. This was a common error amongst learners who did not gain any marks. Other common errors included lengthy descriptions of the cardiac cycle rather than the neural control of the cycle, as well as answers related to the sympathetic and parasympathetic nervous system, which is not covered by this specification.

Q7

This question had some very accessible marks for learners, but also some that were much more challenging to achieve. The command verb is explain. Therefore to achieve full marks learners are required to identify an anatomical feature of a capillary and then expand their answer to explain the effect of this feature on their function. A high proportion of learners gained one mark for identifying that capillary walls are one cell thick and semi-permeable, with a number going on to achieve a second mark for an expansion related to the diffusion of oxygen and carbon dioxide. The first point on the mark scheme was much more challenging for learners and very few of them accessed these marks.

This response gained 3 marks

The main function of a capillary is gaseous exchange.

7 Explain how two characteristics of a capillary are related to gaseous exchange.

(i) Capillaries ^{have} ~~are~~ one cell thick walls, this means it has a semi-permeable membrane which allows oxygen to diffuse out of the blood and carbon dioxide to diffuse in.

(ii) Capillaries are low pressure which means blood flow through them is slow, allowing time for nutrients to diffuse out and waste products to diffuse in.

(Total for Question 7 = 4 marks)

Handwritten notes in the top right corner: 1 cell thick, diffusion, low psi

One mark has been gained from identifying that capillary walls are one cell thick, with a further mark gained for explaining that this allows the diffusion of oxygen and carbon dioxide. This learner has then gained a third mark for explaining that blood flows slowly through capillaries allowing more time for diffusion. This learner does not gain a fourth mark as they have attributed this to low-pressure rather than to an accurate anatomical feature of a capillary.

This response gained 0 marks

The main function of a capillary is gaseous exchange.

7 Explain how **two** characteristics of a capillary are related to gaseous exchange.

- (i) They carry oxygenated and deoxygenated blood because before ~~it~~ the blood reaches the alveoli it carries deoxygenated blood, when gaseous exchange happens it changes to oxygenated.
- (ii) Blood flows in both directions to and from the heart. This is because deoxygenated blood is carried from the heart in capillaries, it is then oxygenated via gaseous exchange and taken back to the heart.

(Total for Question 7 = 4 marks)

This learner has not gained any marks because they have not identified any anatomical features of a capillary. They have made reference to gaseous exchange but have described deoxygenated blood changing to oxygenated. This response is lacking in sufficient detail and accuracy to gain a mark at Level 3.

A common error amongst learners who did not gain any marks was to describe blood flowing in both directions in capillaries, as above. Another popular response that did not gain any marks was to make reference to the large surface area of capillaries. Whilst accurate, this type of response is more of general concept related to gaseous exchange. It again lacks the specific anatomical detail of the structure of a capillary that this question demands.

Q8(b)

This question again uses the command verb explain. One mark is gained for identification of the anatomical function of the epiglottis, with a further mark gained for expanding upon this. A number of learners did not gain any marks for this question possibly due to the specific and detailed level of knowledge required. The mark most commonly accessed by learners was for stating that the epiglottis prevents food from entering the lungs or prevents choking.

This response gained 2 marks

(b) Explain the function of the epiglottis. (2)

To prevent food from entering the
lungs. This is done by closing over the
trachea.

(Total for Question 8 = 4 marks)

One mark gained for identifying that the function of the epiglottis is to prevent food from entering the lungs. A second mark is gained for an accurate anatomical explanation of the epiglottis closing over the trachea to enable this function.

This response gained 0 marks

(b) Explain the function of the epiglottis. (2)

distinguishes food and drink from oxygen ~~and~~ this
means that the ~~the~~ these things go to the correct
place.

(Total for Question 8 = 4 marks)

This learner has not gained any marks. Their response shows that they do seem to have some understanding of the function of the epiglottis. However the simplicity of the language that they have used has not allowed them to demonstrate any accurate anatomical knowledge. Consequently the response lacks the sufficient detail to gain any marks at Level 3.

Q9

This question was designed to be accessible but with sufficient scope to stretch and challenge learners. Whilst there were some excellent answers, overall the learner responses to this question were disappointing and reflected a poor understanding of eccentric muscle contraction. A significant number of learners identified the biceps as the main agonist in this movement and described the triceps relaxing to facilitate the concentric contraction of the biceps.

This response gained 3 marks

Figure 2 shows the downward phase of a press-up.

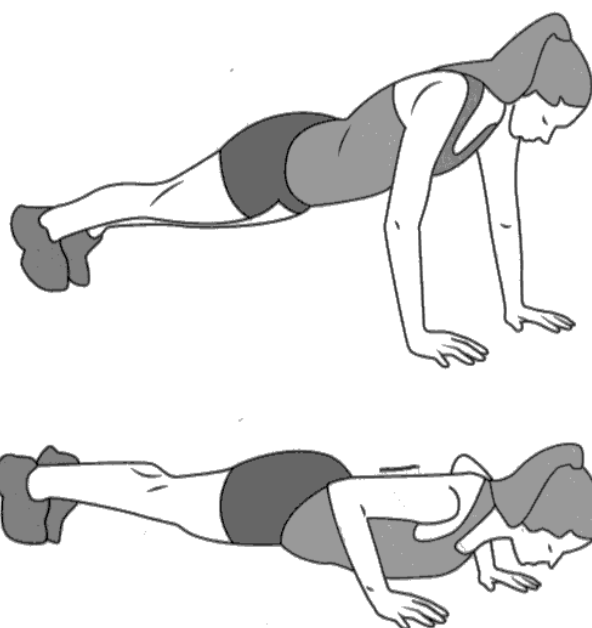


Figure 2

- 9 Explain how **eccentric** muscle contraction allows movement at the elbow during the downward phase of a press-up.

In ~~as~~ the down phase of the press up the tricep lengthens while contracting this is eccentric contraction, ~~the~~ ~~at~~ this contraction means that the elbow must ~~retract~~ ~~side~~ along the sagittal plane so that the press up can be performed correctly. Because of the eccentric contraction this movement of the elbow is controlled on the downward phase.

(Total for Question 9 = 4 marks)

One mark gained here for explaining that the triceps are contracting eccentrically. A second mark is gained for explaining that an eccentric muscle contraction is when the muscle lengthens under tension (or whilst contracting). These two marks are found in the same sentence and this was common amongst learners who gained multiple marks on this question. The third mark is gained for explaining that this muscle contraction ensures the downward phase of the movement is controlled.

This response gained 0 marks

Figure 2 shows the downward phase of a press-up.

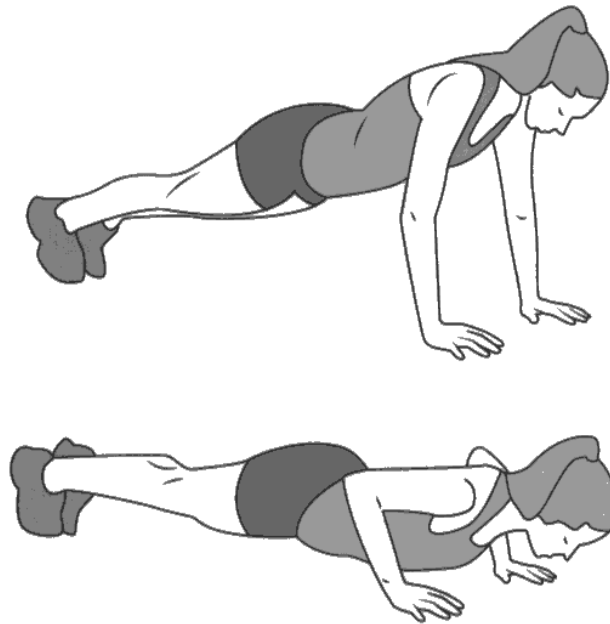


Figure 2

9 Explain how **eccentric** muscle contraction allows movement at the elbow during the downward phase of a press-up.

This is where the ^{tricep} bicep is lengthening and the bicep is shortening to allow the downwards phase to take place. At the downwards phase it allow the muscles to work opposites and it allows the arms and muscles to work together.

(Total for Question 9 = 4 marks)

This learner has identified that the triceps are lengthening but have not explained that they are doing so under tension. The learner has also described the biceps shortening. The language used is simplistic, there is no explanation of which muscles are acting as

the agonist and overall the response lacks the sufficient level of detail required to gain any marks.

Q10

Responses to extended answer questions are marked using levels based mark schemes, with the quality of the response determining the level. There are four levels; level 0 where there is no rewardable material presented and then levels 1, 2 and 3; the higher the level the better the quality of response.

This question uses the command verb analyse. This requires learners to examine a topic in detail, breaking it down into its component parts and explaining how each part contributes to the other.

This question provided the most pronounced examples of learners providing responses that outline general concepts or functions without recognising that this is an exam on anatomy. Consequently those learners that did not provide responses detailing the anatomical structures and functions involved in the process of the redistribution of blood did not get beyond Level 1 on the grade descriptors.

The question asks learners to analyse how the percentage of blood flow to skeletal muscle changes between rest and exercise. Almost all of the learners gained at least one or two marks on this question for simply interpreting the table and describing what the changes were. Namely, an increase in blood flow to skeletal muscle during exercise, then attributing this to an increased demand for oxygen.

Those learners who additionally gave a description of vasoconstriction and vasodilation were able to get into Level 2, possibly for four marks, depending on the quality of the response.

In order for learners to access the higher end of Level 2 and get into the Level 3 grade descriptor, a more detailed and comprehensive description of the anatomical structures and functions involved was required. Learners could achieve this by including reference to vasoconstriction and vasodilation taking place in the arterioles, to this being controlled by the contraction or relaxation of the smooth muscle within these blood vessels and the effect this has on their diameter and capacity to carry blood.

This response gained 5 marks

Table 1 shows a person's percentage of blood flow to skeletal muscles at rest and during exercise.

	Blood flow at rest	Blood flow during exercise
Skeletal muscles	5%	80%

Table 1

10 Analyse how the percentage of blood flow to the skeletal muscle changes from when a person is at rest to during exercise.

(8)

During exercise a demand for oxygen increases at ~~the~~ working skeletal muscles causing percentage of blood flow to increase to carry the oxygen. This is due to vasodilation and vasoconstriction. When exercising the muscles demand more oxygen and therefore the Arterioles vasodilate allowing an increase blood flow to travel to the working skeletal muscles. As well as this the Arterioles around the working vital organs vasoconstrict, causing a bigger percentage of blood flow to travel to the muscles. However when relaxed Arterioles around the skeletal muscle vasoconstrict and the Arterioles around the vital organs vasodilate so they work efficiently. This allows blood causes an increase blood flow to vital organs while at rest.



This learner has initially described an increase in blood flow to skeletal muscle as a result of an increase in oxygen demand whilst exercising. The learner has then expanded their answer to provide some analysis, giving an explanation of vasodilation allowing an increase in blood flow to the skeletal muscle. They have additionally

detailed that vasoconstriction reduces blood flow to other areas of the body during exercise, allowing this blood to be diverted to the skeletal muscles. The learner has referenced vasoconstriction taking place at the vital organs, which is not entirely accurate. However they have explained that both vasoconstriction and vasodilation occur at the arterioles that supply these different areas of the body. The learner has provided some accurate knowledge and understanding, in a partially developed analysis which considers some interrelationships. They are therefore placed in the middle of Level descriptor 2.

This response gained 2 marks

Table 1 shows a person's percentage of blood flow to skeletal muscles at rest and during exercise.

	Blood flow at rest	Blood flow during exercise
Skeletal muscles	5%	80%

Table 1

10 Analyse how the percentage of blood flow to the skeletal muscle changes from when a person is at rest to during exercise.

(8)

When the person is at rest he is using no active muscles so he does not need to breathe as much oxygen in as the blood does not need to flow to any muscles. However when the person starts to exercise their muscles are in more demand of oxygen, so the person will have to take in more oxygen in and to the muscles therefore increasing blood flow as there is more active muscles in need of oxygen.

This is an example of a fairly typical level 1 response. The learner has accurately described an increase in blood flow to the skeletal muscles during exercise and

attributed this to an increased demand for oxygen. These responses were seen frequently and in varying degrees of length and detail. However due to the lack of an analysis of how the key anatomical structures and their functions result in this redistribution of blood flow, responses of this type did not achieve marks beyond those available at the lower end of Level 1.

Q11

This is another extended answer question using a levels based mark scheme. Learners achieved a good spread of marks for this question, though very few learners managed to provide a response that met the criteria for Level 3.

The most accessible marks here were for knowledge of the types of joint involved and the articulating bones at these joints. All movements occurred in the sagittal plane and again this added a level of accessibility for learners.

A number of learners found the trunk more challenging to analyse and had difficulty with all aspects of this joint. This was surprising as the trunk has been included on both of the sample assessment materials and on the paper in the previous series. Accurate analysis of the joint movements at the shoulder and wrist provide a greater level of challenge and these aspects enabled the question to differentiate between learners.

Almost all learners achieved at least marks in the Level 1 grade descriptor for this question. A good proportion of learners demonstrated a sufficient breadth and depth of accurate knowledge and understanding to achieve marks from the Level 2 grade descriptor. However, very few provided an analysis that demonstrated sustained knowledge of interrelationships and linked these to the context of the question in order to get into the Level 3 grade descriptor.

A number of learners made reference to the muscular system detailing antagonistic muscle pairs and the types of contraction taking place in each. This was not required for this question.

This response gained 6 marks

transverse
frontal
sagittal

Figure 3 shows an athlete performing a forward bend.

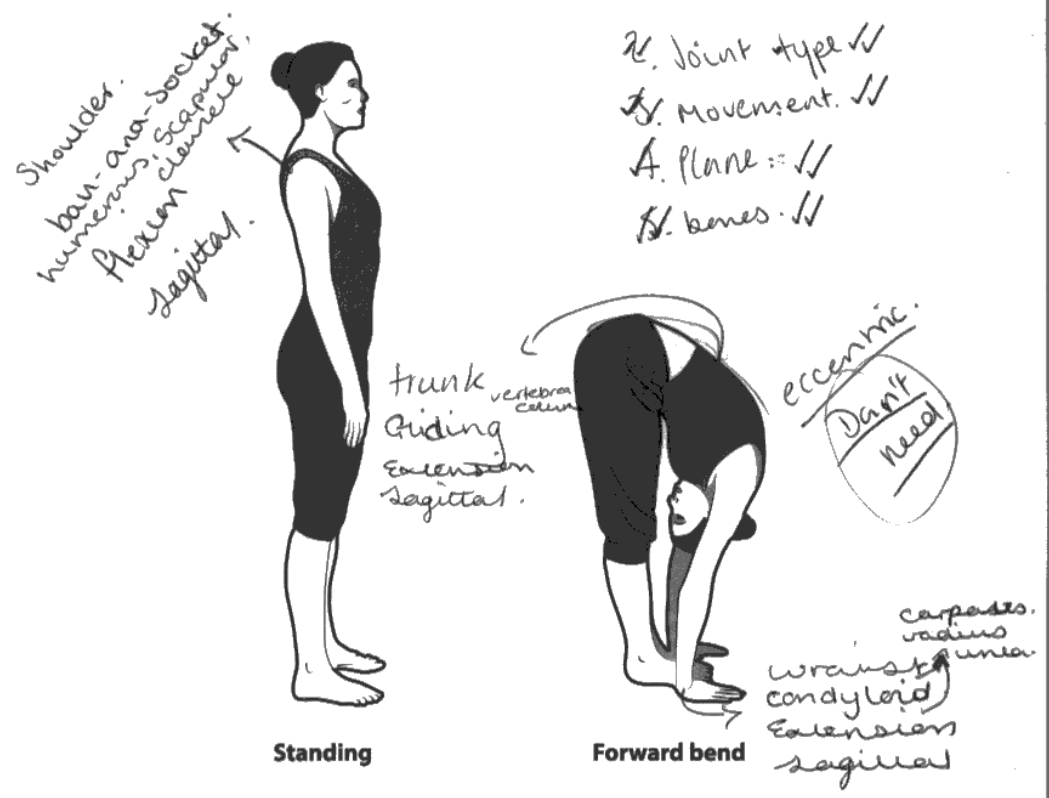


Figure 3

11 Analyse how the axial and appendicular skeleton allows the range of movement, necessary at the:

- shoulder
 - trunk
 - wrist
- vertebrae protection

to achieve the position shown from standing to forward bend.

(8)

The shoulder is a ball and socket synovial joint, that it is a freely moveable joint. The articulating bones are the humerus, scapula and clavicle, these give the range of movement of flexion decreasing the size of angle at the joint. This position shown at the shoulder is on the



coccyx

sagittal plane.

The trunk is a gliding joint also known as a plane joint. The bones that create the trunk is the vertebral column, these are the cervical, thoracic, lumbar, sacrum and ~~any~~ coccyx vertebrae. The movement given is extension, increasing the angle given at a joint. Also ~~with~~ the vertebral column the axial skeleton is ~~part of~~ has a part of of the vertebral column. At the trunk for the movement given in the position shown is happening on the sagittal plane.

Finally, the wrist joint is a condyloid joint, the articulating bones of this is the ~~two~~ radius, ulna and carpus. The movement given at the wrist in the position shown is the extension increasing the angle. Also the ~~no~~ wrist action is on the sagittal plane. This divides the body from left and right.

It is clear that this learner has planned out their response carefully. As a result it addresses all of the key areas that would be expected in this type of analysis. The information provided is mostly accurate, although the joint movement at the trunk is incorrect. The learner has demonstrated some additional knowledge such as the different sections of the vertebral column and very brief expansions on what flexion, extension and the sagittal plane are. This additional knowledge is generally presented in isolation and not linked to the context of the question in a sustained manner.

This response gained two marks

Figure 3 shows an athlete performing a forward bend.

trunk - hip flexors

Axial

femur
pelvic girdle

Shoulder - ball & socket

scapula
humerus

Axial

Appendicular

wrist -

carpals
tarsals
metatarsals
radius
ulna



Standing (A)



Forward bend (B)

Figure 3

11 Analyse how the axial and appendicular skeleton allows the range of movement necessary at the:

- shoulder
- trunk
- wrist

to achieve the position shown from standing to forward bend.

(8)

The shoulder is part of the appendicular skeleton. It is made of the scapula and humerus as well as the triceps and biceps. The shoulder is also a ball and socket joint, this allows it to move in a range of directions. To reach



position B, the tricep is flexed, while the antagonistic pair, bicep, is extended relaxed.

The trunk is part of the axial skeleton, which is made of the femur and pelvic girdle, also the Hamstring, Quadriceps and abdominals, gluteus maximus and latissimus dorsi, and vertebrae. It is able to reach position B as the Hamstrings are ^{extending} flexors, the hip flexors. The ~~vertebrae~~ latissimus dorsi is stretched out. The abdominals, quadriceps are relaxed, gluteus maximus is flexed.

The wrist is also part of the appendicular skeleton, which is made of the tarsals, radius and ulna. It is a condyloid joint, which allows it to move forward & backward. The wrist is flexed in position B.

This learner has also tried to formulate a plan to structure their response. There are isolated elements of knowledge but there are a number of inaccuracies within the response and some key areas required for a detailed analysis of the movement have been completely missed. The points that have been accessed are generally those that may be considered more accessible. This is an example of a learner who has found analysis of the movement at the trunk particularly challenging. The learner has also included detail relating to the muscular system which is not asked for in the question.

Q12

This question is intended to be one of the most demanding on the paper. The question requires learners to analyse the movement of the elbow, hip and knee to achieve the position shown from preparation phase to execution phase.

Again, learners seem to have been prepared to answer movement analysis questions and have plans and systems in place to help them do so.

A high proportion of learners have delivered a structured response based on a pre-planned strategy, often shown by tables that were drawn at the start of the learners' response. However, the accuracy of their analysis has not always been sustained throughout the full range of joints and component parts included. As a result attempts at consideration of interrelationships tended to be more limited.

A number of factors make this question more accessible to learners on this paper compared to the previous series. All movements are concentric contractions, in the sagittal plane and involve flexion. Yet learners frequently only achieved inclusion of some of this material. The joints in the question are also quite accessible to learners, particularly the knee and elbow.

Generally learners accurately analysed the types of joints involved, the articulating bones and the joint movements. However, a number did not include types of contraction or planes of movement and this is material that presents more challenge to learners.

The antagonistic muscle pairs at the elbow are quite accessible, but those involved at the hip and knee seemed to prove slightly more challenging to learners.

Many learners also delivered a response that tackled an analysis of the position at preparation followed by another full analysis of the position at execution, rather than addressing the movement between the two phases.

A pleasing number of learners were able to accurately analyse most of the component parts that are working together to create the movement from preparation to execution and achieved marks at the higher end of the Level 2 grade descriptor.

The nature of the whole movement invites better learners to expand and discuss the interrelationships between the different joints. There were a number of examples of learners including synergists and fixator muscles, but generally this was done inconsistently and a little incoherently. The kinetic chain of movement was also included by some learners, but this was mainly added as an isolated piece, attached to the end of the response and lacking in context.

A small number of learners did manage to achieve marking band 3 quality responses. These were detailed and accurate pieces, but only usually achieved the lower end of the marking band.

This response gained 9 marks

Figure 4 shows an athlete completing a step up. The right leg and left arm have been shaded.

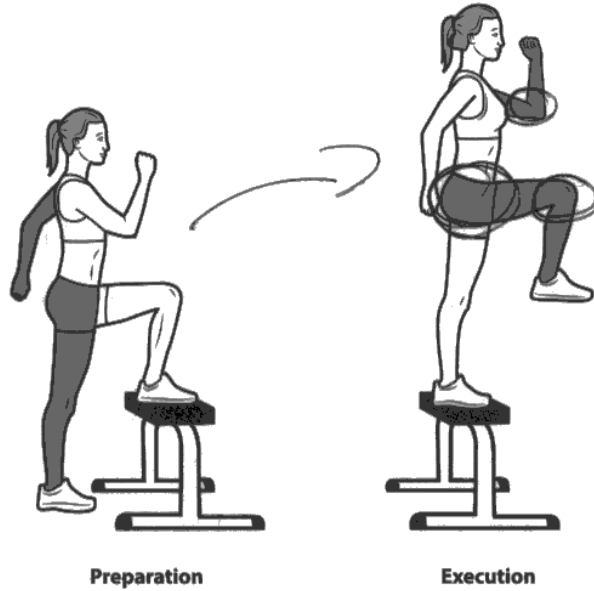


Figure 4

12 Analyse the required movement of the

- left elbow
- right hip
- right knee

to achieve the position shown from preparation to execution.

5 JMBPM...e

Joint	Type of joint	type of movement	Bones	Plane of movement	agonist/antagonist	contraction
Elbow	Hinge	Flexion	Humerus Ulna radius	Sagittal	biceps brachii triceps	Concentric
Hip	Ball and socket Ball and socket	Flexion Flexion	Pelvis	Sagittal	Tib. anterior gluteo	Concentric
Knee	Hinge	Flexion	Femur tibia patella	Sagittal	Hamstring quadriceps	Concentric

(14)

To achieve the execution from the preparation stage the left elbow would perform Flexion, the left elbow is a hinge joint. The plane of movement



from the elbow is sagittal and the type of contraction is concentric.*

The right hip is a ^{ball and socket} ~~girdle~~ joint and it performs hip flexion to get to the execution stage. The plane of movement from the hip is sagittal and the type of contraction is concentric. The bones involved with the hip is the pelvis, ilium, ishium, and iliac crest while the hamstring is being the agonist and the quadriceps is the antagonist.

finally the knee is a hinge joint and it performs flexion. The plane of movement is sagittal and the type of contraction is concentric. The bones involved are the femur, tibia and fibula while the gastrocnemius is the agonist and the tibialis anterior is the antagonist.

* The bones involved with the left elbow are the humerus, ulna and radius while the tricep is the ~~agonist~~ ^{antagonist} and the bicep being the agonist.

(Total for Question 12 = 14 marks)

TOTAL FOR PAPER = 60 MARKS



This is an example of a learner who has planned a structure for their answer, as evidenced by the table drawn at the beginning. The learner has covered all of the key elements but there are areas of inaccuracy, particularly with the analysis of antagonistic muscle pairs at both the hip and knee. There are areas of accurate knowledge and

understanding demonstrated, but evidence of interrelationships in the context of the question are very limited. This response is at the higher end of the Level 2 grade descriptor.

This response gained 2 marks

Figure 4 shows an athlete completing a step up. The right leg and left arm have been shaded.

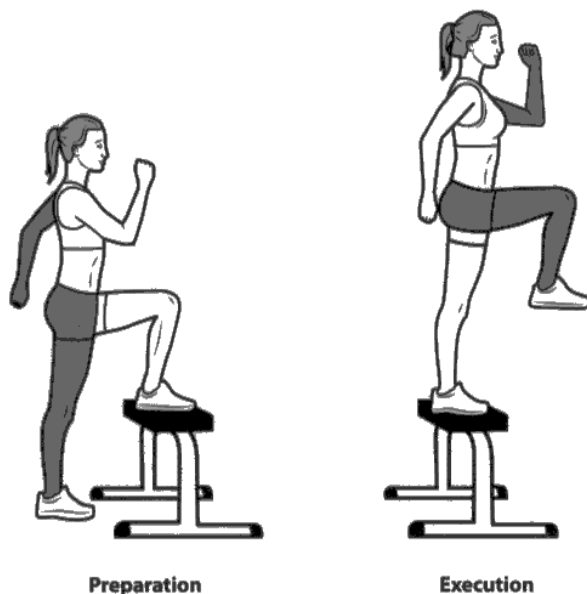


Figure 4

12 Analyse the required movement of the

- left elbow
- right hip
- right knee

to achieve the position shown from preparation to execution.

(14)

In the preparation of the step up the left elbow is posterior to the body and is ~~flexing~~^{extending} and ~~abducting~~ from the body. Then when it comes to the execution the left elbow is bending towards the body in a hinge joint in an anterior position the elbow is now flexing to hold the



bone position. The right hip is a ball and socket joint meaning it can go in all directions. In the preparation the hip is in a natural straight extended position, to move up into the execution the hip needs to extend forward and rotate on the socket to allow the anterior position of the leg. ~~The hip makes~~ The right knee is a hinge joint meaning it is a condyloid joint. the knee in the preparation is fully extended and ~~is~~ straight keeping the body steady with the tibia and fibia. as it moves on to the execution the knee flexes and is abducting from the body. The required movement to get the knee from preparation to execution is an extension of the knee ~~to~~ moving to a flexion to execute and perform the full step up.

This learner does not seem to have planned or executed a particular strategy to answer this question. A significant number of key elements have not been included in their analysis of this movement. The information that has been included focuses mainly on the more accessible elements of the question and is often confused or incoherent. There are isolated elements of knowledge and understanding that place this response at the lower end of the Level 1 marking descriptor.

Summary

Based on their performance on this paper learners are offered the following advice:

- Recognise that this paper is assessing knowledge of anatomy. Whilst an understanding of general principles and functions of the body is required, the majority of the marks on this exam are gained for detailed anatomical knowledge. This will usually include the location, and structure of the component parts of the systems included in the specification, and their specific role in the functions of those systems.
- Read all questions carefully to ensure full understanding of what is being asked.
- Identify keywords in a question - possibly underline or highlight these to draw attention to them.
- Understand the different command verbs (eg, describe, explain, analyse) in order to establish the requirements of each question.
- Understand terminology used in the specification as these words will be repeated in the exam paper.
- Use appropriate technical language throughout responses as this will support the demonstration of accurate anatomical knowledge.
- Use the number of marks and space available as a guide to the depth of response required.
- Refer to the SAM and previous exam papers in order to become familiar with the structure of the exam and expected responses, particularly for question 11 and question 12.

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