

Cambridge Technicals

Sport

Unit 1: Body systems and the effects of physical activity

Level 3 Cambridge Technical in Sport and Physical Activity
05826 - 05829 & 05872

Mark Scheme for June 2024

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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MARKING INSTRUCTIONS

MARKING

1. Mark strictly to the mark scheme.
2. Marks awarded must relate directly to the marking criteria.
3. The schedule of dates is very important. It is essential that you meet the 50% Batch 1 and 100% Batch 2 deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.
4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone or by email.
5. **Crossed Out Responses**
Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed out response where legible.

Rubric Error Responses – Optional Questions

Where candidates have a choice of questions across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM assessor, which will select the highest mark from those awarded. (The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)

Multiple Choice Question Responses

When a multiple choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate). When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses

When a candidate provides contradictory responses, then zero mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only **one mark per response**)

Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been

considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. (The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)














Short Answer Questions (requiring a more developed response, worth **two or more marks**)

If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

Longer Answer Questions (requiring a developed response)

Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

6. Always check the pages (and additional lined pages if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there then add an annotation to confirm that the work has been seen.
7. There is a NR (No Response) option. Award NR (No Response)
 - if there is nothing written at all in the answer space
 - OR if there is a comment which does not in anyway relate to the question (e.g. 'can't do', 'don't know')
 - OR if there is a mark (e.g. a dash, a question mark) which isn't an attempt at the questionNote: Award 0 marks - for an attempt that earns no credit (including copying out the question)
8. Use the annotation BP (Blank Page) for **all pages that have no writing**.
9. Spelling
Accept incorrect or phonetic spellings if the word is recognisable.
10. Assistant Examiners will email a brief report on the performance of candidates to your Team Leader (Supervisor) by the end of the marking period. Your report should contain notes on particular strength displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.
11. **Annotations** used by examiners

Annotation	Meaning
	Benefit of doubt
	Cross
	Development (Use for Q21)
	Example/Reference
	Significant amount of material which doesn't answer the question
	Knowledge and understanding (Use for Q21)
	Level 1 (Use for Q21)
	Level 2 (Use for Q21)
	Level 3 (Use for Q21)
	Max
	Repeat
	Tick
	Vague (<i>Use instead of old NBD</i>)

Multiple Choice Questions

Examiners indicate if answer given is correct or not by using a tick or cross on the right hand side of the question.

All questions other than Multiple Choice and Extended response Question 21

Tick = correct

Cross = incorrect

BOD = benefit of the doubt given

VG = answer is vague / no benefit of the doubt given / also used where additional material may have been seen but no more marks gained. No cross needed.

SEEN = response been read but no credit given / also used where no response attempted

REP = Point repeated and no further credit given

MAX = if maximum marks have been awarded for a question, then mark as MAX in left hand margin.

Extended response - Question 21

Please note that on the extended response question ticks and crosses are not used as it is not 1 tick = 1 mark.

Where applicable:

Please note that on the extended response question ticks and crosses are not used as it is not 1 tick = 1 mark.

Where applicable:

KU is used to indicate that a knowledge point from the mark scheme indicative content has been used.

DEV is used to indicate that a more developed or detailed point has been made (showing greater understanding).

EG is used to indicate where an example has been used or applied to support or develop the response.

L1 = Level 1 (for 'Levels-marked' questions only) – put at end of response to indicate level awarded

L2 = Level 2 (for 'Levels-marked' questions only) – put at end of response to indicate level awarded

L3 = Level 3 (for 'Levels-marked' questions only) – put at end of response to indicate level awarded

Examiner Guidance on annotations

1. General guidance:

- mark using RM annotations – **every** question to be marked
- record the total mark for each question in RM mark boxes
- **check carefully** that you input the correct mark – check the number of ticks recorded for each question (apart from Q21)
- **Do not** use ticks on Q21 – use KU (Knowledge and understanding credits) and DEV (Development credits)
- Only record KU and DEV **on left hand side** of script so that candidate's work is not obscured
- Record level on **left hand side** at the base of Q21 and record total mark for the question
- If candidate has attempted the question or even an attempt that is crossed out (still mark crossed out work), and deserves no credit then
- **record zero**
- If candidate leaves a question unanswered then use the annotation '**SEEN**' and record **NR** in the totals box (no response)
- Use **BP** on all blank pages to show that you have checked for any responses

2. For Multiple-Choice Questions (MCQs), use a **tick** or a **cross** to the right hand side of the option indicated by the learner as being their answer.
3. For points-marked questions (all apart from Q21):
 - Structured scheme: one mark = one point, represented by a **tick**
 - Keep referring to the requirements of each question
 - Annotate **every** question answered
4. For the levels marked questions:
 - Keep checking for relevance of the response to the requirements of the question
 - Give **KU** for each KU credit achieved on the levels MS
 - Give '**DEV**' for every point that has been sufficiently developed and shown understanding indicated on the levels MS
 - Now **review again** the answer.
 - Remember to **keep checking** whether the response actually answers the question set.
 - REVIEW THE LEVELS' DESCRIPTORS AND ESPECIALLY THE DISCRIMINATOR POINTS TO PINPOINT THE MARK.
 - Indicate the level awarded (**L1**, **L2** or **L3**) at the base of the answer on the **LHS**, then enter the total mark for Q21
 - Some candidates may make relatively few points but develop them well to show good understanding, meet well the generic criteria descriptors in the top level and answer all parts of the question and therefore score well.
 - Some candidates may make many points but may not show the depth of analysis required to match the generic criteria descriptors in the top level and therefore score less well.
 - Do not be afraid to give full marks if all descriptors / discriminators are met at the required level.
 - It is **unlikely for learners to score 0** (nil) marks if they have attempted to answer the question set, unless the material is entirely irrelevant.
 - Use your professional judgement and **contact your Team Leader** if you need help in applying the scheme.


Question			Answer	Marks	Guidance
1			B – Platelets	1	
2			B – 0.5 litres	1	
3			A – Marathon	1	
4			A – A and B	1	
5			C – Tidal volume x breathing frequency	1	
6			A – Dorsiflexion and plantar flexion	1	
7			D – Reduces the risk of arthritis	1	
8			Ball and socket	1	
9			Cardiac output	1	DNA: $Q = SV \times HR$
10			1 mark for any 1 of: Resynthesis / restores of phosphocreatine / PC / CP / phosphagen / ATP	1	DNA: EPOC
11			4 marks for: 1. Cervical (vertebrae) 2. Thoracic (vertebrae) 3. Sacrum / sacral (vertebrae) 4. Coccyx / coccygeal (vertebrae)	4	DNA: Lumbar vertebrae (in question) DNA: Letter / Number Designations for different regions of vertebral column e.g. T1 - T12, L1 – L5 DNA: Atlas/Axis as part of cervical Answers can be credited in any order Accept phonetic spellings.
12			A = Trapezius B = Triceps (brachii) C = Deltoid D = Latissimus dorsi	4	MP 1 BOD erector spinae DNA: Lats, traps or other abbreviations. Accept phonetic spellings.

Question			Answer	Marks	Guidance
13	(a)		<p>4 marks for any 4 of:</p> <ol style="list-style-type: none"> 1. Antagonistic pair 2. Triceps (brachii) contracts / shortens 3. Triceps (brachii) is agonist 4. Biceps (brachii) relaxes / lengthens 5. Biceps (brachii) is antagonist 6. Triceps (brachii) contraction during extension is <u>concentric</u> 7. Triceps (brachii) then contracts <u>isometrically</u> to keep arms <u>straight</u> as ball is struck 	4	<p>MP 1 DNA: agonistic pairs MP 4 and 5 DNA: biceps femoris MP 4 DNA: extend as in question</p> <p>BOD: Credit other muscles that act at elbow, e.g. brachialis, brachioradialis, anconeus as 1 mark (beyond the syllabus but worth one mark)</p>
13	(b)		<ol style="list-style-type: none"> 1. (Isometric) no change in length of muscle / no movement / stationary / force = resistance 2. (Concentric) muscle shortens (under tension) 	2	<p>MP 1 DNA: no change in size. MP 1 DNA: Muscle stays the same.</p> <p>MP 2 DNA: change in size. MP 2 DNA: gets smaller.</p> <p>Note: 'muscle contraction' is in question so not needed in answer.</p>

Question	Answer	Marks	Guidance
14	<p>4 marks for any 4 of:</p> <ol style="list-style-type: none"> 1. Hypertrophy / increase in muscle mass / size 2. Increased recruitment of motor units 3. Increase in strength / force / power / endurance / contraction speed 4. Hyperplasia / increase in number of muscle fibres 5. Increase in size / density of mitochondria 6. Increase in myoglobin (stores) 7. Increase in glycogen (stores) 8. Increase in ATP stores / PC stores / phosphocreatine (stores) 9. Increase in enzyme activity 10. Increase in fat / lipids / triglycerides metabolism OR increase in fat / lipids / triglyceride stores 11. Increase in tendon strength 12. Increase in capillarisation / capillary density 13. Increase in flexibility / elasticity / pliability / reduced inhibition of stretch reflex 14. Reduced risk / chance of (muscle) injury OR faster recovery 15. Faster removal of lactic acid / waste products / increased resistance to fatigue 	4	<p>Mark first 4 long-term effects only.</p> <p>MP 1 DNA: Cardiac hypertrophy MP 1 DNA: Muscle growth MP 9 DNA: increase ligament strength MP 10 DNA: increased blood flow MP 12 DNA: Reduced risk of arthritis / osteoporosis / obesity / CHD MP 12 DNA: Prevents injury MP 13 DNA: Less lactic acid build up / DOMS</p>
15 (a)	<ol style="list-style-type: none"> 1. Incorrect = Pulmonary vein 2. Correct = Aorta 3. Incorrect = Aortic valve 4. Correct = Pulmonary valve 	4	<p>Correct names must apply to the incorrect labels on the diagram.</p> <p>Cannot award points 2 and 4 if points 1 and 3 are incorrect.</p> <p>MP 4 DNA: Semilunar valve on its own</p> <p>Incorrect or correct answer can be credited in any order - answer 1 in space 3, answer 2 in space 4, answer 3 in space 1 and answer 4 in space 2.</p>

Question			Answer	Marks	Guidance
15	(b)	(i)	1. (At first) High intensity exercise has begun OR greater demand for oxygen / more oxygen needed 2. (Continues to rise) anaerobic activity OR oxygen demand exceeds supply OR more CO ₂ needs removing (or quicker)	2	Answers must explain the changes in the graph. MP 1 DNA: Anticipatory rise for release of adrenaline / noradrenaline as links to before exercise MP 1 DNA: maximal exercise (in question) MP 1 DNA: Exercise has started MP 2 DNA: Heart rate does not plateau MP 2 DNA: Lactic acid build up
15	(b)	(ii)	1. Continued demand for additional oxygen during recovery / pay back O ₂ debt or deficit / EPOC OR cool down is being performed (to maintain higher HR) OR lactic acid / CO ₂ / waste products are being removed	1	
16	(a)		1. Arterioles 2. Venules	2	Answers must be in the correct order.

Question			Answer	Marks	Guidance
16	(b)		<p>3 marks for any 3 of:</p> <ol style="list-style-type: none"> Increases heart rate / stroke volume / cardiac output Increases venous return / Starlings Law of the heart / increased blood returning to the heart Initiates vascular shunt / increase of oxygen to working muscles Vasodilation / widening of blood vessels / pre-capillary sphincters relax / open to working muscles Vasoconstriction / narrowing of blood vessels / pre-capillary sphincters contract / close to non-essential organs Reduces blood viscosity / peripheral resistance / increase blood pressure 	3	<p>Mark first 3 effects of a warm up only.</p> <p>Answers must refer to effects on cardiovascular system.</p> <p>DNA: Increased temperature of blood DNA: producing more blood cells / haemoglobin</p> <p>MP 1 all linked in unit specification so can only be credited once.</p>
17	(a)		<ol style="list-style-type: none"> (Nasal cavity) warms / moistens / filters air (Epiglottis) allows air to enter trachea / airway / windpipe / lungs OR prevents food entering trachea / lungs OR allows food to enter oesophagus OR covers oesophagus when breathing (Larynx) voice box / vocal cords / passage of air allows us to speak 	3	<p>Some texts give the larynx the same roles as the epiglottis, e.g. allows air to enter trachea. Credit once only. Question asks for a different role for each structure.</p> <p>MP 1 DNA: 'Lets air in'</p>
17	(b)		<p>3 marks for any 3 of:</p> <ol style="list-style-type: none"> Large surface area / many alveoli Thin walls OR semi-permeable walls OR walls are one cell thick Moist lining Surrounded / covered by capillaries OR large blood supply Short diffusion pathway Layer of surfactant (maintains alveolar tension) 	3	<p>DNA: allows for diffusion / gaseous exchange (in question)</p> <p>MP 4 DNA: made up of capillaries</p>

Aerobic  Anaerobic

Award correct answers that are labelled within the points highlighted above.

21* Describe the structures of synovial joints, including other structures that have not been identified in **Fig. 21**.

Explain how these structures allow synovial joints to function. (10 marks).

Do not credit names of joint features in points 1 - 5.

[In the below, S = structure, F = function]

1. (Cartilage)

- KU (S) Articular / hyaline
- KU (S) Smooth tissue **OR** collagen-based tissue **OR** spongy / rubbery tissue
- KU (S) Covers surface of articulating bones
- DEV (F) Absorbs shock
- DEV (F) Allows friction-free movement **OR** prevents bones rubbing together
- DEV (F) Allows for mobility
- DEV (F) Stability **OR** stabilises / supports joint

2. (Ligaments)

- KU (S) Connective tissue
- KU (S) Tough / fibrous / strong bands
- KU (S) Slightly elastic
- KU (S) May be inside capsule / intracapsular **OR** outside capsule / extracapsular
- DEV (F) Connect bone to bone (accept examples of bones e.g. femur to tibia)
- DEV (F) Stabilise joint during movement
- DEV (F) Limit unwanted movements / dislocations **OR** restrict joint mobility

3. (Synovial membrane)

- KU (S) Connective tissue **OR** soft tissue lining
- KU (S) Internal lining of the joint capsule
- KU (S) Two layers (intimal and subintimal)
- DEV (F) Secretes / produces synovial fluid
- DEV (F) Regulates the composition / volume / viscosity of synovial fluid
- DEV (F) Cleans the joint capsule

4. (Synovial fluid)

- KU (S) Smooth / oily liquid
- DEV (F) Lubricates / mobilises / decreases friction at joint
- DEV (F) Nourishes cartilage **OR** absorbs debris **OR** breaks down loose bits of cartilage
- DEV (F) Absorbs shock **OR** cushions the joint **OR** stabilises joint

5. (Joint capsule)

- KU (S) Fibrous / connective tissue
- DEV (F) Encloses the joint **OR** forms the outer lining of the joint
- DEV (F) Stabilises joint / seals joint space / protects bones

6. KU Menisci

- KU (S) Semilunar / C-shaped / crescent-shaped discs of cartilage / cartilage
- DEV (F) Stabilise joint
- DEV (F) Act as 'spacers' / act where the bones do not articulate closely
- DEV (F) Absorb shock **OR** cushion joint **OR** protect cartilage
- DEV (F) prevents friction between bones

7. KU Pads of fat / fat pads

- KU (S) Adipose tissue
- KU (S) Infrapatellar / suprapatellar / posterior (in knee)
- DEV (F) Absorb shock **OR** act as 'spacers' (similar to function of menisci)

8. KU Bursae

- KU (S) Fluid-filled sacs
- KU (S) Synovial membrane filled with synovial fluid
- DEV (F) Allow mobility
- DEV (F) Reduce friction between bones and tendons / ligaments
- DEV (F) Cushion / act a shock absorber / stabilise joint

<p>Level 3 (8–10 marks) A comprehensive answer: Detailed knowledge & understanding. Effective analysis/critical evaluation and/or discussion/explanation/development. Clear and consistent practical application of knowledge. Accurate use of technical and specialist vocabulary. High standard of written communication.</p>	<p>At Level 3 responses <u>are likely to include:</u> Detailed knowledge of the structures of synovial joints and excellent understanding of the functions of these structures. At the top of this level most joint structures listed in the syllabus including bursae, meniscus and fat pads will have been addressed and their structures linked to their functions having been explained accurately. At the bottom of this level there will be reference to most structures of ligaments, cartilage, synovial membrane, synovial fluid, joint capsule including bursae, meniscus or fat pads which may have been described and there will be reference to the functions of these structures.</p>
<p>Level 2 (5–7 marks) A competent answer: Satisfactory knowledge & understanding. Analysis/critical evaluation and/or discussion/explanation/development attempted with some success. Some success in practical application of knowledge. Technical and specialist vocabulary used with some accuracy. Written communication generally fluent with few errors.</p>	<p>At Level 2 responses <u>are likely to include:</u> Satisfactory knowledge of the structures of synovial joints and satisfactory understanding of the functions of many of these structures. Responses may focus on the structures identified in the diagram on the question paper. At the top of this level most of the functions are explained and at least one structure is described of ligaments, cartilage, synovial membrane, synovial fluid, joint capsule. May have described at least one of bursae, meniscus or fat pads relating to either structure or function. At the bottom of this level most of the features listed above will have been addressed but in some cases knowledge of either the structure or function may be inaccurate or lack detail – at least one structure has been described. May have identified at least one of bursae, meniscus or fat pads but not described structure or function.</p>
<p>Level 1 (1–4 marks) A limited answer: Basic knowledge & understanding. Little or no attempt to analyse/critically evaluate and/or discuss/explain/develop. Little or no attempt at practical application of knowledge. Technical and specialist vocabulary used with limited success. Written communication lacks fluency and there will be errors, some of which may be intrusive.</p>	<p>At Level 1 responses <u>are likely to include:</u> Basic knowledge and understanding of the structures or functions of synovial joints. There may be little or no attempt to link the structure of any feature to its function in terms of mobility and/or stability. At the top of this level knowledge of at least one structure or function for several of ligaments, cartilage, synovial membrane, synovial fluid and joint capsule will be shown. Explanations of the functions may be generic rather than specific to individual features. To score 1 mark one structure of a joint has been described OR one function of a feature has been described.</p>
<p>[0 marks] No response or no response worthy of credit.</p>	

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