

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 January 2023

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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 traditional 40% 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 must give candidates the benefit of the doubt and **mark the crossed out response** where legible.

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**.

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.

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 ticks or crosses on the right hand side of the question.

All questions other than Extended response Question 21

Tick = correct

Cross = incorrect

BOD = benefit of the doubt given

VG = response is too vague to achieve credit

NR = no response attempted

SEEN = response been read but no credit given

REP = Point repeated and no further credit given

BP = Blank Page = use this on all pages that have no candidate writing

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 and using the mark scheme and guidance:

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

UND 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 on LHS to indicate level awarded

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

L3 = Level 3 (for 'Levels-marked' questions only) – put at end of response on LHS 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		(d) Pivot	1	
2		(b) Pectoralis minor muscles contract during inspiration	1	
3		(b) 2	1	
4		(d) Thicker cartilage at joints	1	
5		(c) Pronator teres	1	
6		(d) Increased cardiac output and increased stroke volume	1	
7		(c) Iliopsoas	1	
8		(a) High glycogen content	1	
9		2 – 3 <u>minutes</u> OR 120 – 180 <u>seconds</u>	1	Must have relevant unit Number must fall within range stated Eg 3 minutes (on its own) = 1 mark Eg 3-4 minutes = X
10		80 <u>ml</u> (per beat)	1	Unit required 80L = X
11	(a)	A – Rib / rib cage B – Femur C – Ulna D – Fibula	4	Accept phonetic spellings. Do not accept: D - fibia or tibula
11	(b)	Shape / structure / posture Support / stability Movement / attachment for muscles / provides (system of) levers Blood cell production	3	Mark 1st three answers only Answers can be in any order Do not accept: protection / mineral storage (in question)

Question	Answer	Marks	Guidance
12	1. (Articular cartilage) allows <u>smooth</u> / <u>friction-free</u> movement OR prevents bones rubbing together OR acts as a shock absorber OR cushions joint 2. (Ligaments) connect bone to bone OR stabilise / support joint OR prevent dislocation	2	Accept: Pt1 – Reduces/prevents friction Pt2 – Holds bones together BOD Do not accept: Prevent joints rubbing together Pt1 = Vg It helps with movement Pt1 = Vg Stabilises the joint Pt1 = Vg
13 (a)	1. Agonist is rectus femoris / vastus medialis / vastus intermedius / vastus lateralis 2. Agonist / named muscle from pt 1 contracts (concentrically) 3. ... causing extension of the <u>knee</u> (as the ball is kicked) 4. Antagonist is biceps femoris / semitendinosus / semimembranosus 5. Antagonist / named muscle from pt4 lengthens / relaxes	4	NB. If no muscles are named candidate can still gain 3 marks. Do not accept: - Response that relates to <u>before or after</u> the kick takes place = IRR Pt 3 leg extension = Vg (must be knee) - Knee extension pt3 unless linked to the agonist or named agonist
13 (b)	1. Gastrocnemius / soleus / tibialis anterior 2. Isometric	2	Mark 1st named muscle only Allow spelling errors if term recognisable
13 (c)	1. Increased flexibility / range of movement at joints 2. Increased elasticity/pliability of muscles / connective tissue 3. Force can be applied over a greater distance / range of movement 4. Increased co-ordination / efficiency of antagonistic pairs 5. Increased enzyme activity 6. Increased energy production / metabolism 7. Increased speed of nerve impulses 8. Release of adrenaline/noradrenaline/epinephrine	3	Do not accept: - Increased speed/force of contraction (in question) - Reduced risk of injury - Increased temperature - More oxygen/blood to muscles - Increase in energy stores / glycogen Pt6 - Increased efficiency (on its own) = Vg Pt4 - more energy can be used by the muscle Pt6 = Vg

Question		Answer			Marks	Guidance
14		Joint	Type of synovial joint	Joint movement	4	Accept: Pt 4 abduction / vertical abduction = BOD Do Not accept: Pt 4 horizontal abduction = Vg
		Knee	1. Hinge	2. Extension		
		Shoulder	3. Ball and socket	4. Flexion		
15		1. Contract 2. Fatigue 3. High 4. Capillary			4	
16		1. <u>Right</u> atrium 2. <u>Left</u> atrium 3. <u>Left</u> ventricle			3	

Question	Answer	Marks	Guidance
17	<ol style="list-style-type: none"> (Before) Graph originates from a point above the x-axis / not from zero (Before) Increase in HR shown (even if from zero) (During) Greater increase in gradient than 2 shown initially (During) Plateau / graph levels for at least 50% of duration of exercise (Recovery) Graph falls but not to point lower than starting level / not to zero 	4	<p>NB - Full (4) marks can be given even if graph starts from zero</p> <ul style="list-style-type: none"> If just a plateau or just an increase is shown in the middle section then no marks for Pt3 and Pt4 <p>Pt5 – Give BOD if line finishes level/unclear</p> <p>Do not accept:</p> <p>Pt4 Decrease in heart rate before the end of exercise</p> <p>Pt5 Plateau continues into recovery</p>
18 (a)	<ol style="list-style-type: none"> Ring of (smooth) muscle OR Entrance/gates to capillary (beds) To adjust/regulate/change blood flow / redistribute blood / redirect blood (to capillaries) Open / relax / dilate and to allow more blood / oxygen to (working) muscles Close / contract / constrict and to reduce <u>blood</u> flow to other (non-essential) organs / tissues / areas of low demand 	3	<p>Accept:</p> <p>Vasodilates to allow...Pt3 = BOD</p> <p>Vasoconstrict to reduce... Pt4 = BOD</p> <p>Allow oxygen as an alternative to blood in Pt3 but must be <u>blood</u> for Pt4</p>

Question		Answer	Marks	Guidance
18	(b)	<ol style="list-style-type: none"> 1. Transport / carry / contains oxygen / oxygenated blood 2. White blood cells 3. Platelets 4. Transports / carries blood cells / nutrients / (small amount of) oxygen / minerals 	4	Accept first answer only in each box Accept: Pt1. Carries (some) carbon dioxide = BOD Pt4 contains minerals = BOD Do not accept: oxyhaemoglobin (without reference to transporting/carrying) Pt1.
19	(a)	A – Nasal cavity / nostrils B – Trachea C – Bronchus / bronchi	3	Do not accept: Nose for A Windpipe for B Bronchiole for C
19	(b)	<ol style="list-style-type: none"> 1. A – Warms / moistens / filters air 2. C – Transports air / oxygen to bronchioles / alveoli / (left and right) lungs OR Provides pathway for air OR Allows air/oxygen to go to lungs 	2	Accept: A - Moisturises Pt1 = BOD A - Any descriptions of filtering eg trapping dust etc = BOD
20		<ol style="list-style-type: none"> 1. Krebs cycle OR citric acid cycle 2. Oxygen 3. Carbohydrates / glycogen / glucose 4. Fats / lipids / FFAs /triglycerides 5. Carbon dioxide / CO₂ 	5	NB. Pts 3 and 4 are interchangeable. E.g. 'The food fuels for the aerobic system are fats and carbohydrates' is also correct. Carbs Pt2 = BOD If glycogen and glucose given then one mark only for Pt3 (annotate as REP)

21* Define and give resting values for respiratory terms for untrained & trained athletes. Suggest differences for rest and exercise – 10 marks

(Respiratory terms and typical resting values)

Four Knowledge and Understanding (KU) credits for each term:

1. (Tidal volume)

- Volume / amount of air inspired **or** expired per breath
- (Untrained) 400 – 600 ml / 0.4-0.6l
- (Trained) 400 – 600 ml / 0.4-0.6l
- No difference in tidal volume between untrained and trained athletes
OR slight increase in TV for trained athletes

2. (Breathing frequency)

- Numbers of breaths taken in one minute
- (Untrained) 12 – 15 breaths/minute
- (Trained) 10 – 12 breaths/minute
- Trained athlete will have lower breathing frequency (at rest)

3. (Minute ventilation)

- Volume / amount of air inspired **or** expired in one minute
- (Untrained) 6 – 8 litres/minute
- (Trained) 5 – 6 litres/minute
- Trained athlete will have lower minute ventilation (at rest)

Two DEV credits for equation if included:

4. (Equation)

- Minute ventilation = tidal volume x breathing frequency / $VE = TV \times f$
- (Example of equation) e.g. 7500ml/min = 500ml x 15 breaths

(Reasons for differences in trained athletes)

Development (DEV) credits:

5. (At rest)

- (Tidal volume) no difference as breathing is quiet / passive process
- (Tidal volume) no need for trained athletes to actively inhale more air
- (Breathing frequency and minute ventilation) of trained athlete lower due to more efficient gaseous exchange
- (Breathing frequency and minute ventilation) of trained athlete lower due to adaptations to circulatory / respiratory system eg capillarisation
- (Breathing frequency and minute ventilation) of trained athlete lower due to 2nd adaptation to circulatory / respiratory system eg better oxygen transport / more haemoglobin
- (Minute ventilation) trained athlete has more efficient gaseous exchange
- (Minute ventilation) trained athlete has better oxygen transport / more haemoglobin

6. (During exercise)

- (Tidal volume) greater increase for trained athletes
- Stronger respiratory muscles
- Diaphragm / intercostal muscles
- Sternocleidomastoid / scalene / pectoralis minor
- Rib cage lifted higher / greater increase in thoracic cavity / lungs
- Greater pressure differences
- Stronger contraction of expiratory muscles
- Internal intercostals / abdominals / rectus abdominis and obliques
- (Breathing frequency) faster rate possible for trained athletes
- Greater speed of contraction / relaxation of respiratory muscles
- (Minute ventilation) greater for trained athletes
- Due to greater tidal volume and breathing frequency

<p>21* Define and give resting values for respiratory terms for untrained & trained athletes. Suggest why the values for untrained individuals may be different to trained athletes at rest and during high intensity exercise. 10 marks</p>	
<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 are likely to include: Detailed knowledge and understanding of respiratory terms and values for untrained individuals and trained athletes and the reasons for differences. At the top of this level descriptions and values are accurate and there may be detailed explanations of reasons for differences in trained athletes at rest and during exercise. At the bottom of this level knowledge and understanding of respiratory terms and values for untrained individuals and trained athletes may be very good but the lack of a difference in the tidal volumes at rest may not be given or explained.</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 are likely to include: Satisfactory knowledge and understanding of respiratory terms and values for untrained individuals and trained athletes and the reasons for differences. At this level one part of the answer may be covered in more detail than the other. At the top of this level respiratory terms may be correctly described and resting values for an untrained individual may be accurate with correct units shown. Some reasons for differences between untrained individuals and trained athletes may be explained. At the bottom of this level there may be knowledge of some respiratory values and a limited explanation of differences may be shown.</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 are likely to include: Basic knowledge of respiratory terms and values for untrained individuals and trained athletes and the reasons for differences between them. At the top of this level some knowledge of respiratory values is shown and there may be a limited description of a few differences between the values of untrained individuals and trained athletes. To score 1 mark, one respiratory term is correctly described or one respiratory value is within the correct range or one reason for a difference between untrained individuals and trained athletes may be stated.</p>
<p>[0 marks] No response or no response worthy of credit.</p>	

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