

# **Cambridge Technicals Sport**

## **Unit 1: Body Systems and the effects of physical activity**

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

## **Mark Scheme for January 2020**

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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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**Annotations** used by examiners

Multiple Choice Questions

Examiners indicate if answer given is correct or not by indicating '1' or '0' 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

**NBD** = no benefit of the doubt given / also used where additional material may have been seen but no more marks gained

**NR** = no response attempted

**SEEN** = response been read but no credit given

**REP** = Point repeated and no further credit given

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:

**Id** 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 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

Question		Answer	Marks	Guidance
1		C – The volume of air inspired per minute	1	
2		A – Bicuspid valve	1	
3		C - Soleus	1	
4		D – Maintains elevated ventilation rate	1	
5		C – Fights infections	1	
6		B – Throwing a discus	1	
7		A – 200m breaststroke swimming race	1	
8		D – Restoration of phosphocreatine stores	1	
9		<u>50-100ml (per beat) or 0.05-0.1 litres or 50-100cm<sup>3</sup> or 0.05-0.1dm<sup>3</sup></u>	1	Units must be given – Accept any value that includes the range 50-100ml
10		Diffusion <b>or</b> gas/gaseous exchange	1	
11	(a)	<ol style="list-style-type: none"> <li><u>Sesamoid</u></li> <li><u>Long</u></li> <li><u>Flat</u></li> <li><u>Short</u></li> </ol>	4	Do not accept: <ul style="list-style-type: none"> <li>Small for pt 4</li> </ul> Do not accept: <ul style="list-style-type: none"> <li>Named bones (question asks for type)</li> </ul>
11	(b)	<ol style="list-style-type: none"> <li>Cartilage / Meniscus</li> <li>Shock</li> <li>Cartilaginous/amphiarthrosis</li> <li>Vertebrae/(bones of) spine <b>or</b> clavicle <b>and</b> ribs/scapula</li> </ol>	4	Do not accept: <ol style="list-style-type: none"> <li>Impact</li> <li>Shoulder blades/neck or ribs on their own</li> </ol> 1. meniscus - BOD

Question		Answer	Marks	Guidance
12	(a)	1. Drawn line linking bone to bone (Anterior cruciate / Posterior Cruciate / Medial Collateral / Lateral Collateral ligament)	1	Accept single line drawing linking bone to bone.  NBD if line does not link bone to bone, even if labelled correctly. Labelling name of ligament is not necessary. If femur from front side view is linked to tibia on the other diagram then BOD
12	(b)	1. Secretes/produces synovial fluid	1	
12	(c)	1. (Structure) cartilage  2. (Function) stabilises/cushions joint <b>or</b> helps bones fit together better  3. (Function) prevents friction between (femur and tibia) <b>or</b> allows free movement (between bones at knee)	3	Do not accept Pt3 – lubricates  2. Absorbs shock – BOD 3. Prevents rubbing - BOD
13		1. Stronger / more durable bones 2. Increase in bone density 3. Increase in mineral storage /calcium absorption 4. Stronger ligaments/connective tissue/joints <b>or</b> increased joint stability 5. Reduced risk of osteoporosis/arthritis/fractures/broken bones 6. Improved posture 7. Increase in cartilage/stronger/thicker cartilage <b>or</b> more synovial fluid	3	<b>Mark 1<sup>st</sup> three effects only.</b> <b>Mark from left to right, from top to bottom as per marking guidelines.</b> <b>(Eg stronger and denser bones = 2 marks)</b> Do not accept: stronger tendons / prevents injuries / more blood cells produced / increased range of movement / looser joints / bone disease

Question		Answer	Marks	Guidance
14	(a)	<ol style="list-style-type: none"> <li>1. Triceps (brachii) is agonist (for both phases)</li> <li>2. Biceps (brachii) is antagonist (for both phases)</li> <li>3. Upward phase triceps contracts (concentrically)</li> <li>4. Upward phase biceps lengthens/relaxes</li> <li>5. Downward phase triceps contracts eccentrically</li> <li>6. Downward phase biceps shortens</li> </ol>	4	<p>N.B. If no specific mention of upward/downward phases only pt 1 and 2 can be credited.</p> <p><b>Pts 1 and 2</b> - If triceps identified as agonist for upward phase and then as an antagonist for downward phase or vice versa then do not award a mark.</p> <p>As above: If biceps identified as the antagonist in one phase and then as an agonist in another phase then do not award a mark.</p>
14	(b)	<ol style="list-style-type: none"> <li>1. (Fixator) erector spinae/rectus abdominus/sacrospinalis</li> <li>2. (Type of contraction) isometric</li> </ol>	2	Mark <b>first</b> named attempt for each.
15	(a)	<b>A</b>	1	
15	(b)	<ol style="list-style-type: none"> <li>1. (Artery) small lumen/thick (muscular) wall <b>or</b> thick tunica media</li> <li>2. (Capillary) Very small lumen/one cell thick/single layer of cells/no muscular walls/tunica intima only</li> <li>3. (Vein) large lumen/contains valves/thin (muscular) wall <b>or</b> thin tunica media</li> </ol>	3	<p>For each mark the <b>first</b> structural characteristic only</p> <p>Pt 2 thin wall - NBD</p>
15	(c)	<ol style="list-style-type: none"> <li>1. (Pulmonary artery) carries de-oxygenated blood</li> <li>2. To the lungs</li> <li>3. (Pulmonary vein) carries oxygenated blood</li> <li>4. To the left atrium</li> </ol>	4	<p>Pt 2 away from the heart - NBD</p> <p>Accept - 'pulmonary artery takes blood to lungs to be oxygenated' = 2 marks</p>

Question	Answer	Marks	Guidance
16	1. A (slight increase / anticipatory rise) caused by release of adrenaline/noradrenaline 2. B (rapid increase) caused by action of receptors on heart/need for <b>more</b> oxygen/increase in carbon dioxide/oxygen supply not meeting demand 3. C (steady state) oxygen supply meets demand 4. D (decrease) receptors detect less/no movement <b>or</b> less oxygen needed <b>or</b> removal of carbon dioxide / lactic acid / pay back oxygen debt <b>or</b> removal of waste products	4	An <u>explanation</u> is required rather than a description of the graph  1. caused by warm up - NBD  2. muscles need oxygen - NBD
17 (a)	A - Larynx B – Epiglottis / Pharynx C - Bronchiole D - Diaphragm	4	
17 (b)	1. (Structure) (Hollow) tube / pipe <b>or</b> rings of (fibro) cartilage 2. (Function) Allows passage of <u>air</u> to lungs/bronchi	2	Do not accept: 'oxygen' for pt 2 (must be air) Pt 2 -allows air to pass through = BOD
18	1. Contracts during <u>inspiration</u> to... 2. <u>Increase air</u> inspired/inhaled/taken into lungs or increase in tidal volume (by...) 3. Lifting rib cage up/out 4. Increasing the volume of lungs/thoracic/chest cavity <u>more or</u> larger thoracic / chest cavity 5. Reducing pressure in the lungs/thoracic/chest cavity <u>more</u> 6. Relaxes during expiration	3	N.B. Pts 2, 4 and 5 need a <b>comparative</b> term to show a greater change caused by the sternocleidomastoid.  Do not accept: Pt 4 Increase lung volume (on its own – must be more)
19	1. Increased breathing frequency/rate 2. Increased tidal volume/deeper breathing/more air in 3. Increased minute ventilation/ minute volume 4. More oxygen taken in 5. More carbon dioxide expired/breathed out	3	Mark <b>first three</b> effects only. <b>Mark from left to right, from top to bottom as per marking guidelines.</b>  Do not accept: long term adaptations e.g. increased lung capacity.

Question			Answer	Marks	Guidance
20			<ol style="list-style-type: none"><li>1. False</li><li>2. True</li><li>3. True</li><li>4. False</li></ol>	4	

21* (Describe muscle fibre types)	(Explanation of link between type and performance)
<ol style="list-style-type: none"> <li>1. Slow oxidative muscle fibres/SO fibres <ul style="list-style-type: none"> <li>• Type I fibres</li> <li>• Small in size</li> <li>• High capillary density</li> <li>• High in mitochondria/myoglobin</li> <li>• Low in phosphocreatine/PC/CP</li> <li>• Slow contractions</li> <li>• Low force of contraction/strength</li> <li>• High aerobic capacity</li> <li>• High resistance to fatigue</li> </ul> </li> <li>2. Fast oxidative muscle fibres/FOG fibres <ul style="list-style-type: none"> <li>• Type IIa fibres</li> <li>• Large in size</li> <li>• High capillary density</li> <li>• Some mitochondria/myoglobin</li> <li>• High in phosphocreatine/PC/CP</li> <li>• Fast contractions</li> <li>• High force of contraction/strength</li> <li>• Moderate aerobic capacity</li> <li>• Moderate resistance to fatigue</li> </ul> </li> <li>3. Fast glycolytic muscle fibres/FG/FTG fibres <ul style="list-style-type: none"> <li>• Type IIb fibres</li> <li>• Large in size</li> <li>• Low capillary density</li> <li>• Low in mitochondria/myoglobin</li> <li>• High in phosphocreatine/PC/CP</li> <li>• Fast contractions</li> <li>• High force of contraction/strength</li> <li>• Low aerobic capacity</li> <li>• Low resistance to fatigue</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>4. All people have a mix of all three muscle fibre types <ul style="list-style-type: none"> <li>• Percentages of each</li> <li>• Genetics determines percentages</li> <li>• Average person has 50/50 fast and slow twitch</li> <li>• Elite athletes have very high percentage of one fibre type</li> <li>• This gives a physiological advantage in certain activities</li> </ul> </li> <li>5. High % of SO fibres succeed at endurance events <ul style="list-style-type: none"> <li>• E.g. marathons/triathlons/cross country running</li> <li>• Do not do well at anaerobic/explosive/power events</li> <li>• E.g. sprinting/throwing/jumping in athletics</li> </ul> </li> <li>6. High % of FOG fibres succeed at high-intensity events <ul style="list-style-type: none"> <li>• E.g. 800m and 1500m run/200m swimming races</li> <li>• May do well in games activities e.g. basketball/tennis</li> </ul> </li> <li>7. High % of FTG fibres succeed at explosive events <ul style="list-style-type: none"> <li>• E.g. sprinting/throwing/jumping in athletics</li> <li>• Do not do well at aerobic/endurance events</li> <li>• E.g. marathon</li> <li>• May need rest periods/substitution/time-outs during game</li> </ul> </li> <li>8. Games players need all 3 muscle fibre types during a game <ul style="list-style-type: none"> <li>• E.g. footballer will need SO fibres to last full 90 minutes</li> <li>• E.g. badminton player will need FOG fibres to make many quick movements and shots during a long, sustained rally</li> <li>• E.g. rugby player will need FTG fibres to make a big tackle</li> </ul> </li> <li>9. Games players may suit a certain position depending on mix <ul style="list-style-type: none"> <li>• E.g. winger in football may have high % fast twitch fibres</li> <li>• E.g. centre back in football may have more slow twitch</li> </ul> </li> <li>10. Tactics during event may depend on mix of fibres <ul style="list-style-type: none"> <li>• Marathon runner who has no sprint finish may try and tire out an opponent with a faster pace during race</li> <li>• Tennis player with more SO fibres may take pace off ball or try to maintain longer rallies to tire an opponent</li> </ul> </li> </ol>

<p><b>Level 3 (8–10 marks)</b>  <b>A comprehensive answer:</b>  Detailed knowledge &amp; 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><b>At Level 3 responses are likely to include:</b>  Detailed knowledge and understanding of structures and functions of all three muscle fibre types.  <b>At the top of this level</b> there is detailed explanation of the strengths of each fibre type and these are linked to a range of accurate practical examples. There may be an evaluation of the weaknesses of each fibre type.  <b>At the bottom of this level</b> knowledge of muscle fibre types is very good and all three fibre types have been correctly identified. Muscle fibre types will have been linked to a range of practical activities that benefit from a high percentage of each of the three fibre types.</p>
<p><b>Level 2 (5–7 marks)</b>  <b>A competent answer:</b>  Satisfactory knowledge &amp; 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><b>At Level 2 responses are likely to include:</b>  Satisfactory knowledge and understanding of muscle fibre types, including a description of at least two fibre types, and an explanation of the benefits of at least two fibre types to some practical activities.  <b>At the top of this level</b> all three muscle fibre types have been described, although the difference between FOG and FG/FTG fibres may not be described very well. All three fibre types should be linked to success in at least one practical activity for each. An answer that does not differentiate between FOG and FG/FTG can only get a max of 6 marks.  <b>At the bottom of this</b> level the description of each fibre type may focus more on their functions, rather than their structural characteristics, and there may be some errors in the description of at least one fibre type. Practical examples should cover both fast and slow twitch muscle fibres and the benefits of each.</p>
<p><b>Level 1 (1–4 marks)</b>  <b>A limited answer:</b>  Basic knowledge &amp; 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><b>At Level 1 responses are likely to include:</b>  Basic knowledge of muscle fibre types, which may be limited to fast and slow twitch fibres.  <b>At the top of this level</b> fast and slow twitch fibres should be identified and there should be a brief description of the differences between them. One practical example that would benefit from fast twitch fibres, and one that would benefit from slow twitch fibres may be identified.  <b>To score 1 mark</b> one muscle fibre type has been identified and this may be linked to a practical activity</p>
<p><b>[0 marks]</b> No response or no response worthy of credit.</p>	

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