

# **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 June 2019**

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

© OCR 2019

**Annotations** used by examiners

Multiple Choice Questions

Examiners indicate if an 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

Examiner Guidance on annotations

## 1. General guidance:

- mark in red ink (supervisors mark scripts they are sampling in green)
- record the total mark for each **part question** (e.g. question 4 (a)) in the right hand margin
- record the total mark for each **whole question/section** (e.g. question 4 (a), (b) and (c) total) at the end of the question in right hand margin – circle this total mark

## 2. For points-marked questions (the majority):

- Structured scheme: one mark = one point, represented by a **tick**
- Keep referring to the requirements of each question
- Take into consideration the sub-max for parts of the question where applicable and indicate '**max**' has been reached for each part as appropriate
- Ringed mark at the end of each whole question only
- Use only the agreed annotations when marking.

## 3. For the levels marked questions:

- Keep checking for relevance of the response to the requirements of the question
- Give '**Id**' for each numbered point in the MS indicative content (don't record the numbered point)
- Give '**Und**' for every point that has been sufficiently developed and shown understanding (often, but not always, indicated by a bullet point in the MS)
- Put '**Eg**' in the LH margin if a valid, relevant and accurate practical example is given
- Use other usual annotations on the body of the script.
  
- 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.
- Write the final mark for the question at the end of the response in the RH margin and also indicate the level awarded (**L1**, **L2** or **L3**).

FINALLY – remember that

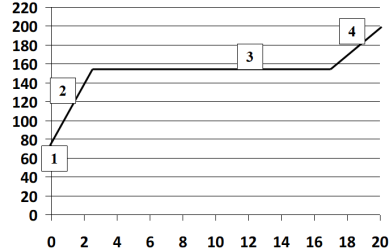
- Some learners may make relatively few points but develop them well to show good understanding, meet well the generic criteria descriptors in the top level and answer all parts of the question and therefore score well.
- Some learners may make many points but may not show the depth of analysis required 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.

THEN:

- Add up the marks for the whole question and put in RH margin and circle.
- Record all question totals on the front of the script in the grid provided on the cover.
- Add up these question totals to give a final mark and record on top left of script encircled.
- Check for arithmetical errors.
- Transfer question totals to the online mark sheet and make sure the total mark on the online mark sheet agrees with the total on the question paper.
- Ensure marks are legible on the question paper.
- Ensure every page of script is annotated – cross through blank pages and if additional pages/material has been provided and considered in the marking, annotate this in the usual way to indicate any credit given or use '**NBD**' if the material has not attracted additional marks to show it has been seen.

Question	Answers	Marks	Guidance
1	A – 400m hurdles	1	
2	C – Scapula and clavicle	1	
3	D - Gliding	1	
4	B – Teres major	1	
5	D – Fast glycolytic	1	
6	B – 2-3 minutes	1	
7	C – The pharynx is also known as the voice box	1	
8	D - Right atrium – tricuspid valve – right ventricle – pul. artery	1	
9	Pre-capillary sphincters	1	
10	<u>14,000ml/min or 14l/min</u>	1	Must have correct units
11	1. A = Humerus 2. B = Tibia 3. C = Clavicle 4. D = Carpals	4	Do not accept: Pt2 (Tibia) 'Fibia' / 'Tibula'
12	The skeleton is created to perform several functions. It protects vital <b><u>organs</u></b> , for example the <b><u>cranium</u></b> protects the brain. Long bones also manufacture <b><u>blood cells</u></b> in their <b><u>marrow</u></b> . These bones also provide a useful store of <b><u>minerals/calcium</u></b> . The skeleton is jointed to allow <b><u>movement</u></b> and also gives the body <b><u>shape/structure</u></b> and support.	7	Answers are in bold and underlined. Answers are: <b>Organs</b> <b>Cranium</b> <b>Blood cells</b> <b>(Bone) Marrow</b> <b>Minerals/calcium</b> (Accept: phosphorus/ magnesium/ fluoride) (DNA: Iron) <b>Movement</b> <b>Shape/structure</b>
13	(a) 1. (Hip) flexion 2. (Knee) extension 3. (Elbow) extension	3	Pt 1 'flexed' BOD Pts 2 and 3 'extended' BOD

Question		Answers			Marks	Guidance
13	(b)	<b>Muscle function</b>	<b>Muscle acting</b>	<b>Type of contraction</b>	5	Answers are in bold and underlined.
		Agonist	<u><b>Triceps (brachii)</b></u>	Eccentric		
		Antagonist	<u><b>Biceps (brachii)</b></u>	<u><b>Concentric</b></u>		
		<u><b>Fixator</b></u>	Erector spinae	<u><b>Isometric</b></u>		
14	(a)	1. Deltoid 2. Latissimus dorsi 3. Pectoralis major 4. Trapezius 5. Teres major 6. Rotator cuff/supraspinatus/infraspinatus/teres minor/subscapularis/pectoralis minor			3	Mark first three muscles only.  Pt3 Accept: 'Pectorals' (but not 'pecs')
14	(b)	1. Low intensity = <u>slow</u> (oxidative) / Type I fibres e.g. jogging into position after a try in rugby. 2. Medium intensity = <u>fast oxidative</u> / Type IIa fibres e.g. a sustained attack in rugby lasting many phases. 3. High intensity = <u>fast glycolytic</u> / Type IIb fibres e.g. a sudden sprint for a loose ball in rugby.			3	<b>Sub-max 1</b> if no sporting activity used.  <b>Look for:</b> <b>Level of intensity&gt;Type of fibre&gt;example</b>  Credit any valid sporting examples.  <b>Credit if intensity is not stated but implied in practical example e.g. sprint implies high intensity; jogging implies low intensity.</b> Credit 'fast oxidative fibres as high intensity', but only then credit fast glycolytic fibres if they are shown to be used for higher intensity activities than that.

Question	Answers	Marks	Guidance
14 (c)	<ol style="list-style-type: none"> <li>Fatigue</li> <li>Lactic acid build-up</li> <li>(Muscle) soreness / pain</li> <li>Depleted phosphocreatine/PC/ATP stores</li> <li>Glycogen/energy stores depleted</li> </ol>	2	Do not accept: <ul style="list-style-type: none"> <li>Tired/lack of energy for pt 1</li> <li>Cramp / DOMS (on its own) for pt 3</li> </ul>
15 (a)	<ol style="list-style-type: none"> <li>HR between 50 – 80 bpm at 0 minutes on x axis</li> <li>Increase in HR to reach plateau before 5 minutes</li> <li>Steady state plateau between 120 – 160 bpm until 17 mins</li> <li>Increase in HR from 17 mins to 180-210bpm</li> </ol>	4	 <p>Pt 4 graph may rise as curve or diagonal straight line.</p>
15 (b)	<ol style="list-style-type: none"> <li>SV of trained athlete higher than untrained or more blood pumped out <u>per beat by trained athlete</u></li> </ol> Trained athlete has: <ol style="list-style-type: none"> <li>Hypertrophy of myocardium/heart</li> <li>Stronger heart (contractions)</li> <li>Greater/improved venous return (mechanism)</li> <li>More blood/overflowing in (left) ventricle(s)</li> <li>Increased stretch/elasticity of ventricles/heart muscle</li> <li>Increased ejection fraction</li> </ol>	3	Accept the opposite emphasis on untrained athlete if correct e.g. pt 3 'untrained athlete has weaker heart contractions'.  Do not accept: <ul style="list-style-type: none"> <li>Bigger/larger heart</li> </ul>
16	<ol style="list-style-type: none"> <li>Venules</li> <li>Arteries / Aorta</li> <li>Veins / Vena Cava</li> </ol>	3	
17	<ol style="list-style-type: none"> <li>(Platelets) aid clotting</li> <li>(RBC) carry/transport oxygen/CO<sub>2</sub></li> </ol>	2	Accept 'clots' BOD pt 1 DNA 'stops bleeding' / scabs



Question	Answers	Marks	Guidance
18	<ol style="list-style-type: none"> <li>1. (SCM) Increases volume of air <u>inspired/breathed in</u></li> <li>2. (SCM) raises sternum/rib cage/ribs</li> <li>3. (SCM) increases volume/size/space of thoracic/chest cavity/lungs</li> <li>4. (Abs) increase volume of air <u>expired/breathed out</u></li> <li>5. (Abs) pull down sternum/rib cage/ribs</li> <li>6. (Abs) decrease volume/size/space of thoracic/chest cavity/lungs</li> </ol>	4	<b>Sub-max 2</b> for each muscle
19	<ol style="list-style-type: none"> <li>1. Tidal volume/TV drops (as soon as exercise ends)</li> <li>2. TV remains higher than resting levels during recovery</li> <li>3. Because oxygen is needed for recovery process or need to repay O<sub>2</sub> debt</li> <li>4. Rapid decrease at first</li> <li>5. Followed by a more gradual decrease</li> </ol>	2	Remains elevated BOD pt 2
20	<ol style="list-style-type: none"> <li>1. <u>In alveoli</u> partial pressure/PP of O<sub>2</sub> is high</li> <li>2. <u>In alveoli</u> PP of CO<sub>2</sub> is low</li> <li>3. <u>In capillaries</u> PP of O<sub>2</sub> is low</li> <li>4. <u>In capillaries</u> PP of CO<sub>2</sub> is high</li> <li>5. Gases move from (an area of) high to low pressure or pressure/diffusion gradient</li> <li>6. O<sub>2</sub> passes/diffuses into capillaries/blood stream</li> <li>7. CO<sub>2</sub> enters/diffuses into alveoli/lungs</li> </ol>	5	Credit answers that use comparative terms e.g. Partial pressure of oxygen is higher in alveoli than capillaries = 2 marks (pt 1 and 3)

Question	Answers	Marks	Guidance
21	<p>(Describe the aerobic system and explain why it provides the majority of the energy needed during the race.)</p> <p><b>(Description of aerobic system)</b></p> <ol style="list-style-type: none"> <li>1. Breakdown of ATP produces energy <ul style="list-style-type: none"> <li>• Re-synthesis of ATP</li> </ul> </li> <li>2. Relies on presence of/sufficient oxygen</li> <li>3. Fuel is glucose/glycogen/carbohydrates <ul style="list-style-type: none"> <li>• And fats/lipids/free fatty acids/FFAs</li> </ul> </li> <li>4. Three stages to aerobic system</li> <li>5. <b>Glycolysis</b> <ul style="list-style-type: none"> <li>• In sarcoplasm/cytoplasm/muscle cell</li> <li>• Glucose/glycogen is converted to pyruvic acid/pyruvate</li> <li>• Pyruvate <b>not</b> converted to lactic acid</li> <li>• 2 ATP produced</li> </ul> </li> <li>6. Link reaction <ul style="list-style-type: none"> <li>• Pyruvate catalysed by co-enzyme A</li> <li>• To produce acetyl co-enzyme A/CoA</li> </ul> </li> <li>7. <b>Krebs/citric acid cycle</b> <ul style="list-style-type: none"> <li>• In mitochondria</li> <li>• Acetyl CoA combines with oxaloacetic acid</li> <li>• To form citric acid</li> <li>• (Cyclical/complex) series of reactions</li> <li>• 2 ATP produced</li> <li>• By-products are CO<sub>2</sub> and hydrogen</li> </ul> </li> </ol>	10	<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 <u>are likely to include:</u></b>  Detailed knowledge and understanding of the aerobic system and reasons why it is the predominant system during the marathon.  Most points are developed.  <b>At the top of this level the three stages are described, glucose and fats are identified as fuels and amount of ATP and by-products are probably correctly stated.</b>  <b>Explanation of why aerobic system is predominant likely to include at least one example when an anaerobic system is used during the race.</b>  At the bottom of this level there may be a description of the stages of the system, together with amount of ATP and at least one by-product. There may be a good explanation of why the aerobic system is predominant.  Both parts are answered well but one may be stronger than the other.</p>

Question	Answers	Marks	Guidance
	<p>8. <b>Electron transport chain</b></p> <ul style="list-style-type: none"> <li>• Hydrogen split into ions and electrons</li> <li>• Electrons passed down chain/NADs and FADs</li> <li>• 32-34 ATP produced</li> <li>• (Ions) oxidised</li> <li>• By-product H<sub>2</sub>O/water</li> </ul> <p>9. Total amount of ATP produced is 36 – 39 ATP</p> <ul style="list-style-type: none"> <li>• From complete breakdown of glucose</li> </ul> <p>10. Fats are broken down/used in the Krebs cycle</p> <ul style="list-style-type: none"> <li>• Produce much greater amounts of ATP</li> <li>• Require more oxygen</li> </ul> <p><b>NOTE – If enzymes (GPP, PFK, LDH are mentioned then give ‘und’ credit – not in the spec but worthy of credit)</b></p> <p><b>(why majority of energy aerobic)</b></p> <p>11. Event is <b>low intensity</b></p> <ul style="list-style-type: none"> <li>• <b>Long duration or over 2 hours</b></li> <li>• Below anaerobic threshold</li> <li>• If runner used anaerobic systems this would cause fatigue/lactic acid build-up</li> </ul> <p>12. <b>Enough/sufficient oxygen</b> is present in muscles</p> <ul style="list-style-type: none"> <li>• Lactic acid is <b>not</b> formed</li> <li>• Anaerobic systems <b>not</b> used</li> </ul> <p>13. <b>Race is not 100% aerobic</b></p> <ul style="list-style-type: none"> <li>• ATP/PC system used at start</li> <li>• Sprint to get ahead of rivals</li> <li>• Sprint finish to get best time or to beat another runner</li> <li>• Lactic acid system may be used for longer sprint at end of race</li> </ul>		<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 the aerobic energy system and why it is the predominant system for the marathon.  Points made but generally not developed.  <b>At the top of this level fuel, amount of ATP and a by-product may have been stated with a few points developed and reasons why the aerobic system is predominant have been developed.</b>  At the bottom of this level a few points may have been made about the aerobic system and a basic explanation of the intensity and duration of the race is given to explain why the aerobic system is predominant.</p>

Question	Answers	Marks	Guidance
			<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 <u>are likely to include:</u></b>            Basic knowledge of the of the aerobic energy system and simple explanation of why it is predominant.  <b>At the top of this level two points may have been made to describe the aerobic system and the intensity and duration of the marathon may have been mentioned as reasons why the aerobic system is predominant.</b>            To score 1 mark one point has been made either to describe the aerobic system or to state why it is the predominant system for the marathon.  <b>[0 marks]</b> No response or no response worthy of credit.</p>

**OCR (Oxford Cambridge and RSA Examinations)**  
**The Triangle Building**  
**Shaftesbury Road**  
**Cambridge**  
**CB2 8EA**

**OCR Customer Contact Centre**

**Education and Learning**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

[www.ocr.org.uk](http://www.ocr.org.uk)

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

**Oxford Cambridge and RSA Examinations**  
is a Company Limited by Guarantee  
Registered in England  
Registered Office; The Triangle Building, Shaftesbury Road, Cambridge, CB2 8EA  
Registered Company Number: 3484466  
OCR is an exempt Charity

**OCR (Oxford Cambridge and RSA Examinations)**  
Head office  
Telephone: 01223 552552  
Facsimile: 01223 552553

© OCR 2019

