

# **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 2021**

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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		B – Deltoid	1	
2		A – 5 litres/minute	1	
3		D – In capillaries ppO <sub>2</sub> is low and ppCO <sub>2</sub> is high	1	
4		A – Increase in glycogen stores	1	
5		C – Sesamoid	1	
6		D – Veins	1	
7		B – Triceps brachii	1	
8		B – Scapula	1	
9		Increases <b>OR</b> more air can be inspired/expired	1	NBD - 'increased muscle size', 'increase in breathing rate', 'increase in lactic acid' (must relate to max minute ventilation or 'increases' on its own).
10		1. Glycolysis 2. Krebs/citric acid cycle 3. Electron transport/transfer chain	1	Accept 1 <sup>st</sup> answer only  Accept incorrect spellings if recognisable/phonetic Electronic chain cycle = BOD Pt 3
11	(a)	1. A = Cervical (vertebrae) 2. B = Lumbar (vertebrae) 3. C = Sacrum/sacral (vertebrae)	3	Accept incorrect spellings if recognisable/phonetic

Question		Answer	Marks	Guidance																
11	(b)	1. Supports (upper) body <b>OR</b> holds body upright <b>OR</b> weight bearing 2. Protects the spinal cord 3. Allows movement (of the trunk/body) <b>OR</b> attachment for muscles/tendons	2	<b>Do not accept:</b> A single word, e.g. protection Keeps the body posture without it we couldn't walk Protects vital organs Gives structure to the body Keeps head up straight Stability Gives body shape																
12	(a)	1. (Synovial fluid) lubricates/cushions joint <b>OR</b> prevents bones rubbing together <b>OR</b> nourishes cartilage <b>OR</b> absorbs loose bits of cartilage/debris <b>OR</b> reduces friction 2. (Joint capsule) Encloses/surrounds the joint <b>OR</b> the outer layer of the joint <b>OR</b> (protective) layers around a joint	2	Encloses synovial fluid = NBD Pt 2 Keeps joint in place/stable/prevents dislocation = NBD Pt 2 protects the joint or protective barrier = NBD Pt 2																
12	(b)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Shoulder</th> <th style="width: 50%; text-align: center;">Hip</th> </tr> </thead> <tbody> <tr> <td colspan="2">1. Both are ball and socket joints</td> </tr> <tr> <td colspan="2">2. Both allow movement in <b>3 planes OR</b> flexion <b>and</b> extension <b>and</b> abduction <b>and</b> adduction <b>and</b> rotation</td> </tr> <tr> <td>3. Scapula and humerus</td> <td>Pelvis and femur</td> </tr> <tr> <td>4. Shallow(er) socket</td> <td>Deep(er) socket</td> </tr> <tr> <td>5. Less stable <b>OR</b> easy to dislocate</td> <td>More stable <b>OR</b> hard to dislocate</td> </tr> <tr> <td>6. More movement allowed</td> <td>Less movement <b>OR</b> weight-bearing function</td> </tr> <tr> <td>7. Stabilised by muscles (mainly)</td> <td>Stabilised by muscles and ligaments</td> </tr> </tbody> </table>	Shoulder	Hip	1. Both are ball and socket joints		2. Both allow movement in <b>3 planes OR</b> flexion <b>and</b> extension <b>and</b> abduction <b>and</b> adduction <b>and</b> rotation		3. Scapula and humerus	Pelvis and femur	4. Shallow(er) socket	Deep(er) socket	5. Less stable <b>OR</b> easy to dislocate	More stable <b>OR</b> hard to dislocate	6. More movement allowed	Less movement <b>OR</b> weight-bearing function	7. Stabilised by muscles (mainly)	Stabilised by muscles and ligaments	3	Must make comparison for each mark.  Allow comparative comments e.g. the shoulder joint is a shallower socket = Pt 4
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13		<ol style="list-style-type: none"> <li>1. Extension</li> <li>2. Adduction</li> <li>3. Lateral flexion</li> <li>4. <b>Lateral/external</b> rotation</li> <li>5. Supination</li> </ol>	5	<p><b>Do not accept:</b> rotation on its own for Pt 4 (in question)</p>
14		<ol style="list-style-type: none"> <li>1. During the upward phase of the sit up, the agonist is the <b>rectus abdominus OR iliopsoas</b> muscle.</li> <li>2. The type of contraction in this muscle is <b>concentric</b></li> <li>3. The antagonist muscle is the <b>erector spinae OR gluteus maximus</b></li> <li>4. If the performer holds their position still for a time before the downward movement the type of contraction in the working muscle is <b>isometric</b></li> <li>5. During the downward phase the agonist is the <b>rectus abdominus OR iliopsoas</b> muscle</li> <li>6. The type of contraction in this muscle is <b>eccentric</b></li> </ol>	6	<p>Correct answers are:</p> <ul style="list-style-type: none"> <li>• <b>Rectus abdominus OR iliopsoas</b></li> <li>• <b>Concentric</b></li> <li>• <b>Erector spinae OR gluteus maximus</b></li> <li>• <b>Isometric</b></li> <li>• <b>Rectus abdominus OR iliopsoas</b></li> <li>• <b>Eccentric</b></li> </ul> <p>Do not accept: abdominals for Pt 1 or 5 Do not accept: external or internal obliques for Pt 3 Isotomic = NBD Pt 2 Isomatic = NBD Pt 4</p>

Question		Answer	Marks	Guidance
15	(a)	<ol style="list-style-type: none"> <li>A = Fast glycolytic/FG/FTG <b>OR</b> Type IIb</li> <li>B = Slow (oxidative) <b>OR</b> SO <b>OR</b> Type I</li> </ol>	2	Fast twitch for A – NBD Slow twitch for B – BOD
15	(b)	<ol style="list-style-type: none"> <li>At low intensity only slow twitch muscle fibres are used</li> <li>At medium/higher intensity FOG <b>and</b> slow twitch fibres are used</li> <li>At high/very high intensity all (3) muscle fibre types are used</li> </ol>	3	Accept suitable alternatives to describe intensity, e.g. low weights/jogging or equivalent.  Pt 3 must suggest higher intensity than Pt 2.  Pt 3 learner can access mark without needing to name all 3.
16	(a)	<ol style="list-style-type: none"> <li>A = <b>Right</b> atrium</li> <li>B = Aorta</li> <li>C = Bicuspid valve <b>OR</b> mitral valve <b>OR</b> left atrioventricular valve</li> </ol>	3	Do not accept: (A) Atrium on its own = NBD  (C) Semilunar valve or valves (on its own)
16	(b)	<ol style="list-style-type: none"> <li>B - Carries (oxygenated) blood to tissues/muscles/body</li> <li>C - Prevents backflow of blood into (left) <b>atrium</b></li> </ol>	2	(B) Carries oxygenated blood (on its own) = NBD (B) Carries deoxygenated blood to the body = X (C) Prevents backflow of blood on its own = NBD (as function of a specific valve is required)
17	(a)	<ol style="list-style-type: none"> <li>Bronchus/bronchi</li> <li>Nasal cavity</li> <li>Prevents food entering trachea/lungs/windpipe <b>OR</b> allows food to enter oesophagus <b>OR</b> covers trachea/windpipe when eating <b>OR</b> covers oesophagus when breathing <b>OR</b> allows air to enter trachea/lungs</li> </ol>	3	Accept incorrect spellings if recognisable/phonetic  Bracea = NBD  Nose = BOD for Pt 2

Question		Answer	Marks	Guidance
17	(b)	<ol style="list-style-type: none"> <li>The diaphragm and the external intercostal muscles <b><u>relax</u></b></li> <li>The internal intercostal muscles <b><u>contract</u></b></li> <li>This causes the ribs to move <b><u>down/in</u></b></li> <li>The volume of the thoracic cavity <b><u>decreases/reduces</u></b></li> <li>This means that pressure in the lungs <b><u>increases</u></b></li> <li>As a result, air is forced out of the lungs.</li> </ol>	5	<p>Correct answers are:  <b>Relax</b>  <b>Contract</b>  <b>Down/in</b>  <b>Decreases/reduces</b>  <b>Increases</b></p> <p>Accept appropriate alternative terms.</p>
18		<ol style="list-style-type: none"> <li>(Breathing frequency) the number of breaths <b><u>per minute</u></b></li> <li>(Average resting value) 10 – 15 breaths/minute</li> <li>(Tidal volume) the amount/volume/how much <b><u>air</u></b> is inspired/expired <b><u>per breath</u></b></li> <li>(Average resting value) 400 – 600 <b><u>ml</u></b> (per breath)</li> </ol>	4	<p>N.B. If correct units have been stated in 1, then they do not need to be repeated for Pt 2.  E.g. Breathing frequency is the number of breaths taken per minute. Average resting value is 12 = 2 marks.  BPM = NBD  Units must be correct for Pt 4. Accept other units e.g. 4-6 dl or 0.4-0.6L</p>
19		<ol style="list-style-type: none"> <li>Glycogen</li> <li>Pyruvic acid/pyruvate</li> <li>(2) ATP</li> </ol>	3	<p>Answers follow direction of arrows</p> <p>ATP-PC = BOD for Pt 3</p>
20	(a)	<ol style="list-style-type: none"> <li>Bar chart is correct if all 3 energy systems are shown as used <b><u>and</u></b> ATP-PC and lactic acid systems are larger than for marathon runner</li> </ol>	1	<p>Games activity must be named for mark to be awarded.  <b>Do not accept:</b>  Individual events e.g. boxing</p>

Question		Answer	Marks	Guidance
20	(b)	<ol style="list-style-type: none"> <li>1. (ATP-PC) used when sprinting for ball / jumping to head ball / passing / shooting ball / tackling another player (high intensity activity)</li> <li>2. (Lactic acid) used for <b>prolonged / repeated</b> sprints / intense periods of attack or defence (high intensity activity over 10 seconds)</li> <li>3. (Aerobic) used for jogging into position when ball is out of play</li> </ol>	3	<p>Practical examples should apply to game named in 20(a). The mark scheme is based on football only for indicative purposes.</p> <p>If no games activity named in 20(a), no marks can be given.  Running during a game = NBD  Running for 90 minutes during the whole game = BOD Pt 3</p>
21*		( <b>Explain</b> the long-term benefits and potential negative impacts of physical activity on the cardiovascular system.)	10	<p><b>Numbered points = 1d</b>  <b>Bullet points = Und</b></p>

<p>(Long term benefits)</p> <ol style="list-style-type: none"> <li>1. (Heart) Stronger heart <ul style="list-style-type: none"> <li>• (Myocardial) hypertrophy</li> <li>• Thicker/more muscular (left) ventricle walls</li> <li>• More <b>blood can be pumped</b> to working muscles during exercise</li> <li>• Increased stroke volume (at rest and during exercise)</li> <li>• Increased cardiac output <b>during high intensity work</b></li> </ul> </li> <li>2. (Heart) Lower resting heart rate <ul style="list-style-type: none"> <li>• Bradycardia (RHR below 60bpm)</li> <li>• Lower working heart rate (at any given intensity)</li> <li>• Faster HR recovery after exercise</li> </ul> </li> <li>3. (Blood vessels) Increased capillarisation or more (active) capillaries <ul style="list-style-type: none"> <li>• More <b>oxygen</b> to muscles/tissues</li> <li>• Increased gaseous exchange</li> <li>• More efficient vascular shunt (mechanism)</li> <li>• Improved vasodilation/vasoconstriction</li> </ul> </li> <li>4. (Blood) More/increased number of red blood cells <ul style="list-style-type: none"> <li>• More/increase in haemoglobin</li> <li>• Increased haematocrit levels</li> <li>• More oxygen can be <b>transported/carried/delivered</b> to muscles</li> <li>• Reduced blood viscosity</li> <li>• Increase in plasma levels</li> <li>• More white blood cells / better at fighting infection / less illness</li> </ul> </li> <li>5. (Health) Lowers blood pressure <ul style="list-style-type: none"> <li>• Reduced risk of high blood pressure/hypertension</li> <li>• Systolic/diastolic pressure lower</li> <li>• Reduced cholesterol</li> <li>• (Cholesterol/plaque) lines walls of blood vessels reducing blood flow</li> <li>• Prevent atherosclerosis</li> <li>• Prevent arteriosclerosis/hardening of artery walls</li> </ul> </li> <li>6. (Health) Reduced risk of cardiovascular disease <ul style="list-style-type: none"> <li>• Coronary Heart Disease (CHD)</li> <li>• Heart attack/myocardial infarction</li> <li>• Angina / strokes</li> </ul> </li> </ol>	<p>(Potential negative impacts)</p> <ol style="list-style-type: none"> <li>7. <b>Too much exercise</b> can put increased strain on heart (during exercise) <ul style="list-style-type: none"> <li>• Cardiac hypertrophy/enlarged heart can be dangerous</li> <li>• Heart attack/myocardial infarctions</li> <li>• Arrhythmia</li> <li>• Sudden cardiac death/SCD</li> <li>• Often linked to genetic factors/predispositions</li> </ul> </li> <li>8. Exercise at <b>higher temperatures/prolonged exercise</b> can cause thickening of blood <ul style="list-style-type: none"> <li>• Increased blood viscosity</li> <li>• Increasing blood pressure/strain on heart</li> <li>• Due to dehydration</li> </ul> </li> <li>9. (High intensity) <b>isometric contractions/lifting heavy weights</b> causes greatest strain on heart/CV system <ul style="list-style-type: none"> <li>• Causes highest blood pressure readings</li> <li>• Ruptured blood vessels</li> </ul> </li> <li>10. Importance of health screening/check before starting exercise programme <ul style="list-style-type: none"> <li>• PAR-Q (or equivalent)</li> <li>• Medical check-up</li> <li>• Regular ECG/heart scans for (teenage) elite sports performers</li> <li>• Principles of training correctly applied</li> </ul> </li> </ol>
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<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 benefits and potential negative impacts of physical activity on the cardiovascular system.  At the <b>top</b> of this level there is detailed <b>explanation</b> of the benefits to the heart, blood <b>and</b> blood vessels, including health benefits. The potential negative impacts may be linked to how much/what type of exercise is done, and the importance of health screening to minimise risks may be stated.  At the <b>bottom</b> of this level knowledge of benefits of exercise are <b>explained</b> well and should cover all three parts of the CV system, and descriptions of more than one negative effect might be expected.</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 the benefits of exercise and some potential negative impacts on the cardiovascular system.  At the <b>top</b> of this level benefits of exercise should cover two of the three parts of the CV system and some should be <b>explained</b>, and the reduced chance of at least one form of cardiovascular disease should be described.  At the <b>bottom</b> of this level the <b>description</b> of benefits may be limited to the heart and/or the blood. At least one negative impact should be <b>described</b> but limited detail is likely.</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 benefits of exercise and potential negative impacts on the cardiovascular system. Answer is likely to be heavily imbalanced in favour of benefits, with little content on negatives.  At the <b>top</b> of this level a few benefits of exercise on the heart, blood or blood vessels have been <b>identified or described</b>, and there may be a very limited attempt to <b>identify</b> possible negative impacts, but not linked to doing too much exercise.  To score 1 mark one benefit of exercise or one negative impact of exercise on the cardiovascular system has been <b>identified</b>.</p>
<p><b>[0 marks]</b> No response or no response worthy of credit.</p>	

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