OCR
Oxford Cambridge and RSA

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 2019

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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.

Annotations used by examiners

Multiple Choice Questions

Examiners indicate is 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 – Talus, tibia and fibula	1	
2			A – Long	1	
3			B – Joint capsule	1	
4			D – Smash in badminton	1	
5			B – Few mitochondria	1	
6			C – Energy continuum	1	
7			C – Increased blood pressure	1	
8			D – Adductor brevis	1	
9			12 breaths per minute/bpm	1	**Per minute/bpm must be specified**
10			Plasma	1	
11			1. Support 2. Protection 3. Blood (cell) production or production of red/white blood cells 4. Mineral storage 5. Attachment for muscles	3	Stability = NBD Structure = NBD Mineral production = NBD Attachment (on its own)

Question			Answer	Marks	Guidance
12			1. A = biceps (brachii) 2. B = rectus abdominus 3. C = rectus femoris 4. D = gluteus maximus	4	Do not accept (DNA): Abs/abdominals for B. Quads/quadriceps for C. Glutes/gluteals for D. Accept incorrect spellings if phrases recognisable Vastus group of muscles = NBD
13	(a)		1. Small size (of neuron) 2. Few fibres per neuron 3. High capillary density or many/lots of capillaries 4. Many mitochondria or high mitochondria density 5. Many myoglobin or high myoglobin content 6. Low phosphocreatine stores 7. Low glycogen stores	3	Mark first 3 answers only DNA • High resistance to fatigue • High in haemoglobin

Question			Answer	Marks	Guidance
13	**(b)**		1. Keeps capillaries dilated 2. **More** oxygen/oxygenated blood (to muscles) 3. (Quicker) removal of lactic acid/CO2 4. Prevents blood pooling (in muscles) 5. Reduces muscle soreness/stiffness/aching/ DOMS/risk of cramp 6. **Increases** flexibility/elasticity	3	Do not accept: • Reduce risk of injury DNA • Increases looseness • References to oxygen debt • Prevents build-up of lactic acid
14			1. Pronator teres 2. Supinator 3. (Movement is) pronation 4. (Pronator teres) is agonist **or** contracts **concentrically** 5. (Supinator) is antagonist **or** relaxes	4	Only give pts 4 and 5 if referring to the correct muscle for each
15			1. Bicuspid/mitral valve 2. Right atrium 3. Pulmonary vein 4. Right ventricle	4	

Question			Answer	Marks	Guidance
16			1. Amount/volume of blood pumped out of the heart/ventricles/left ventricle **per beat** 2. 60 – 80 ml (per beat) 3. Amount/volume of blood pumped out of the heart/ventricles/left ventricle **per minute** 4. 4-6l or 4000 - 6000ml (per minute)	4	Pt 1 and Pt 3- Must also be some reference to heart or ventricle **(not right ventricle on its own).** Accept any value in range 60-80 for point 2? Pts 2 and 4 must have correct units Accept any value between 4 -6 litres for pt 4 DNA • Amount of blood pumped out per beat (no mention of heart)
17			Arterioles are blood vessels with thick walls and a **large** diameter. The tunica **media** consists of some elastic fibres and relatively large amounts of **smooth** muscle. This smooth muscle **contracts** to reduce the size of the **lumen**, causing vasoconstriction, and then **relaxes** to increase its width, causing vasodilation. Arterioles subdivide into **capillaries** which are the smallest blood vessels in the body.	7	Missing words are bold and underlined. They are: **Large** **Media** **Smooth** **Contracts** **Lumen** **Relaxes** **Capillaries**

Question			Answer	Marks	Guidance
18	**(a)**		1. (Nasal cavity) warms/moistens/ filters air or traps dust **or** entrance chamber of respiratory system **or** where air enters (body) 2. (Epiglottis) allows air to enter trachea/ windpipe/lungs **or** food to enter oesophagus **or** prevents food entering trachea/windpipe/lungs **or** covers trachea/windpipe when eating **or** covers oesophagus when breathing 3. (Alveoli) allow gas exchange/diffusion	3	Pt1 – foreign objects caught = BOD Pt 1 – O2 enters = BOD
18	**(b)**		1. Contract during inspiration/breathing in 2. Causing ribs to move up/out 3. To increase volume/size of lungs/thoracic cavity 4. To reduce pressure in lungs/thoracic cavity 5. Relax during expiration/breathing out 6. Causing ribs to move down/in 7. To decrease volume/size of lungs/thoracic cavity 8. To increase pressure in lungs/thoracic cavity	4	**Sub-max 3** for inspiration **Sub-max 3** for expiration Increase / decrease size of chest = NBD

Question			Answer	Marks	Guidance
19	**(a)**		1. (How) MV increases 2. (Why) **more** oxygen is needed (at working muscles)	2	DNA • Meet demands for oxygen (pt 2)
19	**(b)**		1. **More** carbon dioxide needs to be exhaled 2. Oxygen/aerobic system used (during recovery) or repay oxygen debt / EPOC 3. Removal of lactic acid 4. Replenishment of myoglobin stores	2	Accept 'due to the need to remove **excess** CO2 build up' (pt 1) Pt 3 breaking down lactic acid = BOD
20	**(a)**		1. (Type of reaction) anaerobic 2. (Fuel) phosphocreatine / PC/CP/ creatine phosphate 3. (ATP) one (per mole of PC) 4. (By-products) none or ADP	4	DNA: • Exothermic (reaction) • Endothermic (reaction) • Coupled (reaction)

Question			Answer	Marks	Guidance
	(b)		**Sub-max 2 for**: 1. Lactacid/slow component 2. Removal of lactic acid **or** conversion of lactic acid to pyruvate/CO2/glycogen/glucose/protein/H2O 3. Replenishment of glycogen 4. Ventilation / circulatory rates remain elevated (during recovery) or aerobic system provides energy (for recovery process) **One mark for**: 5. (Timescale) 30 minutes - 2 hours	3	DNA: Lactic acid component for pt 1 (repeats question) 'Slow' (pt1) (on its own) Any time range outside 30 mins – 2 hours eg 2-3 hours = NBD Accept a specific value within range of 30 mins – 2 hours eg 1 hour Pt 2 breaking down lactic acid = BOD

21* **(Explain the structures and functions of the vertebral column)**		**10 marks**
(Names of sections)	**(Types of joint)**	**(Functions)**
1. Cervical vertebrae • 7 bones • Atlas and axis are top two vertebrae • Atlas supports head • Allows nodding of head • Creates pivot joint at neck • E.g. heading a football 2. Thoracic vertebrae • 12 bones • Each vertebra is attached to ribs • Less / limited movement 3. Lumbar vertebrae • 5 bones • Largest vertebrae • Support weight of upper body • Allow more movement than thoracic vertebrae 4. Sacrum / sacral vertebrae • 5 bones • Attach lumbar vertebrae / spine / upper body to lower body • Fused / fixed joints • Attached to pelvis / pelvic girdle • Weight-bearing function	6. Pivot joint • Between atlas and axis • Allows ***rotation*** / turning head (to left and right) • E.g. Football turning head to scan pitch for passing options 7. Slightly movable / cartilaginous joints • Between adjacent vertebrae • Discs of cartilage • Allow slight movements in all directions • E.g. flexion of spine during sit up 8. Gliding joints • Between processes of vertebrae • Bones slide across each other 9. Fixed/fused joints (only credit these joints once) • Between sacrum / coccyx / pelvis • No movement possible **(Joint movements, *NB. rotation = pt 6*)** 10. Flexion • Curling spine • E.g. tuck during forward roll in gymnastics 11. Extension • Straightening spine • E.g. jumping high to rebound in basketball • Hyperextension • E.g. arching back during Fosbury flop in high jump	13. Movement • Combination of slight movements gives effect of wide range of movement • From slightly movable / cartilaginous joints 14. Protection • Spinal cord / CNS • Thoracic vertebrae work with ribs to protect vital organs / lungs / heart. 15. Support/shape • Each vertebra supports structures above • Gives upright/erect posture **or** good posture • S-shape of spine gives greater strength • Shape of bones allow space for (peripheral) nerves and blood vessels **(other points)** 16. Vertebrae are irregular bones 17. Reference to spinal problems • Lordosis / kyphosis / scoliosis / spondylosis / slipped disc 18. Reference to core muscles attached to spine • Erector spinae group / rectus abdominus / internal and external obliques / trapezius 19. Advantages of vertebral column • Combination of great strength and wide range of movement, without exposing spinal cord to danger

21* (Explain the structures and functions of the vertebral column)		**10 marks**
5. Coccyx • 4 bones • Fused / fixed vertebrae • Remains of tail / tail bone	12. Lateral flexion • Bending to side (right and left) • E.g. during cartwheel or bowling in cricket	20. Disadvantages • Potential stress of lifestyle/sport/training • Degenerative damage • Importance of learning good posture/habits at early age

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.	**At Level 3 responses <u>are likely</u> to include:** **Detailed** knowledge and understanding of the structures and functions of the vertebral column. At the **top of this level** there is detailed coverage of names of sections, joint types and all movements are likely to be covered with accurate practical examples. There may be an explanation of the strengths and/or weaknesses of the spine. At the **bottom of this level** knowledge of the vertebral column is very good. At least **three** joint types and joint movements are described with practical examples. **At least two** functions of the vertebral column may have been explained.
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.	**At Level 2 responses <u>are likely</u> to include:** **Satisfactory** knowledge and understanding of the vertebral column, including names of most bones, joint types and movements and functions. At the **top of this level** most sections of the spine have been named in the correct order. **At least two** joint types and movements are **described**, and practical examples are used successfully. At the **bottom of this level** there may be errors in the names or order of bones, a couple of joint types may be **identified** with limited development and some joint movements are backed up with at least one practical example.
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.	**At Level 1 responses <u>are likely</u> to include:** **Basic** knowledge of the vertebral column. At the **top of this level** at least **two** sections of the vertebral column have likely been identified together with **one** joint movement and **one** function. Answers may be stronger naming parts of the spine rather than differentiating between joint types. There may be at least **one** practical example of a joint movement at the spine. To **score 1 mark** either **one** section, type of joint, movement or function has been identified.
[0 marks] No response or no response worthy of credit.	

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