



Cambridge Technicals

Sport

Unit 1: Body systems and the effects of physical activity

Level 3 Cambridge Technical Certificate/Diploma in Sport
05826-05829, 05872

Mark Scheme for January 2018

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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

Annotation	Meaning
Tick (Q1-20)	One mark given for each tick
Circle with ID (Q21 only)	Credit for identification
Circle with Und (Q21 only)	Credit for understanding/developed points
Eg (Q21 only)	Credit given for practical example
Cross	Incorrect
BOD with tick	Benefit of doubt – mark given
NBD	No Benefit of Doubt – no mark given
L1, L2, L3 (Q21 only)	Level given for extended question
NR	No response given
R	Repeat of a point already credited

Question		Answer	Marks	Guidance									
1		(b) 5 litres/minute	1										
2		(a) Vastus medialis	1										
3		(a) Fixed	1										
4		(d) Amount of haemoglobin increases	1										
5		(c) The volume of air inspired per breath	1										
6		(c) Fast oxidative fibres	1										
7		(d) Bronchioles – bronchi – trachea - larynx	1										
8		(a) Cranium and ribs	1										
9		It decreases/slows down	1	Do not accept: returning to normal									
10		(Pocket) valves	1	Do not accept: any valves of the heart eg Tricuspid valve = x									
11		1. A = <u>Tibia</u> 2. B = <u>Talus</u> 3. C = <u>Metatarsal</u>	3	Do not accept: A = Fibia / tibula (NBD) C = Metatarples (NBD)									
12		<table border="1"> <thead> <tr> <th>Joint</th> <th>Joint type</th> <th>Movement</th> </tr> </thead> <tbody> <tr> <td>Hip</td> <td><u>Ball and socket</u></td> <td>Flexion</td> </tr> <tr> <td>Elbow</td> <td><u>Hinge</u></td> <td><u>Flexion</u></td> </tr> </tbody> </table>	Joint	Joint type	Movement	Hip	<u>Ball and socket</u>	Flexion	Elbow	<u>Hinge</u>	<u>Flexion</u>	3	Answers are in bold and underlined.
Joint	Joint type	Movement											
Hip	<u>Ball and socket</u>	Flexion											
Elbow	<u>Hinge</u>	<u>Flexion</u>											

Question		Answer	Marks	Guidance
13		When performing a pike jump, the gymnast causes <u>flexion</u> at the hip joint with a <u>concentric</u> contraction of the <u>iliopsoas</u> muscle. This muscle is the <u>agonist</u> during this movement. On landing, the gymnast returns to an upright position by contracting the <u>gluteus maximus</u> muscle.	5	Answers are in bold and underlined. Flexion – concentric – iliopsoas – agonist – gluteus maximus
14		1. Fast <u>oxidative</u> or Type 2a 2. Slow (oxidative) or Type 1 3. Fast <u>glycolytic</u> or Type 2b	3	Do not accept: Fast or fast twitch for 1 or 3 Slow glycolytic = BOD
15	(a)	1. (Muscle) hypertrophy/increase in size/strength/force/endurance 2. (Muscle) hyperplasia or more (muscle) fibres 3. Increase in size/density of mitochondria 4. Increase in myoglobin (stores) 5. Increase in glycogen (stores) 6. Increase in metabolism of triglycerides/fats or increase in fat stores 7. Increase in <u>tendon</u> strength 8. Increased capillarisation	3	Mark first three benefits only. Do not accept: - Quicker recovery - Less chance of injury - Increased elasticity/flexibility - Less lactic acid build-up
	(b)	1. Increased flexibility/range of movement (at joint) 2. Increased speed of oxygen delivery <u>to muscles</u> or more oxygen <u>to muscles</u> 3. Increase in <u>muscle</u> temperature 4. Increased elasticity/extensibility of muscle or can stretch further 5. Increased speed/force of contraction or muscles work faster 6. Increased speed of nerve impulses	2	Do not accept: - Reduced risk of muscle injury - Increased blood flow - Can loosen up

Question		Answer	Marks	Guidance
		7. Increased enzyme activity 8. Reduced muscle soreness/DOMS/lactic acid build up		
16	(a)	1. A = <u>Right atrium</u> 2. Receives (de-oxygenated) blood from body or pumps/transport / sends (de-oxygenated) blood into right ventricle 3. B = <u>Aorta</u> 4. Carries (oxygenated) blood (from L ventricle) to tissues/body/muscle 5. C = <u>Left ventricle</u> 6. Pumps/transport/sends (oxygenated) blood out of the heart/to body/into aorta	6	Identification must be correct for mark to be given for description. ie - If identification incorrect then mark cannot also be given for description Do not accept: - Pumps blood (NBD Pt6)
	(b)	1. (During exercise) arterioles (vaso)dilate 2. To allow more blood to the working muscles 3. (and) (vaso)constrict to <u>non-essential organs/stomach/gut</u>	2	Do not accept: - Become wider - Arterioles dilate and constrict = 1 mark only

Question	Answer	Marks	Guidance
17	<ol style="list-style-type: none"> 1. (account) B is fitter/trained performer or A is a less fit / untrained performer 2. (describe) B has lower resting heart rate than A or A has higher resting heart rate 3. (account) because B has higher stroke volume/stronger heart or A has lower SV/less strong heart 4. (describe) B has steady state at lower HR/lower working HR or A has steady state at higher HR/higher working HR 5. (account) due to greater efficiency at using oxygen or less oxygen needed (at any exercise intensity) 6. (describe) B shows quicker recovery/ has returned to resting heart rate before A or has returned to resting heart rate between 17 and 18 minutes / within 3 minutes 7. (account) B is able to get rid of waste products/lactic acid quicker 	4	<p>Sub max 2 for describing differences</p> <p>Sub max 2 for accounting for differences</p> <p>Examiners to write 'a' for account and 'd' for describe in left margin of script - to make sure sub-maxes are not exceeded</p> <p>Candidate may talk about one or other graph to gain marks. E.g. A has steady state plateau higher due to needing more oxygen to work = Pt 4 (implies B is lower).</p>
18	<ol style="list-style-type: none"> 1. External intercostals contract 2. Diaphragm contracts/flattens 3. Rib cage moves up/out 4. Volume of thoracic cavity increases 5. Pressure in lungs is reduced 	5	<p>Candidates may write a sentence using more than one word. E.g. external intercostals and diaphragm contract = 2 marks.</p> <p>E.g. Rib cage moves up, increasing volume of thoracic cavity and decreasing pressure inside lungs = 3 marks.</p> <p>Do not accept:</p> <ul style="list-style-type: none"> - Diaphragm moves up - Makes lungs larger

Question		Answer	Marks	Guidance
19		In the alveoli the partial pressure of oxygen is <u>high</u> and the partial pressure of carbon dioxide is <u>low</u> , whereas in the blood capillaries at the alveoli the partial pressure of oxygen is <u>low</u> and the partial pressure of carbon dioxide is <u>high</u> . Gases move from areas of <u>high</u> to <u>low</u> pressure. Therefore, <u>carbon dioxide</u> diffuses into the alveoli and <u>oxygen</u> diffuses into the capillaries surrounding them.	8	Answers are in bold and underlined. Order of answers is: High – low – low – high – high – low – CO₂ – O₂ Accept alternative valid words for high/low e.g. great/small, increased/decreased
20	(a)	<ol style="list-style-type: none"> (Aerobic) glycolysis Krebs/citric acid cycle Electron transport/transfer chain 	3	
	(b)	<ol style="list-style-type: none"> 1st stage = 2 (ATP) 2nd stage = 2 (ATP) 3rd stage = 32-34 (ATP) 	3	

Question	Answer	Marks	Guidance
21*	<p><i>(Describe the positive and negative impacts of physical activity and sport on the skeletal system, using practical examples...)</i></p> <p>(Positives)</p> <ol style="list-style-type: none"> 1. Stronger/thicker bones <ul style="list-style-type: none"> • Caused by high impact/weight-bearing exercise • increased bone density • Increased calcium/collagen • Prevents/protects from injury to bones 2. Increased stability/stronger joints <ul style="list-style-type: none"> • Stronger ligaments/tendons • Prevents sprains/dislocations 3. Prevents osteoporosis <ul style="list-style-type: none"> • Which is reduced bone density/weakening with age • Can affect young people as well as older people 4. Reduced risk of (osteo)arthritis <ul style="list-style-type: none"> • Exercise thickens (articular/hyaline) cartilage • Which covers the ends of adjacent bones • More/improved synovial fluid produced • Reduces friction/wear and tear at joints • Joints better able to absorb shock • Most common in weight-bearing joints/knee/hip/ankle 5. Improved posture <ul style="list-style-type: none"> • Increased strength of core stability muscles • Reduces likelihood of lower back pain/ spine curvature • Named back problems e.g. sciatica, scoliosis 6. Weight management <ul style="list-style-type: none"> • Maintain a balanced active healthy lifestyle • Prevent sedentary lifestyle (leading to e.g. osteoporosis) 	10	<p>No ticks for marking Q21</p> <p>Examiners to use:</p> <p>ID - for Identification of main point</p> <p>Und - for development of the point (bullet points on MS)</p> <p>EG for practical example</p> <p>Write L1 or L2 or L3 at the base of the answer on the LHS and a ringed total on the RHS at the base of the answer</p> <p>Level 3 (8–10 marks)</p> <p>A comprehensive answer:</p> <p>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 <u>are likely to include:</u></p> <p>Detailed knowledge and understanding of both positive and negative impacts of physical activity on the skeletal system. Most points are developed. At the top of this level bone and joint structures are considered and a range of specific conditions are named.</p>

Question	Answer	Marks	Guidance
	<p>(Negatives)</p> <p>7. Increased risk of (osteo)arthritis</p> <ul style="list-style-type: none"> • Overuse/poor technique can cause wear and tear/ loss of (articular/hyaline) cartilage • Reduced production of synovial fluid • Friction between bone surfaces • Formation of bone spurs • High impact activities/repetitive actions are risk factor • Weight bearing joints e.g. knee/hip/ankle <p>8. Chronic/overuse injuries</p> <ul style="list-style-type: none"> • Repetitive actions cause damage • Tendonitis injuries e.g. tennis/golfers elbow • Stress fractures e.g. shin splints • E.g. Osgood Schlatter’s disease/bursitis <p>9. Acute/impact injuries</p> <ul style="list-style-type: none"> • Contact sports e.g. football/rugby • Fractures/dislocations/torn cartilage/ligaments • Can lead to arthritis in later life • Can lead to sedentary lifestyle during recovery or to avoid repeat injury <p>(Conclusions)</p> <p>10. Negatives can be minimised</p> <ul style="list-style-type: none"> • Use of correct techniques • Avoid overtraining/follow principles of training • Apply moderation/progressive overload 		<p>Practical examples are clearly relevant and linked to most points made.</p> <p>At the bottom of this level both positives and negatives are considered and a few specific conditions, such as osteoporosis, arthritis and shin splints are named and/or described. Practical examples are clearly relevant and linked to many points made.</p> <p>Level 2 (5–7 marks)</p> <p>A competent answer:</p> <p>Satisfactory knowledge & understanding.</p> <p>Analysis/critical evaluation and/or discussion/explanation/development attempted with some success.</p> <p>Some success in practical application of knowledge.</p> <p>Technical and specialist vocabulary used with some accuracy.</p> <p>Written communication generally fluent with few errors.</p> <p>At Level 2 responses <u>are likely to include:</u></p> <p>Satisfactory knowledge and understanding of impact of physical activity on the skeletal system.</p> <p>Points made but generally not developed.</p> <p>At the top of this level both positives and negatives have been identified, and some have been described, such as stronger bones, arthritis prevention and examples of chronic or high impact injury.</p>

Question	Answer	Marks	Guidance
			<p>Practical examples are mostly relevant and linked to many points made. At the bottom of this level a few points have been made but there may be more focus on either negatives or positives, and specific conditions may not be named. Some practical examples are relevant and some are linked to points made.</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 the impact of physical activity on the skeletal system. At the top of this level at least three effects are likely to have been identified and at least one has been described. They may all be either positive or negative impacts, and there may be inaccuracies. Few or no practical examples are relevant and few if any linked to points made.</p>

Question	Answer	Marks	Guidance
			To score 1 mark one effect of exercise on the skeletal system has been named or described. [0 marks] No response or no response worthy of credit.

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