



GCSE (9–1)

Physical Education

J587/01: Physical factors affecting performance

General Certificate of Secondary Education

Mark Scheme for June 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.

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Annotations

Annotation	Description	Annotation	Description
	Tick	KU	Knowledge and understanding / indicates AO1 on extended response Q (*)
	Cross	EG	Example/Reference / indicates AO2 on extended response Q (*)
BOD	Benefit of doubt	DEV	Development / indicates AO3 on extended response Q (*)
TV	Too vague	L1	Level 1 response on extended response Q (*)
REP	Repeat	L2	Level 2 response on extended response Q (*)
IRRL	Significant amount of material which doesn't answer the question	L3	Level 3 response on extended response Q (*)
SEEN	Noted but no credit given / indicates sub-max reached where relevant	S	Sub-max reached
BP	Blank page		

- **KU**, **EG** and **DEV** used instead of ticks on the extended response question to indicate where knowledge or development points from the indicative content have been made.
- On the extended response question (*), one KU, EG or DEV does not necessarily equate to one mark being awarded; the marking is based on a levels of response mark scheme which awards a level and mark holistically based upon the quality of the response overall against the levels descriptors.

Question			Answer	Mark	Guidance
1			<p>2 marks from:</p> <ol style="list-style-type: none"> 1. Increased flexibility / elasticity / pliability (of muscles) OR increased range of movement / mobility 2. Increased pliability of tendons / connective tissue 3. Increased / more / faster blood (flow) / oxygen to muscles 4. Increased speed / strength of contractions 5. Reduced risk of injury 6. Delays / reduces (build-up of lactic acid) / delays fatigue 	<p>2</p> <p>(AO1)</p>	<p>Do not accept: Benefits to other systems such as heart, e.g. initiates vascular shunt is a cardiovascular benefit</p> <p>Prevent injury = TV (does not prevent, only reduce ...) Warming up the body / muscles = TV More blood to body = TV Muscles are stretched / loose = TV Muscles ready to work = TV Prevents lactic acid build-up = TV</p>
2		(a)	<p>1 mark for:</p> <p>Prevent back flow of <u>blood</u> OR prevents blood from returning to where it came from OR prevents blood flowing in wrong direction</p>	<p>1</p> <p>(AO1)</p>	<p>Keeps blood flowing in correct direction = BOD Stops blood travelling backwards = BOD Prevents backflow on its own = TV Blood flow in one direction = TV</p>
		(b)	<p>1 mark for (Mark 1st answer only):</p> <p>Semi-lunar / aortic / pulmonary (valves)</p>	<p>1</p> <p>(AO1)</p>	<p>Do not accept: Bicuspid / mitral / tricuspid valves / aorta / pulmonary artery</p>
3			<p>1 mark for (Mark 1st answer only):</p> <p>Ball and socket / hip / shoulder OR gliding / condyloid / wrist / knuckle OR saddle / base of thumb</p>	<p>1</p> <p>(AO1)</p>	<p>Do not accept: Ankle / thumb / finger on its own</p> <p>N.B. Ankle is a uniaxial joint, despite what some websites may show.</p>
4		(i)	<p>1 mark for (Mark 1st answer only):</p> <p>Abdominals OR rectus abdominis</p>	<p>1</p> <p>(AO2)</p>	<p>Do not accept: Abs</p>
		(ii)	<p>1 mark for (Mark 1st answer only):</p> <p><u>Sagittal</u></p>	<p>1</p> <p>(AO3)</p>	

Question			Answer	Mark	Guidance
5			1 mark for (Mark 1st answer only) : <u>Frontal</u>	1 (AO3)	Sagittal = BOD
6			1 mark for (Mark 1st answer only) : <u>Third / 3rd / 3</u> (class lever)	1 (AO3)	
7		(a)	1 mark for (Mark 1st answer only) : <u>Frontal</u>	1 (AO2)	
		(b)	1 mark for (Mark 1st answer only) : Any movement that is abduction or adduction, e.g. star jumps / jumping jacks / cartwheel / abduction of the hip during the breaststroke leg action (in swimming) / abduction of shoulder to shoot in netball	1 (AO3)	Do not accept: Movements that involve different planes, e.g. circumduction. Tennis serve on its own = TV (starts with extension) Catching a ball / golf swing / football throw-in = TV BUT: Arm action in golf swing = BOD
8			1 mark for: (B) Nose, trachea, bronchi, bronchioles, alveoli	1 (AO1)	

Question			Answer	Mark	Guidance
9			<p>Two marks from (Mark 1st 2 answers only):</p> <ol style="list-style-type: none"> 1. The floor is hard / uneven 2. litter / objects / equipment left out / not put away / in wrong position 3. equipment is damaged / broken / unsafe 4. Inappropriate footwear being worn 5. Other participants / area too crowded / other activities going on 6. Short run off area OR proximity of wall to edge of court OR wall surface / fittings 7. Open doors / windows OR blocked fire exit 8. Poor / unsuitable lighting 	<p>2</p> <p>(AO1)</p>	<p>Do not accept:</p> <p>Wet / slippery floor answers relating to the weather</p> <p>Temperature / too hot / too cold = TV Litter / objects on its own = TV</p>
10		(i)	<p>One mark for (Mark 1st answer only):</p> <p>Vertical / Sargent jump (test)</p>	<p>1</p> <p>(AO1)</p>	<p>Do not accept:</p> <p>Standing (broad) jump / high jump</p> <p>Accept: phonetic spellings of Sargent</p>
		(ii)	<p>One mark from:</p> <ol style="list-style-type: none"> 1. Reach up and make a mark / slide ruler up 2. Performer jumps up <u>and</u> touches the board / marks chalk on the wall 3. maximum score / height recorded <p>OR distance between two marks is measured OR measure how high you jumped (by touching ruler)</p>	<p>1</p> <p>(AO1)</p>	<p>Do not accept:</p> <p>'Jump as high as you can' on its own = TV</p>
11		<p>(i)</p> <p>(ii)</p>	<p>Two marks from:</p> <p>Mobility – (exercises that) take the joint through its (full) range of movement <u>and</u>, e.g. arm swings / heel flicks / high knees / open the gate / lunges</p> <p>Dynamic movement – movements that involve speed and/or changes of direction <u>and</u>, e.g. shuttle runs / skipping / running in and out of cones / zig zag running / high knees / heel flicks / agility ladders</p>	<p>2</p> <p>(AO2)</p>	<p>Description and example required for each mark.</p> <p>If no suitable example = TV</p> <p>If example but no description = TV</p>

12		One mark for (Mark 1st answer only) : Metacarpal(s) / phalange(s)	1 (AO2)	Do not accept: Carpals (in wrist, not hand)
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Question			Answer	Mark	Guidance										
13			One mark for (in any order): <u>Abduction, adduction and rotation</u>	1 (AO1)	All three movements to be named for mark 1 tick only after 3rd correct movement named. If only 1 or 2 named movements then = TV not X										
14			Two marks from: 1 mark for one difference: <table><tr><td>Aerobic</td><td>Anaerobic</td></tr><tr><td>1. Continuous exercise / 3+ minutes</td><td>Short bursts of exercise / up to 30 seconds</td></tr><tr><td>2. Low / moderate intensity</td><td>High intensity</td></tr><tr><td>3. oxygen is used / no oxygen debt</td><td>No / little oxygen used / oxygen debt created</td></tr><tr><td>4. Lactic acid not produced / CO₂ / H₂O produced</td><td>Lactic acid is produced</td></tr></table> 1 mark for examples of aerobic and anaerobic exercise (Aerobic) e.g. – long distance running / jogging / 800m + / middle distance running and (Anaerobic) e.g. – 100m (sprint) / sprinting	Aerobic	Anaerobic	1. Continuous exercise / 3+ minutes	Short bursts of exercise / up to 30 seconds	2. Low / moderate intensity	High intensity	3. oxygen is used / no oxygen debt	No / little oxygen used / oxygen debt created	4. Lactic acid not produced / CO ₂ / H ₂ O produced	Lactic acid is produced	2 (AO2)	1 mark for correct statement about the difference between aerobic and anaerobic exercise Answer must show a difference by stating both sides of one point in the table Use highlighter for one side correct, tick when 2nd part is seen Anaerobic is short period of time and aerobic a longer/extended period of time = TV 1 mark for correct practical examples of <u>both</u> types of exercise 'running', 'cycling' or 'football' = TV; BUT Full game of football / tennis match for aerobic = BOD
Aerobic	Anaerobic														
1. Continuous exercise / 3+ minutes	Short bursts of exercise / up to 30 seconds														
2. Low / moderate intensity	High intensity														
3. oxygen is used / no oxygen debt	No / little oxygen used / oxygen debt created														
4. Lactic acid not produced / CO ₂ / H ₂ O produced	Lactic acid is produced														
15			One mark for: Volume / amount of blood pumped from the left ventricle / ventricles / heart per beat / contraction	1 (AO1)	Key words are in bold Right ventricle = TV										

16		(i)	One mark for: (Cardiac output) = heart rate / HR x stroke volume / SV OR Volume / amount of blood pumped out of left ventricle / ventricles / heart per <u>minute</u>	1 (AO1)	Key words are in bold Right ventricle = TV
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Question			Answer	Mark	Guidance
		(ii)	One mark for: Increases	1 (AO2)	Accept equivalent words i.e. higher But 'quicker' = TV More blood pumped = TV
17			One mark for: 1. Connects muscle to bone 2. Assists the muscle with pulling the bone 3. Makes bones move when muscles contract / involved with muscular contractions 4. Give stability / support / shock absorber	1 (AO1)	Allows movement at a joint = TV Keeps the joint together = TV Holds bones and muscles in place = TV BUT Holds muscles on to bones = BOD
18		(a)	One mark for: An increase in the number of / more capillaries	1 (AO1)	Formation of new capillaries = BOD Bigger capillaries = TV
		(b)	One mark for: <u>False</u>	1 (AO2)	
19			One mark for: <u>HIIT / High intensity interval training</u>	1 (AO2)	Do not accept: Interval training on its own (in question) Fartlek = X (type of continuous training) Watch out for HITT or HIT = TV
20			One mark for (Mark 1st answer only) : Helmet / head guard / scrum cap	1 (AO1)	Do not accept: Gum shield / hat / headgear


Question			Answer	Mark	Guidance																		
21	(a)	(i)	One mark for (Mark 1st answer only) : <u>Flexibility</u>	1 (AO1)																			
		(ii)	One mark for: <u>2 OR Abdul and Olivia</u>	1 (AO3)																			
		(iii)	Two marks for: <table border="1"><tr><td>(excellent / Emma / Farah)</td><td>(poor / Liam)</td></tr><tr><td>1. were motivated / effort</td><td>Unmotivated / didn't try</td></tr><tr><td>2. warmed up / stretched</td><td>Did not warm up / stretch</td></tr><tr><td>3. long / elastic muscles / large range of motion</td><td>Short / inelastic muscles / small range of motion</td></tr><tr><td>4. No injuries</td><td>Recovering from injury / suffering from injury</td></tr><tr><td>5. Participate in activities that require excellent flexibility, e.g. dance</td><td>Does not participate in activities that require good flexibility</td></tr><tr><td>6. Long arms and short legs / high arm:leg length ratio</td><td>Short arms and long legs / low arm:leg length ratio</td></tr><tr><td colspan="2">7. Females generally more flexible than males</td></tr><tr><td colspan="2">8. The test was not measured correctly / issues over the validity / accuracy of the test</td></tr></table>	(excellent / Emma / Farah)	(poor / Liam)	1. were motivated / effort	Unmotivated / didn't try	2. warmed up / stretched	Did not warm up / stretch	3. long / elastic muscles / large range of motion	Short / inelastic muscles / small range of motion	4. No injuries	Recovering from injury / suffering from injury	5. Participate in activities that require excellent flexibility, e.g. dance	Does not participate in activities that require good flexibility	6. Long arms and short legs / high arm:leg length ratio	Short arms and long legs / low arm:leg length ratio	7. Females generally more flexible than males		8. The test was not measured correctly / issues over the validity / accuracy of the test		2 (AO3)	<p>Answers must address both sides for pts 1 – 6</p> <p>But accept comparative comments such as:</p> <p>Emma / Farah did a better warm up (than Liam) OR Emma / Farah had a more favourable arm:leg length ratio OR Liam was not as motivated (to do well in the test)</p> <p>Pts. 7 and 8 are stand-alone points.</p> <p>Use highlighter for one side correct, tick when 2nd part is seen</p> <p>Do not accept: Emma is more <u>flexible</u> than Liam for pt 3 (flexibility already identified as component being measured in (i))</p> <p>More active v more sedentary = TV</p> <p>Liam does not train at all = TV</p>
(excellent / Emma / Farah)	(poor / Liam)																						
1. were motivated / effort	Unmotivated / didn't try																						
2. warmed up / stretched	Did not warm up / stretch																						
3. long / elastic muscles / large range of motion	Short / inelastic muscles / small range of motion																						
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8. The test was not measured correctly / issues over the validity / accuracy of the test																							

Q21(b) Level descriptors	Discriminators
<p>Level 3 (5–6 marks)</p> <ul style="list-style-type: none"> • detailed knowledge & understanding • clear and consistent practical application of knowledge & understanding • effective analysis/evaluation and/or discussion/explanation/development • relevant information drawn upon from other areas of the specification • accurate use of technical and specialist vocabulary • there is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. 	<p>Level 3 Discriminators</p> <ul style="list-style-type: none"> • detailed knowledge & understanding of the three other principles of training (overload; progression; reversibility) • several reasons for the use of beta blockers are evaluated • clear and consistent practical application of knowledge & understanding to a gymnast and their training programme • AO2 and AO3 are well covered for Level 3; some imbalance between the two may be present for 5 marks. At 6 marks, both are equally well addressed
<p>Level 2 (3–4 marks)</p> <ul style="list-style-type: none"> • satisfactory knowledge & understanding • some success in practical application of knowledge & understanding • analysis/ evaluation and/or discussion/explanation/development attempted with some success • some relevant information drawn upon from other areas of the specification • technical and specialist vocabulary used with some accuracy • there is a line of reasoning presented with some structure. The information presented is in the most-part relevant and supported by some evidence. 	<p>Level 2 Discriminators</p> <ul style="list-style-type: none"> • satisfactory knowledge & understanding of at least two other principles of training (overload; progression; reversibility) • some success in practical application of knowledge & understanding to a gymnast's training programme • at least two reasons for the use of beta blockers may be evaluated at the top of this level • at the bottom of this level, one part of the question may be addressed very well while there is a lack of knowledge in the other part or both parts may have been addressed with some success
<p>Level 1 (1–2 marks)</p> <ul style="list-style-type: none"> • basic knowledge & understanding • little or no attempt at practical application of knowledge & understanding • little or no attempt to analyse/ evaluate and/or discuss/explain/develop • little or no relevant information drawn upon from other areas of the specification • technical and specialist vocabulary used with limited success • the information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear. 	<p>Level 1 Discriminators</p> <ul style="list-style-type: none"> • basic knowledge & understanding of the principles of training • little or no attempt to evaluate the use of beta blockers • little or no attempt at practical application of knowledge & understanding to a gymnast's training programme • at the top of this level at least one principle of training has been explained using a practical application to a training programme or principles of training have been described with limited application • at the bottom of this level some knowledge of either a principle of training or the use of beta blockers has been shown
<p>(0 marks)</p> <ul style="list-style-type: none"> • no response or no response worthy of credit. 	

Q21(b) Indicative content (3 x AO2, 3 x AO3)

Using practical examples, explain the use of other principles of training in a gymnastic training programme.	Evaluate reasons why some gymnasts may use beta blockers within their training programme.
<p>1. (Overload)</p> <ul style="list-style-type: none"> • Work harder than normal / puts body under stress • So that fitness adaptations / improvements will occur E.g. gymnast will lift heavier weights in the gym • Links with FITT principle • Increase frequency / intensity / duration or time of training / or change type of training E.g. gymnast will lift weights for longer / do more sets/reps E.g. gymnast will put themselves through a higher intensity schedule E.g. gymnast will do more training sessions per week <p>2. (Progression)</p> <ul style="list-style-type: none"> • Training gradually becomes more difficult / challenging • Because body has made adaptations / got stronger • Must be gradual to avoid injury E.g. gymnast will gradually do more complex vaults / exercises in a floor routine in training <p>3. (Reversibility)</p> <ul style="list-style-type: none"> • Fitness will deteriorate if training stops E.g. If the gymnast is injured / stops training then the adaptations / fitness will be lost • Training must be maintained E.g. gymnast will continue training programme all year 	<p>4. Psychological reasons</p> <ul style="list-style-type: none"> • Help keep the gymnast calm / avoid anxiety / relax / reduce stress • To focus / concentrate better on routine <p>5. Physiological reasons</p> <ul style="list-style-type: none"> • Reduce HR / blood pressure • Reduce effects of adrenaline • Useful for balance / stability • Helps to avoid muscle spasms / reduce muscle tension <p>6. (Other reasons)</p> <ul style="list-style-type: none"> • Win at all costs / get more prize money / fame / sponsorship • Preparation for major competitions • To score higher marks from the judges • To improve performance / be better • Others are taking drugs / widespread misuse • Consequences not severe enough / won't get caught • Pressure from coach / peers / society • Lack of education / understanding about the dangers
<p>Guidance</p> <p>Use highlighter to identify overload, progression and reversibility</p> <p>Use KU for knowledge of principles of training</p> <p>Use EG for practical examples related to gymnast's training programme</p> <p>Use DEV for knowledge of use of beta blockers</p>	<p>Do not credit: knowledge that is not relevant to the question, e.g. side-effects and illegal status of beta blockers OR other principles of training not listed in OCR's syllabus, i.e. tedium – Use SEEN, not IRRL</p> <p>If SMART described use IRRL once at end of paragraph</p> <p>All annotations must be in the left-hand margin, not in the body of the text</p> <p>L1, L2 or L3 must be stamped at the end of the answer</p>

Question			Answer	Mark	Guidance
22	(a)		<p>Two marks for:</p> <p>1. (Protection) Bones help to protect vital organs E.g. Cranium protects the brain in rugby OR ribs protect the lungs during collisions / impact / tackles in rugby</p> <p>2. (Movement) Bones provide a surface for muscles / tendons to attach to OR provide lever systems OR muscles pull bones when they contract OR has joints that allow the body to move E.g. elbow joint moves to throw a ball in rounders</p>	<p>2</p> <p>(AO2)</p>	<p>Description and example required for each mark.</p> <p>If no suitable examples then no marks.</p> <p>Needs specific bone protecting specific organ in e.g. for pt 1</p> <p>Elbow joint moves to throw a ball in rounders = ✓ (description and example given in one sentence) BUT joint moves to throw a ball in rounders = TV</p> <p>Specific joint movement or named muscle pulling specific bones is required in e.g. for pt 2</p> <p>Triceps contracts to move the arm (bones) to do a football throw-in = ✓</p>
	(b)	(i)	<p>One marks for (Mark 1st answer only):</p> <p><u>Quadriceps</u> (or one of: rectus femoris, vastus medialis, vastus lateralis, vastus intermedius)</p>	<p>1</p> <p>(AO1)</p>	<p>Do not accept:</p> <p>Quads</p>
		(ii)	<p>Two marks for:</p> <p>1. (muscles work together as) an antagonistic pair / antagonistically</p> <p>2. <u>quadriceps</u> is prime mover / agonist</p> <p>3. <u>hamstrings</u> relax / is antagonist</p>	<p>2</p> <p>(AO3)</p>	<p>Do not accept:</p> <p>Muscles work in pairs (in question)</p> <p>Quadriceps contract (has already been credited in (i))</p> <p>Hamstrings extend = TV</p> <p>Can score pt 1 even if pts 2 and 3 are wrong way round</p> <p>No marks for describing knee flexion phase</p>
		(iii)	<p>Two marks for (Mark 1st 2 answers only):</p> <p>1. <u>Femur</u></p> <p>2. <u>Pelvis / pelvic girdle / ilium</u></p>	<p>2</p> <p>(AO1)</p>	

	(c)	<p>Three marks from:</p> <ol style="list-style-type: none"> 1. <u>First /1st class</u> lever OR <u>class 1</u> lever. 2. Fulcrum in middle / EFL / LFE 3. <u>effort, fulcrum and load OR load, fulcrum and effort</u> (in correct order) 4. Effort and load arrows <u>both</u> point downwards. 	<p>3 (AO3)</p>	<p>Sub-max 1 mark if no diagram (use S for sub-max)</p>  <p>Pt 2 – place tick under fulcrum Pt 3 – place tick under 3rd correct name, i.e. load Pt 4 – place tick by arrow on right Accept: resistance for load (as in 2018) Do not accept: force for effort If either arrow point upwards = X No credit for 1 2 3 F L E = SEEN</p>
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Question			Answer	Mark	Guidance																		
23	(a)		Five marks from: 1. Lower <u>resting</u> heart rate 2. <u>Bradycardia</u> 3. The heart becomes bigger / larger / (cardiac) hypertrophy 4. The heart becomes stronger / stronger contractions 5. Increase in stroke volume / more blood pumped from the heart in one beat 6. Increase in cardiac output / volume of blood ejected from left ventricle in one minute 7. (Increase in) capillarisation (of heart) 8. Reduce risk of heart attacks / cardiac arrest / angina / CHD	5 (AO2)	Do not accept: Adaptations to blood, e.g. more red blood cells Reduced risk of strokes (vascular and brain, not heart) = TV Lower blood pressure = TV (vascular) Healthier heart = TV Pump blood faster = TV Lower heart rate = TV Heart/walls get thicker = TV																		
	(b)	(i)	Four marks from: <table border="1"><thead><tr><th></th><th>Pulmonary artery</th><th>Pulmonary vein</th></tr></thead><tbody><tr><td>1.</td><td>Carries <u>deoxygenated</u> blood</td><td>Carries <u>oxygenated</u> blood</td></tr><tr><td>2.</td><td>to the lungs</td><td>from the lungs / back to the heart</td></tr><tr><td>3.</td><td>From <u>right ventricle</u></td><td>To <u>left atrium</u></td></tr><tr><td>4.</td><td>Carry <u>blood</u> at high pressure</td><td>Carry <u>blood</u> at low pressure</td></tr><tr><td>5.</td><td>Thick (walls) / small lumen</td><td>Thin (walls) / large lumen</td></tr></tbody></table>		Pulmonary artery	Pulmonary vein	1.	Carries <u>deoxygenated</u> blood	Carries <u>oxygenated</u> blood	2.	to the lungs	from the lungs / back to the heart	3.	From <u>right ventricle</u>	To <u>left atrium</u>	4.	Carry <u>blood</u> at high pressure	Carry <u>blood</u> at low pressure	5.	Thick (walls) / small lumen	Thin (walls) / large lumen	4 (AO1)	Responses must compare differences for each mark. Reference to valves = TV Speed of blood = TV Use <u>highlighter</u> for one side correct, tick when 2nd part is seen If comparison between veins and arteries is done, credit if points are correct (can only hit pts 4 and 5) Accept comparative terms, e.g. thicker
	Pulmonary artery	Pulmonary vein																					
1.	Carries <u>deoxygenated</u> blood	Carries <u>oxygenated</u> blood																					
2.	to the lungs	from the lungs / back to the heart																					
3.	From <u>right ventricle</u>	To <u>left atrium</u>																					
4.	Carry <u>blood</u> at high pressure	Carry <u>blood</u> at low pressure																					
5.	Thick (walls) / small lumen	Thin (walls) / large lumen																					
		(ii)	One mark for (Mark 1st answer only) : <u>Vena cava</u>	1 (AO1)																			

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