



# **Mark Scheme (Results)**

Summer 2018

Pearson Edexcel GCE  
In Physical Education (8PE0/01)  
Component 1: Scientific Principles of  
Physical Education

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## General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Additional guidance	Mark
Q1(a)	Newton's 1 <sup>st</sup> Law (Law of Inertia) states that "a body continues in a state of rest or uniform velocity unless acted upon by an external force".	Candidates must use the word force in order to gain the mark.	(1)

Question Number	Answer	Additional guidance	Mark
Q1(b)	When the footballer applies force to the ball (with his foot), it moves.	Need to mention applying force to the ball	(1)

Question Number	Answer	Additional guidance	Mark
Q1(c)	<ul style="list-style-type: none"> <li>• Hamstrings and quadriceps act as an antagonistic pair</li> <li>• The hamstring (agonist) contracts concentrically / shortens</li> <li>• The quadriceps (antagonist) relaxes / lengthens</li> <li>• Causing flexion at the knee</li> </ul>	<p>Question specifically asks about preparation phase at the knee so no marks for action or recovery phase or other joint movement.</p> <p>Candidates have to name the muscle groups to get the mark for antagonistic pair.</p> <p>No mark for bending at the knee.</p>	(3)

Question Number	Answer	Additional guidance	Mark
Q2(a)	<ul style="list-style-type: none"> <li>• <math>68\text{kg} \times 9.81\text{N} =</math></li> <li>• <math>667(.08)\text{ Newtons} / \text{N}</math></li> </ul>	<p>1 mark for correct formula (must use 9.81N)</p> <p>1 mark for correct value without units for inferred use of formula</p> <p>2 marks for correct answer <b>with units</b></p>	(2)

Question Number	Answer	Additional guidance	Mark
Q2(b)	<ul style="list-style-type: none"> <li>The basketball pushes down on the ground with more force</li> <li>The ground pushes back with equal force (ground reaction) forcing them upwards</li> </ul>	Also accept <ul style="list-style-type: none"> <li>The basketball player applies a force on the ball with his hand</li> <li>And the ball applies an equal and opposite force on the ball</li> </ul> No marks for stating Newton's Law	(2)

Question Number	Answer	Additional guidance	Mark
Q3a	<ul style="list-style-type: none"> <li>A muscle which aids the action of a prime mover</li> <li>A muscle that acts to stabilise the joint at which the prime mover acts</li> </ul>		(1)

Question Number	Answer	Additional guidance	Mark
Q3b	<ul style="list-style-type: none"> <li>A muscle which allows the prime mover to work more efficiently</li> <li>A muscles that stabilises the bone where the prime mover originates</li> </ul>	Reference must be made to the prime mover.	(1)

Question Number	Answer	Additional guidance	Mark
Q4(a)	<ul style="list-style-type: none"> <li>Bradycardia is a heart rate of 60 bpm (or below)</li> </ul>		(1)

Question Number	Answer	Additional guidance	Mark
Q4(b)	<ul style="list-style-type: none"> <li>• Long-term aerobic training <b>causes</b> cardiac hypertrophy</li> <li>• Muscular walls of the heart increase in thickness <b>producing</b> a more powerful contraction</li> <li>• Increase in heart size (left ventricle) <b>causes</b> an increase in stroke volume (SV) / cardiac output(Q)</li> <li>• Increase in stroke volume (SV) / more forceful contraction <b>means</b> the same amount of blood can be supplied with less beats of the heart</li> <li>• Increased end diastolic volume <b>results</b> in more powerful contraction of the heart</li> </ul>	<p>Points need to be linked explanations to be awarded a mark. Some points could have multiple links.</p>	<b>(3)</b>

Question Number	Answer	Additional guidance	Mark
Q5	<ul style="list-style-type: none"> <li>• The SA node is the pacemaker of the heart / electrical impulses are sent from the SA node</li> <li>• The impulse from the SA node causes the atria to contract</li> <li>• Atrial contraction pushes blood into the ventricles</li> <li>• The electric signal arrives at the AV node which is located between the two atria</li> <li>• There is a short delay in the signal at the AV node</li> <li>• The impulse from the AV node causes the ventricles to contract</li> </ul>	<p>Marks can be awarded for</p> <ul style="list-style-type: none"> <li>• The impulse from the AV node travels through the bundle of His</li> <li>• The impulse travels along the left and right bundle branches and through the Purkinje fibres</li> </ul>	<b>(5)</b>

Question Number	Answer	Additional guidance	Mark
Q6	<ol style="list-style-type: none"> <li>1. The pulmonary vein empties oxygenated blood from the lungs into the left atrium of the heart</li> <li>2. (The left atrium contracts) blood flows from the left atrium into the left ventricle</li> <li>3. Blood flows (from the atrium to the ventricle) through the open mitral / bicuspid/AV valve</li> <li>4. When the ventricle is full, the mitral /bicuspid/ AV valve closes preventing blood from flowing backward into the atrium</li> <li>5. The left ventricle contracts and forces blood into the aorta which distributes oxygenated blood to all parts of the body</li> <li>6. Deoxygenated blood from the body enters the heart through the inferior and superior vena cava, into the right atrium of the heart</li> <li>7. (The right atrium contracts) blood flows from the right atrium into the right ventricle</li> <li>8. Blood flows (into the right ventricle) through the open tricuspid / AV valve</li> <li>9. When the right ventricle is full, the tricuspid / AV valve shuts. This prevents blood from flowing backward into the atria while the right ventricle contracts</li> <li>10. As the right ventricle contracts, blood flows into the pulmonary artery and to the lungs where it is oxygenated</li> </ol>	<p>Order of the bullet points does not affect marking</p> <p>Valves need to be correctly named to gain credit.</p> <p>Candidates are expected to identify three stages of both the left and the right side of the heart. These are blood entering the heart, blood moving between the ventricles and blood leaving the ventricles.</p> <p>They are expected to accurately name the structures involved in these processes.</p>	(6)

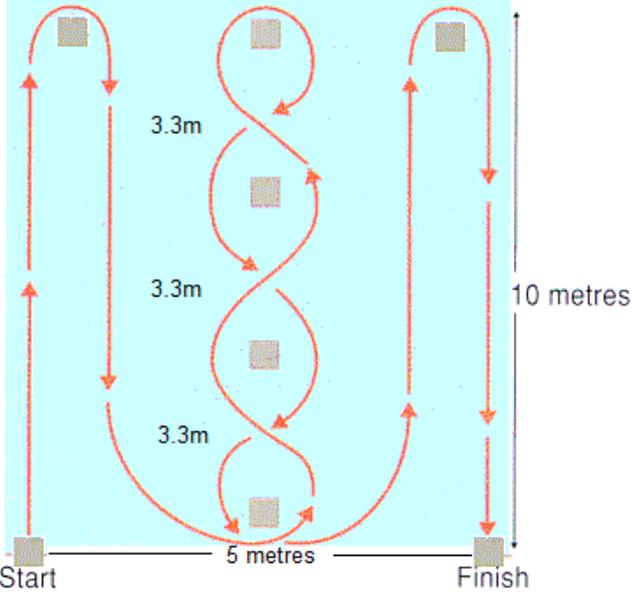
Question Number	Answer	Additional guidance	Mark
Q07a	i) A= Vital Capacity ii) B= Tidal Volume iii) C= Inspiratory reserve volume iv) D- Expiratory reserve volume v) E – Residual volume	These are the only acceptable answers	(5)

Question Number	Answer	Additional guidance	Mark
Q07b	i) Functional residual capacity is the amount of air remaining in the lungs after a normal expiration (FRC = RV + ERV). ii) Total lung capacity is the maximum amount of air that can fill the lungs (TLC = TV + IRV + ERV + RV). (TLC =VC + RV).	Accept either description of formula. TLC is the amount of air <i>in</i> the lung at the end of maximal breath in and not the maximal amount of air that can be breathed in. The maximum amount of air that can be breathed in does not account for the residual volume.	(2)

Question Number	Indicative Content		
Q8	<p><b>AO1 = 4 AO3 =8</b></p> <p><b>Students who only show achievement against AO1 will not be able to gain marks beyond Level 1.</b></p> <p><b>Reward acceptable answers. Responses may include, but are not limited to the following.</b></p> <p>A discussion that gives all sides of the issue and any implications, including details about how and why adaptations occur that includes the following indicative content:</p> <ul style="list-style-type: none"> <li>• Hypertrophy of the muscle /increased muscle mass(AO1)</li> <li>• Leads to increased strength of skeletal muscle (AO3)</li> <li>• Increased stores of ATP/PC (AO1)</li> <li>• leads to increased anaerobic energy production / increased anaerobic capacity (AO3)</li> <li>• Greater levels of anaerobic enzymes present (AO1)</li> <li>• Speeds up rate of anaerobic energy production (AO3)</li> <li>• Leading to an increased rate of glycolysis (AO3)</li> <li>• increased tolerance to hydrogen ions through buffering (AO1)</li> </ul> <p>The indicative content is a guide to the responses candidate may give. Other valid responses which answer the question correctly can be credited as appropriate.</p> <p>The candidate's response must be read in conjunction with the level descriptor below in order to give the appropriate mark. For example, a response that is firmly in the level would receive the middle mark in the level, a response that is just into the level would receive the bottom mark in the level, a response which nearly reaches the next level would receive the top mark in the level preceding it.</p>		<b>(12)</b>
Level	Mark	Level descriptor	
0	0	<ul style="list-style-type: none"> <li>• No rewardable content</li> </ul>	
1	<b>1-3</b>	<ul style="list-style-type: none"> <li>• Limited understanding of the factors that underpin performance and involvement in physical activity and sport. This is communicated in a basic way with simple or generalised statements (AO1).</li> <li>• Limited analysis of the factors that underpin performance and involvement in physical activity and sport (AO3).</li> <li>• Analysis is not used to make a judgement (AO3).</li> </ul>	

2	<b>4-6</b>	<ul style="list-style-type: none"> <li>• Attempts some understanding of the factors that underpin performance and involvement in physical activity and sport and expresses ideas with some clarity (AO1).</li> <li>• Attempts some analysis of the factors that underpin performance and involvement in physical activity and sport (AO3).</li> <li>• Analysis may not be used to make a clear judgement (AO3)</li> <li>•</li> </ul>
3	<b>7-9</b>	<ul style="list-style-type: none"> <li>• Evidence of some understanding of the factors that underpin performance and involvement in physical activity and sport. Communicated in a logical writing structure (AO1).</li> <li>• Good analysis of the factors that underpin performance and involvement in physical activity and sport (AO3).</li> <li>• Uses analysis to make a judgement but without full substantiation (AO3)</li> <li>•</li> </ul>
4	<b>10-12</b>	<ul style="list-style-type: none"> <li>• Comprehensive understanding of the factors that underpin performance and involvement in physical activity and sport. Communicated in a logical, clear writing structure (AO1).</li> <li>• Comprehensive analysis of the factors that underpin performance and involvement in physical activity and sport (AO3).</li> <li>• Uses analysis to make a clear judgement and supports this with examples (AO3).</li> </ul>

## Section B

Question Number	Answer	Additional guidance	Mark
Q9(a)	<ul style="list-style-type: none"> <li>This test requires the athlete to run the red line route in the diagram below as fast as possible.</li> </ul>  <ul style="list-style-type: none"> <li>The athlete <a href="#">warms up</a> for 10 minutes</li> <li>The assistance sets up the course as detailed in the diagram</li> <li>The athlete lies face down on the floor at the "Start" cone</li> <li>The assistant gives the command "GO" and starts the stopwatch.</li> <li>The athlete jumps to his/her feet and negotiates the course around the cones following the red line route shown in the diagram to the finish</li> <li>The assistant stops the stopwatch and records the time when the athlete passes the "Finish" cone</li> </ul>	Accept diagram correctly labelled or description	<b>(4)</b>

Question Number	Answer	Additional guidance	Mark
Q9 (b)	<ul style="list-style-type: none"> <li>• Level of motivation</li> <li>• Intensity and duration of warm-up</li> <li>• Accuracy of timekeepers including their reaction time</li> <li>• Time of day</li> <li>• Is the athlete actually applying maximum effort?</li> <li>• The amount of sleep the athlete had prior to testing</li> <li>• The athlete's prior test knowledge/experience</li> <li>• The weather</li> <li>• Surface completed on</li> <li>• Accurate measurement of distance between cones</li> <li>• Footwear</li> </ul>		<b>(4)</b>

Question Number	Answer	Additional guidance	Mark
Q10(a)	Standing Long Jump 30m Acceleration Sprint	1 mark max	(1)

Question Number	Answer	Additional guidance	Mark
Q10(b)	<p><b>Standing long jump</b></p> <ul style="list-style-type: none"> <li>An improvement in score in her standing long jump would mean there was more elastic strength in her legs</li> <li>This would allow her to take more powerful strides and cover the ground in a faster time/get a better drive out of the blocks</li> </ul> <p><b>30m acceleration sprint</b></p> <ul style="list-style-type: none"> <li>an improvement in her 30m acceleration sprint would mean that she would be able to get to maximum speed quicker out of the blocks</li> <li>This would allow her to get off to the best possible start</li> </ul>	<p>DO NOT accept</p> <ul style="list-style-type: none"> <li>Run faster</li> <li>More chance of winning without an explanation of why</li> <li>Answer MUST be linked to the answer in part a</li> <li>Select the appropriate two bullet points as the follow through from part a</li> </ul>	(2)

Question Number	Answer			Additional guidance	Mark
Q10 (c)	<b>Method of training</b>	<b>Explanation</b>	<b>Impact</b>	<p>1 mark is given for the explanation if it is linked to the impact, which also receives one mark. Candidates either receive 2 marks or 0 for each training method.</p> <p>No marks for just naming methods of trainings.</p> <p>Fartlek is an adapted form of continuous training, not suitable for 100m sprinter.</p>	
	Plyometrics	Increased rate of force development / power	improved stride length		
	Weight training	Increased strength	Improved stride length/ driving out of the blocks		
	Resistance training	Increased strength	increased stride length		
	Assisted training	Increased muscle fibre recruitment	increased leg cadence / leg speed		
	Circuit training	Increased strength / power	will increase stride length		
	SAQ	Increased fibre recruitment / co-ordination  Increased reaction time	increased leg cadence / speed  increased speed out of the block		
	Interval training (anaerobic)	Increase anaerobic energy	Improve speed		

**(6)**

Question Number	Answer	Additional guidance	Mark
Q11	<ul style="list-style-type: none"> <li>• Increased frequency can lead to progressive overload <b>by</b> changing training from (2 times per week to 4 times per week) over a period of (2 months)</li> <li>• Increased intensity can lead to progressive overload <b>by</b> changing training from (60% max to 75% max) over a period of (8 weeks)</li> <li>• Increased time can lead to progressive overload <b>by</b> changing training from (30 mins per session to 45 mins per session) over a period of (4 weeks)</li> </ul>	<p>Two marks for each stated principle with a linked explanation of the principle and how it can be changed.</p> <p>No marks for a principle without an explanation.</p>	(4)

Question Number	Answer	Additional guidance	Mark
Q12(a)	<ul style="list-style-type: none"> <li>• <math>\{(Max\ HR - resting\ HR) \times \% \text{ intensity}\} + resting\ HR</math></li> <li>• <math>Min = 172 - 72 = 100</math> <math>100 \times 50\% = 50</math> <math>50 + 72 = 122\text{bpm}</math></li> <li>• <math>Max = (172 - 72) = 100</math> <math>= 172 - 72 = 100 \times 85\%</math> <math>= 85 + 72 = 157\text{bpm}</math></li> <li>• Training zone = 122 to 157 bpm</li> </ul>	<p>1 mark for correct formula 1 mark for minimum HR 1 mark for max HR 1 mark for correct training zone</p> <p>Accept values of min 50% and max 85%</p>	<b>(4)</b>

Question Number	Indicative Content		
Q12(b)	<p><b>AO1 = 4 marks, AO3 = 4 marks</b>  <b>Students who only show achievement against AO1 will not be able to gain marks beyond Level 1.</b></p> <p><b>Reward acceptable answers. Responses may include, but are not limited to the following.</b></p> <p>A discussion that gives all sides of the issue and any implications, including details about how and why continuous training would be best to improve sub-maximal aerobic fitness, that includes the following indicative content:</p> <ul style="list-style-type: none"> <li>• Continuous training is any type of physical training that involves activity without rest (AO1)</li> <li>• It can be done at different intensities allowing the athlete to work at the right intensity to get in their training zone (AO3)</li> <li>• It is usually performed at sub-max intensity over a long duration (AO1)</li> <li>• Can use a variety of activities e.g. running, cycling, swimming to avoid tedium (AO1)</li> </ul> <p>As a result of continuous training:</p> <ul style="list-style-type: none"> <li>• Resting heart rate will decrease (AO1)</li> <li>• Stroke volume will increase (AO1) due to an increase in left ventricular size (AO3)</li> <li>• Cardiac output is increased (AO1) due to an increase in left ventricular size (AO3)</li> <li>• Lactate threshold is increased (AO1) due to an increase in mitochondria (AO3)</li> <li>• Continuous training is more effective at improving sub-maximal aerobic fitness than interval training (AO3)</li> </ul> <p>The indicative content is a guide to the responses candidate may give. Other valid responses which answer the question correctly can be credited as appropriate.</p> <p>The candidate's response must be read in conjunction with the level descriptor below in order to give the appropriate mark. For example, a response that is firmly in the level would receive the middle mark in the level, a response that is just into the level would receive the bottom mark in the level, a response which nearly reaches the next level would receive the top mark in the level preceding it.</p>		<b>(8)</b>
Level	Mark	Level descriptor	
0	0	<ul style="list-style-type: none"> <li>• No rewardable content</li> </ul>	
1	1 - 2	<ul style="list-style-type: none"> <li>• Some accurate and relevant knowledge (AO1).</li> <li>• Simple or generalised statements supported by limited evidence (AO1).</li> <li>• Limited balancing of ideas against each other (AO3).</li> <li>• Limited evaluative statement (AO3).</li> </ul>	
2	3 - 5	<ul style="list-style-type: none"> <li>• A good level of accurate and relevant knowledge (AO1).</li> </ul>	

		<ul style="list-style-type: none"> <li>• A line of reasoning is presented and supported by some evidence (AO1).</li> <li>• Examines a wide range of ideas, balancing ideas against each (AO3).</li> <li>• An evaluative statement which is relevant (AO3).</li> </ul>
3	6 - 8	<ul style="list-style-type: none"> <li>• A high level of accurate and relevant knowledge (AO1).</li> <li>• Articulates a clear viewpoint with clarity and precision which is well substantiated (AO1).</li> <li>• Critically examines a wide range of issues balancing ideas against each other (AO3).</li> <li>• Clear evaluative statement which is thorough and focussed (AO3).</li> </ul>

Question Number	Indicative content		Mark
Q13	<p><b>AO1 = 4 marks, AO3 = 8 marks</b>  <b>Students who only show achievement against AO1 will not be able to gain marks beyond Level 1.</b></p> <p><b>Students who only draw their answer from one area of study will not be able to gain marks beyond Level 3</b></p> <p><b>Reward acceptable answers. Responses may include, but are not limited to the following.</b>  A discussion that gives all sides of the issue and any implications, including details about how and why the strategies would be beneficial that includes the following indicative content:</p> <p>Dietary manipulation / Optimal Weight</p> <p>Use of supplementation</p> <p>Use of technology to monitor fitness levels</p> <p>Use of periodisation</p> <p>Altitude training</p> <p>Warm weather training</p> <p>Familiarisation to the venue</p> <p>Tactical development</p> <p>Psychological skills training</p> <p>The indicative content is a guide to the responses candidate may give. Other valid responses which answer the question correctly can be credited as appropriate.</p> <p>The candidate's response must be read in conjunction with the level descriptor below in order to give the appropriate mark. For example, a response that is firmly in the level would receive the middle mark in the level, a response that is just into the level would receive the bottom mark in the level, a response which nearly reaches the next level would receive the top mark in the level preceding it.</p>		<b>(12)</b>
Level	Mark	Level descriptor	
0	0	<ul style="list-style-type: none"> <li>• No rewardable content</li> </ul>	
1	1 – 3	<ul style="list-style-type: none"> <li>• Limited understanding of the factors that underpin performance and involvement in physical activity and sport. This is communicated in a basic way with simple or generalised statements (AO1).</li> <li>• Limited analysis of the factors that underpin performance and involvement in physical activity and sport (AO3).</li> <li>• Analysis is not used to make a judgement (AO3).</li> </ul>	
2	4 – 6	<ul style="list-style-type: none"> <li>• Attempts some understanding of the factors that underpin performance and involvement in physical</li> </ul>	

		<p>activity and sport and expresses ideas with some clarity (AO1).</p> <ul style="list-style-type: none"> <li>• Attempts some analysis of the factors that underpin performance and involvement in physical activity and sport (AO3).</li> <li>• Analysis may not be used to make a clear judgement (AO3)</li> </ul>
3	7 - 9	<ul style="list-style-type: none"> <li>• Evidence of some understanding of the factors that underpin performance and involvement in physical activity and sport. Communicated in a logical writing structure (AO1).</li> <li>• Good analysis of the factors that underpin performance and involvement in physical activity and sport (AO3).</li> <li>• Uses analysis to make a judgement but without full substantiation (AO3)</li> </ul>
4	10 - 12	<ul style="list-style-type: none"> <li>• Comprehensive understanding of the factors that underpin performance and involvement in physical activity and sport. Communicated in a logical, clear writing structure (AO1).</li> <li>• Comprehensive analysis of the factors that underpin performance and involvement in physical activity and sport (AO3).</li> <li>• Uses analysis to make a clear judgement and supports this with examples (AO3).</li> </ul>