



Mark Scheme (Results)

Summer 2017

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.
- Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:
 - i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear
 - ii) select and use a form and style of writing appropriate to purpose and to complex subject matter
 - iii) organise information clearly and coherently, using specialist vocabulary when appropriate.

Question Number	Answer	Additional Guidance	Mark
1	The <u>muscle</u> that is <u>directly responsible for creating the movement</u> produced at a joint	No mark for agonist alone.	(1)

Question Number	Answer	Additional Guidance	Mark
2	Any two from Plantar Flexion, Dorsi Flexion, Eversion and Inversion	- Correct spellings only -Only the first two answers will be marked	(2)

Question Number	Answer	Additional Guidance	Mark
3	<ul style="list-style-type: none"> Concentric contractions involve the muscle shortening while contracting, as happens in the bicep brachii during the upward phase of a bicep curl, or in the tricep brachii during the upward phase of a push up. Eccentric contraction, involves the muscle lengthening while contracting (remember a muscle is not always relaxing while lengthening) e.g. the bicep brachii in the downward phase of the bicep curl or tricep brachii in the downward phase of the press up. 	-If no practical examples are used then no marks can be awarded. -One mark for the explanation and one for the example, as long as the example is present. -Correct muscle terms must be used e.g. Bicep Brachii not Biceps. -The hamstring group, or the quadricep group are acceptable, but if the word group is not used then no mark is awarded. -The muscle group used in the example must be identified. -Additional lengthening is OK for eccentric contraction	(4)

Question Number	Indicative Content	
4 A01 = 3 marks A03 = 3 marks	<p>Students who only show achievement against AO1 will not be able to gain marks beyond Level 1.</p> <p>Answers in bullet points are not sustained responses and therefore will only score a maximum of band one</p> <p>Reward acceptable answers. Responses may include, but are not limited to the following:</p> <ul style="list-style-type: none"> • The pivot is at the elbow and the forearm acts as the lever arm. The biceps muscle provides the effort (force) and bends the forearm against the weight of the forearm and any weight that the hand might be holding. (AO1) • The load is further away from the pivot than the effort. <p>There is no mechanical advantage because the effort is greater than the load. However this disadvantage is compensated with a larger movement – a small contraction of the biceps brachii produces a large movement of the forearm. This type of lever system also gives us the advantage of a much greater speed of movement. (AO3)</p> <ul style="list-style-type: none"> • For example, the further it is between the fulcrum and the resistance the greater speed that can be generated. The greater distance between the effort and the fulcrum the less effort is required to move a resistance. In sport, rackets are often used to increase this length, which will increase the force that an object is struck with. (AO3) • Any suitable sporting examples will be accepted e.g. the advantage of throwing with a bent arm versus a straight arm. 	
Level	Mark	Descriptor
	0	No rewardable material.
1	1-2	<ul style="list-style-type: none"> • Some accurate and relevant knowledge (AO1) • Simple or generalised statements supported by limited evidence (AO1) • Limited balancing of ideas against each other (AO3) • Limited evaluative statement (AO3) <p>Basic description of load, effort, fulcrum</p>
2	3-4	<ul style="list-style-type: none"> • A good level of accurate and relevant knowledge (AO1) • A line of reasoning is presented and supported by some evidence (AO1) • Examines a wide range of ideas, balancing ideas against each other (AO3) • An evaluative statement which is relevant (AO3) • Technical application e.g. Biceps is the effort

3	5-6	<ul style="list-style-type: none"> • A high level of accurate and relevant knowledge (AO1) • Articulates a clear viewpoint with clarity and precision which is well substantiated (AO1) • Critically examines a wide range of issues balancing ideas against each other (AO3) • Clear evaluative statement which is thorough and focussed (AO3) <p>Needs to be applied and with some reasoning e.g. that's why a racket sport player has.....</p>
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Question Number	Answer	Additional Guidance	Mark
5	The point where all the mass of a body is concentrated (and the sum of all the moments of inertia of the body is zero).		(1)

Question Number	Answer	Additional Guidance	Mark
6A	<ul style="list-style-type: none"> • Newton's 2nd Law of Motion - force = mass x acceleration ($F = MA$) (1) • Player A: $F = 72 \times 2 = 144N$ (1) • Player B: $F = 57 \times 3 = 171N$ (1) • Resultant force of 27 N (1) 	<p>-Not all candidates will write Newton's second Law out in full, but marks can be awarded for the first point in the mark scheme if the calculations are correct</p> <p>-The last mark can only be awarded if correct units are included</p>	(4)
6B	Player B (1)	-Accept a (B) on its own	(1)

Question Number	Answer	Additional Guidance	Mark
7	<ul style="list-style-type: none"> • Stiffening of blood vessels • Blocking of blood vessels • Reduction in blood flow • Increase in blood pressure/ hypertension • Increase in heart rate • Increase in stroke volume • Heart has to contract more forcefully to do the same work/ is put under increased strain • Can lead to stroke/ heart attack or other CV diseases • Formation of blood clots/ Thrombosis 	<ul style="list-style-type: none"> • Points must link to the CV system. • Candidates may refer to unhealthy lifestyle choices such as smoking, drinking alcohol, but these are not worthy of marks. 	(4)

Question Number	Answer	Additional Guidance	Mark
8	<p>Any four linked responses needed</p> <ul style="list-style-type: none"> • Increased ATP stores enable greater power for contraction of muscles • High levels of PC stores enable the muscle to work at greater speed of muscle contraction / power. • A high level of PC stores enables the ATP-PC system to last longer. • Higher glycogen stores enable the athlete to maintain a high power output / speed for longer / energy. • Large motor neurons enable a faster speed of contraction. • Higher force production enables greater power output. • Higher level of anaerobic enzymes allows better energy production in the ATP-PC and glycolytic system. • They have a larger diameter/ size and therefore can produce more force/ power 	<p>-Points need to be linked explanations that link the characteristic to its effect</p> <p>-All points must link to power activities and not aerobic events, i.e. no converse points</p>	(4)

Question Number	Answer		Additional Guidance	Mark
9	Structural	Leads to functional	<ul style="list-style-type: none"> • Answers must be linked together for the functional mark to score • Answers must be relevant to the muscular system to be worthy of credit. • Examiners need to ensure structural and functional are correct 	(6)
	Increased myofibril hypertrophy / muscle mass increase fibre size	Leads to increased strength / power / force production of contraction		
	Increased levels of ATP and PC within the muscle	Athlete can exercise for longer before feeling effects of fatigue		
	Increased activity of enzymes responsible for breakdown of ATP and PC / more anaerobic enzymes	Faster breakdown of ATP and PC		
	Increased muscle elasticity	Increased ROM /reduction in injury risk		
	Increased anaerobic metabolism	Perform anaerobic exercise for longer		
	Increased capillary network	Better delivery of Oxygen/gas exchange		

Question Number	Indicative Content
10	AO2 = 4 marks, AO3 = 8 marks
	<p>Students who only draw their answer from one topic / area of study will not be able to gain marks beyond Level 3.</p> <p>Answers in bullet points are not sustained responses and therefore will only score a maximum of band one</p> <p>Reward acceptable answers. Responses may include, but are not limited to the following.</p> <p>Reference is made to there being a positive and a negative side to warming up (AO3)</p>

Positives:

A warm up should:

- increase heart rate and ventilation rates (AO2)
- increase body / local muscular temperature increases speed of energy production / metabolic rate (AO2)
- increase speed of O₂ delivery increases the rate of aerobic energy production / reducing use of anaerobic system (AO2)
- increased venous return helps to facilitate an increased speed of CO₂ / lactate removal (AO2)
- increased venous return increases cardiac output (AO2)
- synovial fluid production facilitates ROM / improves movement efficiency (AO2)
- initiates vascular shunting to ensure a greater O₂ delivery to working muscle (AO2)
- begins the process of thermo-regulation so preventing overheating (AO2)
- improves alertness / reaction times / ready to begin straight away (AO2)
- perform at a higher intensity for longer (AO2)
- Improve timing – increases skill level (AO2)
- allows opportunity to prepare mentally / increases confidence (AO2)
- faster nerve impulses when warm (AO2)
- Research suggests a warm-up to minimise impairments and enhance performance should be composed of a submaximal intensity aerobic activity followed by large amplitude dynamic stretching and then completed with sport-specific dynamic activities. Sports that necessitate a high degree of static flexibility should use short
- duration static stretches (AO3)

Negatives / Counter Arguments:

- Static stretching before performance can reduce power and strength if it is the only type of stretch done (AO3)
- The evidence for both static and dynamic stretching to reduce risk of injury is inconclusive (AO3)

Level	Mark	Descriptor
	0	No rewardable material.
1	1-3	<ul style="list-style-type: none"> • There are limited links between theory and practice. • Limited technical language supports isolated elements of knowledge and understanding (AO2) • Limited analysis of the factors that underpin performance and involvement in physical activity and sport (AO3) • Analysis is not used to make a judgement (AO3) <p>Basic statements not linked to effect on perf or v short</p>
2	4-6	<ul style="list-style-type: none"> • Makes few links between theory and practice. • Basic technical language supports some elements of knowledge and understanding (AO2) • Attempts some analysis of the factors that underpin performance • Analysis may not be used to make a clear judgement (AO3) • Some links to performance
3	7-9	<ul style="list-style-type: none"> • Makes some links between theory and practice. Some appropriate technical language supports a good knowledge and understanding • Good analysis of the factors that underpin performance and involvement in physical activity and sport (AO3) • Uses analysis to make a judgement but without full substantiation (AO3) • Uses the change resulting from the warm up to explain how performance improves
4	10 - 12	<ul style="list-style-type: none"> • Makes strong links between theory and practice. <p>Appropriate technical language supports a very good knowledge and understanding (AO2).</p> <ul style="list-style-type: none"> • Comprehensive analysis of the factors that underpin performance and involvement in physical activity and sport (AO3). • Uses analysis to make a clear judgement and supports this with examples (AO3). <p>-A valid counter argument -Positives and negatives -Draw from more than one topic of study</p>

Section B

Question Number	Answer	Additional Guidance	Mark
11(a)	Exercise economy is the energy required to maintain a constant velocity of movement	-Can accept Oxygen used in the place of the word energy, but this must be linked to a constant velocity	(1)

Question Number	Answer	Additional Guidance	Mark
11(b)	<ul style="list-style-type: none"> • For example, if two people running at the same speed (1) • One of them could be using less energy than the other because they are more economic. (1) 	-We are awarding one mark for the example and one mark for the correct application	(2)

Question Number	Answer	Additional Guidance	Mark
12	<ul style="list-style-type: none"> • Whey protein / protein shakes or drinks would aid an athlete in regaining protein to aid recovery with repair of tissues. • Creatine will assist the athlete in recovering the ATP-PC system. • Amino Acids / BCAAs (branched chain amino acids) to assist in the repair of muscles. • Energy bars / drinks / gels maximise the glycogen store. • Sports drinks (all variations) replenish electrolyte level. • Nitrates / beetroot juice / nitrous oxide deliver more oxygen to muscles to help recovery. • Cherry juice speeds up recovery from muscle damage. • Or any other suitable examples. 	<p>-Answers must link to recovery specifically, not preparation or performance. E.g creatine for energy stores not OK</p> <p>-Supplements should be things that do not form part of your normal diet e.g. protein is not a supplement, but a protein shake is</p> <p>-Herbal remedies are not accepted due to the lack of scientific support</p> <p>-Caffeine is not a recovery drink</p>	(4)

Question Number	Answer	Additional Guidance	Mark
13	<p>Effect of wearing compression garments during exercise:</p> <ul style="list-style-type: none"> • Compression effect creates a constant pressure on the working muscles, which creates a stimulatory effect on blood flow. • Increased blood flow / increased venous return helps feed the muscle with both oxygen and energy. • Speeds up the removal of waste products which has a positive impact on recovery / prevent lactate build up. • Assists thermoregulation because material wicks moisture away from the skin. • Insulates the body and therefore helps maintain localised temperature. • Reduces muscle vibration which can reduce injury. • Psychological / placebo effect therefore raises self- esteem /confidence. • Streamline / more aerodynamic so less resistance to performance. <p>Effect of wearing compression garments during recovery:</p> <ul style="list-style-type: none"> • Reduce the possibility of delayed onset muscle soreness / DOMS which will speed up recovery. • Less reduction in strength after muscle damaging activity. • Less reduction in power after muscle damaging activity. 	Marks awarded for linked points, the advantage must be linked to the effect on performance	(6)

Question Number	Answer	Additional Guidance	Mark
14	<ul style="list-style-type: none"> • Periodisation is the systematic planning of training to reach the best performance at an appropriate time. • Preparation phase includes both general and specific preparation. • The general preparation phase includes pre-season when athletes perform general conditioning, aerobic endurance training, mobility training. • The general preparation phase aims to give a base upon which to build. • Specific preparation phase aims to focus on training to prepare for competition. • Specific preparation phase training is more intense and specific to the activity than the general preparation phase. • Competition phase is when competition is happening, will include tapering. • Transition phase, which is bridging the gap between the season passed and the next training year, a period of active rest with some low intensity aerobic work. <p>Training can be split into cycles:</p> <ul style="list-style-type: none"> • Macrocycle is long term planning usually a year sometimes an Olympic cycle. • Mesocycle is a subunit of the macrocycle and usually lasts several weeks or months. • Microcycles are smaller cycles e.g. weekly. 	<p>-Macrocycle, Mesocycle and Microcycle cannot score points alone, candidate must demonstrate understanding of what they are</p>	(5)

Question Number	Answer	Additional Guidance	Mark
15	<ul style="list-style-type: none"> • Bungee running uses the recoil action of the bungee cord to pull you at a faster rate than you could achieve on the flat. • Downhill running enables you to achieve a faster rate than you could achieve on the flat. • Assisted training forces your muscles to work at a higher intensity than they normally would. • Assisted training forces the nerve cells that control movements and coordinate leg-muscle activity to work at a higher rate than they could achieve on the flat. • During very quick contractions muscles are trained to function at accelerated firing rates. 	-Points must be linked in order to gain a mark	(4)

Question Number	Answer	Additional Guidance	Mark
16	<ul style="list-style-type: none"> • The ability to successfully conduct this test requires the availability of steps of the appropriate height and with a clear run up area. • Accurate measuring of the height of the steps. • The accuracy of this test will be reduced if a stopwatch is used instead of timing mats for measurement of the time. • If using a stopwatch, you should have two people record simultaneously and use the average of the two measurements. • It is also important to give the subjects adequate practice so that they can confidently run up the stairs with maximum effort/ familiarity with the test • Whether the subject has performed an adequate warm up. • Whether the test is done inside or outside/ weather conditions 		(3)

Question Number	Indicative Content		
17	AO2 = 4 marks, AO3 = 4 marks		
	Level	Mark	Descriptor
		0	No rewardable material.
1	1-2		<p>Students who only draw their answer from one topic / area of study will not be able to gain marks beyond Level 3.</p> <p>Answers in bullet points are not sustained responses and therefore will only score a maximum of band one</p> <p>Reward acceptable answers. Responses may include, but are not limited to the following:</p> <ul style="list-style-type: none"> • Cross training is training in two or more sports or modes of exercise to improve fitness or performance in a main sport. (AO2) • Depending on the games being played - the central CV system will be involved in different exercise and therefore any gains will benefit across activities. (AO2) • Can provide a more all-round body work out. (AO2) • May not be specific enough for elite level performers. <ul style="list-style-type: none"> ◦ (AO3) • Depending on the sports there may be transfer of skill / tactical awareness. (AO3) • Variety of methods with cross training can reduce / enhance motivation. (AO2) • Provides opportunities for active recovery (AO2) • Cross training can be used during rehabilitation from injury. (AO2) • Cross training can be used to reduce the effect of impact forces from running based activities (AO2)

2	3-5	<ul style="list-style-type: none"> • Makes connections between theory and practice (AO2). • Applies a knowledge and understanding of factors that underpin performance and involvement in physical activity and sport (AO2) • Examines a wide range of ideas, balancing ideas against each other (AO3). • An evaluative statement which is relevant (AO3) • Can link why you are doing different training
3	6-8	<ul style="list-style-type: none"> • Makes many insightful and significant connections between theory and practice (AO2). • Applies an excellent knowledge and understanding of factors that underpin performance and involvement in physical activity and sport (AO2). • Critically examines a wide range of issues balancing ideas against each other (AO3) • Clear evaluative statement which is thorough and focused (AO3) • Assesses if it is useful or not

Question Number	Indicative Content
18	<p>AO1 = 4 marks, AO2 = 4 marks, AO3 = 4 marks</p> <p>Students who only show achievement against AO1 will not be able to gain marks beyond Level 1.</p> <p>Answers in bullet points are not sustained responses and therefore will only score a maximum of band one</p> <p>Reward acceptable answers. Responses may include, but are not limited to the following:</p> <ul style="list-style-type: none"> • All tests are suitable for predominantly aerobic activities. (AO3) • All the tests are tests of maximal aerobic fitness and involve running. (AO2) • All provide estimates of VO₂ max. (AO3) • None of the tests would be as suitable for sports that do not require running. (AO1) • Testing for VO₂ max can be expensive - field tests are cheaper and able to cope with multiple performers. (AO2) • All tests are relatively simple to set up and administer. (AO1) • Tests have well established normative tables (AO2). • The MSFT and Yo-Yo test require a change in direction, whereas the <ul style="list-style-type: none"> • Cooper test is a continuous run. (AO2) • The MSFT and Yo-Yo test are externally paced, whereas the Cooper test is self-paced. (AO2) • The MSFT and Cooper test have no rest within them, whereas the Yo-Yo test requires a break every 40 meters. (AO2) • Outcomes can depend on motivation levels / arousal; rely on maximal effort; and there are health issues around over-exertion (AO3) • Environmental conditions can influence them all (AO2) • Two different types of Yo-Yo test - studies suggest that the YYIET underestimates VO₂ when compared to treadmill test. YYIRT close to match performances for stop-go sports like hockey and football (AO3) • MSFT - studies vary as to accuracy. Some indicate performance (distance covered) more useful than the VO₂ measure (AO2) • The MSFT relies on observing protocols and sometimes athletes can continue but not at the speed required over the distance. (AO1)

Level	Mark	Descriptor
	0	No rewardable material.
1	1-3	<ul style="list-style-type: none"> 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 Limited links between theory and practice. Limited technical language supports isolated elements of knowledge and understanding (AO2). Analysis is not used to make a judgement (AO3). <p>Doesn't show they know what all the tests are</p>
2	4-6	<ul style="list-style-type: none"> Attempts some understanding of the factors that underpin performance and involvement in physical activity and sport and expresses ideas with some clarity (AO1) Makes few links between theory and practice. Basic technical language supports elements of knowledge and understanding (AO2). Analysis may not be used to make a clear judgement. (AO3) Compares the tests a bit and knows what they all are
3	7-9	<ul style="list-style-type: none"> Evidence of some understanding of the factors that underpin performance and involvement in physical activity and sport. Communicated in a logical writing structure (AO1). Makes some links between theory and practice. Some appropriate technical language supports a good knowledge and understanding (AO2). Uses analysis to make a judgement but without full substantiation (AO3). <ul style="list-style-type: none"> Has some analysis of which tests are good or not and why
4	10-12	<ul style="list-style-type: none"> Comprehensive understanding of the factors that underpin performance and involvement in physical activity and sport. Communicated in a logical, clear writing structure (AO1). Makes strong links between theory and practice. Appropriate technical language supports a very good knowledge and understanding (AO2). Needs differences and full understanding of the tests with positives and negatives Uses analysis to make a clear judgement and supports this with examples (AO3).

Total for Paper – 90 marks