



Cambridge IGCSE™

PHYSICAL EDUCATION

0413/13

Paper 1 Theory

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MARK SCHEME

Maximum Mark: 100

Published

This mark scheme contains the instructions and marking guidance that our examiners used to mark candidate responses for this component.

Before they start marking, examiners complete a standardisation process. They review a range of candidate responses and discuss the mark scheme in detail to agree which answers can and cannot be accepted. Examiners award marks where it is clear that candidate responses have met the requirements of the mark scheme. These requirements may vary between different components or different versions of the same component, depending on the exact requirements of the question and the candidate responses seen during the standardisation process.

Sometimes, our mark schemes may allow marks to be awarded to responses which contain elements that are factually incorrect or for content not covered by the syllabus. We do this in response to the demands of a specific question to support candidates and make sure that our assessments are fair. However, these allowances should not be used as a guide for teaching and learning.

We cannot discuss the mark scheme with schools, and we recommend that schools read the mark scheme together with the assessment material and the Principal Examiner Report for Teachers.

This document consists of **25** printed pages.

General marking principles

All examiners must apply these marking principles when marking candidate responses.

1	Examiners must award marks for each response in line with: - the specific content defined in the mark scheme - the specific skills defined in the mark scheme or in the level descriptions - the standard of response required as exemplified by the standardisation scripts.
2	Examiners must award whole marks (not half marks, or other fractions).
3	Examiners must award marks positively . This means that: - marks are not deducted for errors or omissions - marks are awarded for correct/valid answers as defined in the mark scheme and also for other valid answers which go beyond the scope of the syllabus and mark scheme referring to your team leader as appropriate - the quality of spelling, punctuation and grammar are judged only when the mark scheme indicates that these features are specifically assessed in the question. However, the meaning of all responses must be unambiguous.
4	Examiners must consistently apply the requirements of the mark scheme and any rules for what to do when candidates have not followed instructions correctly.
5	Examiners must use the full range of marks defined in the mark scheme, unless limited by the quality of the candidate responses seen.
6	Examiners must award marks according to the mark scheme and must not award marks with grade thresholds or grade descriptions in mind.

Science-Specific Marking Principles

1	Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly.
2	The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored.
3	Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g.. ethane / ethene, glucagon / glycogen, refraction / reflection).
4	The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted.
5	<u>'List rule' guidance</u> For questions that require <i>n</i> responses (e.g.. State two reasons ...): • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked <i>ignore</i> in the mark scheme should not count towards <i>n</i>. • Incorrect responses should not be awarded credit but will still count towards <i>n</i>. • Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should not be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response. • Non-contradictory responses after the first <i>n</i> responses may be ignored even if they include incorrect science.

6 Calculation specific guidance

Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'.

For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.

For answers given in standard form (e.g.. $a \times 10^n$) in which the convention of restricting the value of the coefficient (a) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.

Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.

7 Guidance for chemical equations

Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
	correct point or mark awarded
	incorrect point or mark not awarded
	benefit of the doubt given
	error carried forward applied
	point has been noted, but no credit has been given or blank page seen
	response is too vague or there is insufficient detail in response
	incomplete answer
	linked consideration of points
	linked consideration of points

Annotation	Meaning
REP	repetition in response
A	information missing or insufficient for credit
CON	contradiction in response, mark not awarded

Question	Answer	Marks	Guidance
1	1 mark for 1 aspect from each area of well-being. (physical) (1 mark max.) all body systems working well ; free from illness / injury / disease ; able to carry out everyday tasks ; (mental) (1 mark max.) able to cope with stress ; can control emotions; feeling good / self-esteem / confident / motivated ; (social) (1 mark max.) essential human needs are met ; friendship and support ; having value in society ; ability to mix with other people ; Accept alternative wording.	3	Having a healthy body – TV Being able to do activities without any problem – BOD for ‘able to carry out everyday tasks’ ‘able to relax’ BOD for ‘cope with stress’ ‘reduces anger / worry / fear’ BOD for ‘control emotions’ ‘make rational decisions’ BOD for ‘control emotions’ ‘feel happy / fight depression / release endorphins’ BOD for ‘feeling good’ ‘prevents feeling of isolation’ BOD for ‘mix with others’ OR ‘friendship’

Question	Answer	Marks	Guidance
2	1 mark for: heart rate $\times$ stroke volume ;	1	

Question	Answer	Marks	Guidance
3	2 marks for: introvert ; extrovert ;	2	Accept in any order. Accept other appropriate personality types – e.g. Type A / Type B

Question	Answer	Marks	Guidance
4(a)	2 marks for: (X) triceps ; (Y) biceps ;	2	
4(b)	2 marks for: (elbow) flexion ; (shoulder) extension ;	2	BOD abduction for shoulder.
4(c)(i)	1 mark for: isometric ;	1	
4(c)(ii)	2 marks for: eccentric ; the muscle gets longer (as it produces force) ;	2	If contraction is wrong – can still award mark for description. Isotonic alone – TV Isotonic eccentric ✓ Extends – TV

Question	Answer	Marks	Guidance
5(a)	1 mark for: skills are learnt / practised / sport-specific / more easily adapted AND abilities are innate / you are born with them / general / enduring / difficult to change ;	1	Need reference to both skill and ability for mark.

Question	Answer	Marks	Guidance
5(b)	1 mark for explaining the effect of each named factor. 3 marks from: (culture) where cultures have a traditional sporting activity, young people are more likely to develop skills in that particular activity so have a higher skill level / in some cultures there may not have been opportunities to develop skills due to restrictions on performances, e.g. females may not be able to swim in mixed sessions so may not have many opportunities to develop swimming skills so skill levels are lower ; (anxiety) if a performer has high anxiety, they may have low levels of skill / if a performer thinks that a skill is too difficult to learn / do, it may limit any improvement / if a performer suffers from anxiety, the coach may use relaxation techniques to reduce the anxiety and therefore help to improve the skill ; (teaching and coaching) high quality coaching in clubs may develop the skill level of performers (to an elite level) / children may not have specialised PE teachers in school which may limit the development of basic skills in some activities Accept other appropriate explanations.	3	Need to have reference to change in skill level to award a mark. BOD – need a certain amount of anxiety to perform skills well

Question	Answer	Marks	Guidance
5(c)	1 mark for each description. for example in gymnastics: (fluent) a performer is able to move from a handstand to a roll without hesitation / smoothly ; (consistent) a performer is able to perform a routine on the beam without falling and can repeat the performance ; (coordinated) a performer is able to use the arm and the legs at the same time to complete a cartwheel ;	3	Activity must be on accepted list. Description must be linked to named activity. Generic descriptions – TV If repeat characteristic in description – TV Accept ‘routine’ in gymnastics – otherwise need a named skill. Accept ‘can do most of the time’ for consistent. Need to identify 2 body parts in the movement, e.g., arms and legs working together. BOD – doing ... whilst doing ...

Question	Answer	Marks	Guidance
6(a)	2 marks for: static ; dynamic ;	2	Accept in any order.

Question	Answer	Marks	Guidance
6(b)	1 mark for: Standing Stork Test ; AND 3 marks from: subject stands on one leg (on toes) ; raises other foot to place it on the inside of the standing leg / subject stands with hands on hips ; timer stops when the standing foot moves / standing foot heel touches the floor / non-standing foot loses contact with knee / a hand comes off the hip ; some variants have eyes closed (e.g.. Blind Standing Stork Test) ; (the best time from 3 attempts is) compared to normative data tables ; Accept other recognised tests for balance.	4	If name of test is wrong – no marks for description (unless correct name is included in description) Stork test – TV Stork balance test – BOD Stork stand – BOD Hold position as long as possible – TV BOD – stop timing when falls BOD – measure time stood on one foot ‘lift one leg up and place on other knee’ – 2 marks (infers standing on one leg) Best from 3 attempts alone – TV Compare to norms / tables / other results – TV

Question	Answer	Marks	Guidance
6(c)	1 mark for each named component (2 marks max.). 1 mark for each explanation (2 marks max.). for example: agility ; needs to change direction quickly to perform a tumbling sequence in a floor routine ; cardiovascular endurance / stamina ; needs to perform movements continuously (for at least 90 seconds) during a floor routine (without getting tired) ; coordination ; needs to move the arms and legs / two body parts at the same time during the take-off in a vault ; flexibility: needs flexibility at the hips to perform the splits / have a range of motion at the joint to perform the splits ; muscular endurance: needs to repeat a series of jumps during a floor routine and achieve the same standard of performance ; power ; needs to produce strength quickly to be able to jump high enough to perform a somersault ; reaction time ; needs to be able to re-adjust their position on the beam quickly so as not to fall off ; speed ; needs to be able to run fast on the vault runway to be able to perform the vault successfully ; strength ; needs to be able to hold the bodyweight in a crucifix position on the rings ; Accept other appropriate explanations.	4	DNA balance – in Question Explanation must relate to gymnastics. To perform the splits alone – TV Explosive jump – BOD

Question	Answer	Marks	Guidance
6(d)	1 mark for each example. For example: (manual / mechanical) hold the gymnast's legs in a handstand / use of harness / use of springboard / use of waist-level rings ; (verbal) provide instructions on how to perform a cartwheel / tell the gymnast what to do when landing from a jump	2	Stunt / Trick – TV (need specific skill / movement named)

Question	Answer	Marks	Guidance										
7(a)	4 marks for: <table><tr><td></td><td>type of performance-enhancing drug (PED)</td></tr><tr><td>shot putters are more likely to use this type of drug than long distance runners.</td><td>anabolic steroids ;</td></tr><tr><td>sprinters may use this type of drug to get a better start in a race.</td><td>stimulants ;</td></tr><tr><td>golfers may use this type of drug because of its calming effect when putting.</td><td>beta blockers ;</td></tr><tr><td>some performers may use this type of drug to lose weight and get into a lower weight category.</td><td>diuretics ;</td></tr></table>		type of performance-enhancing drug (PED)	shot putters are more likely to use this type of drug than long distance runners.	anabolic steroids ;	sprinters may use this type of drug to get a better start in a race.	stimulants ;	golfers may use this type of drug because of its calming effect when putting.	beta blockers ;	some performers may use this type of drug to lose weight and get into a lower weight category.	diuretics ;	4	PEDs must be different BOD – steroids alone Accept stimulants for shot putters Accept anabolic steroids for sprinters
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7(b)	1 mark for: Blood ;	1	Accept other appropriate tests										

Question	Answer	Marks	Guidance
7(c)	3 marks from: ruined reputation / public humiliation ; monetary fines ; disqualification ; banned from competition ; loss of sponsorship ; negative media coverage ; loss of titles / medals ; Accept other disadvantages.	3	Disadvantages to performer. DNA reference to health / mental health – in Question BOD – ‘become a negative role model’ for ruined reputation. BOD – ‘results cancelled’ for loss of titles

Question	Answer	Marks	Guidance
8(a)(i)	1 mark for: (A) quadricep(s) (group) ;	1	Quads – TV Accept individual names of quadriceps muscles.
8(a)(ii)	1 mark for: (B) patella ;	1	Kneecap – TV
8(a)(iii)	2 marks for: (C) femur ; Long ;	2	

Question	Answer	Marks	Guidance
8(b)	1 mark for name of structure (3 marks max.). 1 mark for each description of a different function of each named component. (3 marks max.). (X) cartilage ; stops the bones knocking together / acts as a shock absorber / cushion / reduces friction ; (Y) ligament ; holds the bones together / keep bones in place ; (Z) synovial fluid ; acts as a lubricant / allows smooth movement / reduces wear / reduces friction / absorbs shock ;	6	Functions must be different. If name is wrong or TV – can still mark function (from diagram)
8(c)	1 mark for range of movement. 1 mark for a difference in stability. (range of movement) shoulder has a greater range of movement than the knee ; (stability) shoulder is less stable than the knee ;	2	Need reference to both joints for mark. (comparison) Accept inference – more / less Accept reverse e.g. knee has less movement than shoulder. Accept RoM: both knee and shoulder allow extension / flexion; only shoulder allows adduction / abduction / rotation / circumduction; both knee and shoulder movement is limited by ligaments; Stability: both knee and shoulder are held together by ligaments; knee has more / larger ligaments than the shoulder; knee has ligaments inside the joint, but shoulder does not;

Question	Answer	Marks	Guidance
9(a)(i)	1 mark from: plyometric training / weight training / circuit training / HIIT ;	1	
9(a)(ii)	1 mark for an advantage. 1 mark for a disadvantage. (plyometric training advantage) increases the force of muscle contractions / increases energy / provides explosive movements / aids weight loss ; (plyometric training disadvantage) greatly increases the possibilities of injury / places great stress on joints / can cause slow progress / need to have good technique / safe landing areas need to be provided ; (weight training advantage) easy to measure progress / muscle size increased / can be adapted to develop muscular endurance / can train specific muscles ; (weight training disadvantage) can be expensive as equipment / specialist equipment is needed / performers prone to injury / requires good technique to avoid injury / spotters needed for safety ; circuit training advantage) gives variety so does not get boring / easily adapted for different activities / fitness goals / can include skill stations / easy to overload ;	2	DNA increase power – in Question

Question	Answer	Marks	Guidance
9(a)(ii)	(circuit training disadvantage) requires a lot of time to set up / can require equipment / requires a lot of space / difficult to determine work:rest ratio ; (High-intensity interval training advantage) combines aerobic and anaerobic exercise / can be adapted for activities or fitness levels / specialist equipment not required ; (High-intensity interval training disadvantage) can become boring / difficult to undertake on your own / the high intensity nature of training can demotivate a performer / need to include rest periods / easy to over-train / can cause overuse injuries ; Accept other appropriate advantages / disadvantages.		
9(b)(i)	1 mark for naming the test. 1 mark for each part of a description of the test (3 marks max. per test) Vertical Jump Test ; AND 3 marks from: subject adjusts vertical jump board so that the lower edge touches fingertips when arms are extended overhead and if body fully stretched with feet flat on the floor ;	4	If name of test is X – no marks for description (unless name is included in description) If name of test is TV – can still mark description (3 marks max) Best score from 3 attempts alone – TV Compare to tables / norms / other results – TV
9(b)(i)	If a vertical jump board is not available subject stands sideways on to wall with feet flat and extends arm nearest wall upwards to make mark with chalk held in fingers ; subject bends knees and jumps as high as possible ; marking the board / wall at the highest point using chalk or eq. method ; measure the difference between the two marks ; (the best score from 3 attempts is recorded and) compared to normative data tables ; Accept other standardised tests.		

Question	Answer	Marks	Guidance
9(b)(ii)	4 marks for any 4 of: suitability of performers for different physical activities (a different distance / type of activity could be better for a performer) ; identifying strengths / weaknesses (identify areas of performance that need improvement) ; monitoring improvement / progression (after injury) / check for reversibility (ensure training is appropriate) ; able to make comparison to others (enables a coach to know when a performer is able to take part / inform positional choices / are they fit enough?) ; informing the design of a training programme / set targets / goals (the results might show a different type of training is needed) ; to identify a baseline fitness level / know current fitness level ; can prevent tedium / adds variety to training schedule ; (test as a source of) motivation ;	4	Test for fitness TV BOD – Test for fitness to know if ready for competition (for comparison point) DNA – to measure power Accept component of fitness once – knowing their level of performance DNA answers relating to mental fitness / health BOD talent identification for suitability
9(c)	2 marks for: anaerobic; glucose → lactic acid (+ energy / ATP) ; OR glucose is broken down in the absence of oxygen AND produces lactic acid ;	2	does not use oxygen / produces lactic acid tv Need – glucose / no oxygen / lactic acid for mark

Question	Answer	Marks	Guidance
10(a)	1 mark for: B (fulcrum / effort / resistance) ;	1	

Question	Answer	Marks	Guidance
10(b)	2 marks for: (A) second class ; (B) third class ;	2	

Question	Answer	Marks	Guidance
11(a)	3 marks for: financial support ; clothing / footwear ; equipment ; provision of specialist facilities ;	3	BOD products / food / drinks / car Brand sponsorship – TV BOD – living expenses for financial
11(b)	2 marks max. for advantages. 2 marks max. for disadvantages. advantages: any 2 from: provides additional income to help pay for daily living costs ; income covers costs for kit / equipment / access to kit / equipment ; income covers costs for travel / accommodation / competition fees ; income covers costs for / access to training facilities / medical support / sport-science support ; increases time to train as do not have to work (to earn money) ; free merchandise / free tickets (from sponsor) ; increases public awareness of the individual / gives opportunity to play at a higher level / increases awareness of national selectors etc. ; motivates the performer to play well ; creates role models ;	4	Gets income / money alone – TV

Question	Answer	Marks	Guidance
11(b)	disadvantages: any 2 from: a performer can become reliant on a particular sponsor, which could then pull out / sponsorship may be short term / any negative publicity may result in a loss of funding ; some sponsorship (for example, alcohol) gives a bad image of the performer ; the performer can be manipulated or exploited to suit the sponsor / the performer has additional commitments that might detract from training / sponsors may make demands ; loss of control, e.g. of own lifestyle / made to act in a certain way ; may have to use equipment / clothing from the sponsor that might not be the best / best suit them ; the sponsor might not be able to provide sufficient funds / equipment ; the athlete may not agree with the integrity of the company's business / loss of integrity ; increased pressure to succeed ; generous sponsorship is only available to the elite few ;		BOD – increased stress / anxiety for 'increased pressure to succeed'. BOD 'meet agreed targets from sponsor' for 'sponsors may make demands'
11(c)(i)	1 mark for: autonomous ;	1	'automatic' TV
11(c)(ii)	2 marks for any 2 of: able to perform the skill without conscious thought ; few mistakes made ; have consistent successful outcome ; able to adapt to different situations ; able to analyse own performance / develop the ability to understand intrinsic feedback ; able to link skills at pace / smoothly ;	2	Accept 'accurate' for 'make few mistakes'.

Question	Answer	Marks	Guidance
12	1 mark for each explanation. (wider media coverage) more coverage raises awareness of activities / online platforms allow booking of tickets and access to information about leisure activities / social media promotes sharing and discovery of new leisure activities / investment in creative marketing and branding has made leisure activities more appealing ; (better awareness of health benefits) the shift from manual labour to office jobs means people look for physical exercise in their leisure time / a shift towards health and wellness culture has increased participation in physical and mindful leisure activities / increased recognition of the importance of work-life balance has raised the status of leisure time ; (improvements in travel methods) more people own cars / increase in public transport / growth of tourism companies / cheaper overseas flights so are able to travel further to access leisure activities ; (reduced cost of equipment) cheaper equipment increased the variety of activities available ; Accept other appropriate explanations.	4	

Question	Answer	Marks	Guidance
13(a)	3 marks for: (X) trachea ; (Y) bronchus / bronchi ; (Z) bronchioles ;	3	

Question	Answer	Marks	Guidance
13(b)	1 mark for each characteristic. (3 marks max) 1 mark for each explanation. (3 marks max) 3 from: alveoli are surrounded by capillaries / good blood supply ; SO ensures that oxygen can be transferred into the blood / carbon dioxide removed from the blood ; alveoli walls are one cell thick ; SO there is a shorter distance for diffusion of oxygen and carbon dioxide so gas exchange is faster ; the walls of the alveoli contain elastic fibres ; SO this allows the alveoli to increase in surface area during inspiration ; walls of the alveoli are moist (lined with a film of water); SO allows gases to dissolve before diffusing through the cell walls ; large surface area / large number of alveoli ; SO more gas exchange can happen at the same time ;	6	'thin walls' – TV More efficient / easier – TV

Question	Answer	Marks	Guidance
14(a)	1 mark for: the desire required to be successful / a driving force that makes you do something / decide how much effort to put in ; Accept equivalent wording.	1	BOD 'an internal drive' DNA – intrinsic / extrinsic
14(b)	1 mark for identifying each type of motivation. 1 mark for each example: intrinsic ; extrinsic ; (intrinsic) desire to do the sport or activity for its own sake / feelings of satisfaction from doing the activity / wanting to beat personal best ; (extrinsic) praise from friends / family / coach / crowd / rewards / money / prizes / medals / trophies / fame / publicity ; Accept other appropriate examples.	4	BOD tangible for extrinsic. DNA internal / external If type is wrong – no mark for example. (int) self-talk / self-motivation – TV (ext.) coach / teammates / crowd encourage / crowd cheering – BOD

Question	Answer	Marks	Guidance
15	2 marks max. for naming factors. 2 marks max for appropriate explanation. 4 from: age ; as a person gets older, they generally take longer to recover ; level of fitness; a fitter person may recover faster / remove lactic acid quicker so recovery is quicker ; genetics; some people inherit characteristic that allow them to recover quicker ; intensity; the harder / longer a person exercises for the longer the period of recovery ; diet / hydration ; if performers do not stay hydrated so recovery is slower / if a performer does not eat the correct nutrients / at the right time will recover slower ;	4	Answers must include speed up or slow down recovery in the answer. Accept reverse statements / statements can be positive or negative. BOD – some drugs may speed up recovery DNA eat a balanced diet BOD eat a poor diet BOD – cool down or aspects of a cool down once only e.g. stretches / use of ice baths / massage BOD – injuries can take longer to recover Athlete v non athlete the athlete will recover faster due to the amount of training / physical activity = lifestyle

Question	Answer	Marks	Guidance
15	cool down ; a cool down will speed recovery as it helps remove lactic acid ; sleep; the better the quality and quantity of sleep so the recovery time usually reduces ; gender ; females who are physically fit have a greater resistance to fatigue than their male counterpart particularly at low to moderate intensities ; overtraining; can cause stress related injuries / muscles tire quickly so takes longer to recover ; environmental conditions; performing in extreme environmental conditions such a hot climate so cause a slower recovery ; taking drugs / drinking alcohol / smoking may result in a slower recovery time ; health / body weight of a performer is poor it may cause an increase in recovery time ; quality of protective equipment / running shoes puts less strain on joints which will aid recovery time ;		