Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICAL EDUCATION **0413/12**

Paper 1 Theory **October/November 2022**

MARK SCHEME

Maximum Mark: 100

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2022 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors 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	‘List rule’ guidance For questions that require ***n*** responses (e.g. State **two** reasons …): • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked *ignore* in the mark scheme should not count towards ***n***. • Incorrect responses should not be awarded credit but will still count towards ***n***. • 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 ***n*** 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.

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1</td><td>3 from:
shape / support;
protection;
muscle attachment for movement;
(red) blood (cell) production;

Accept other functions of the skeleton.</td><td>3</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(a)(i)</td><td>4 marks for 4 of:

<table>
<tr><th>arteries</th><th>veins</th></tr>
<tr><td>thick / muscular walls</td><td>thin walls;</td></tr>
<tr><td>narrow lumen</td><td>wide lumen;</td></tr>
<tr><td>no valves</td><td>has valves;</td></tr>
<tr><td>transport blood away from the heart</td><td>transport blood towards the heart;</td></tr>
<tr><td>high pressure</td><td>low pressure;</td></tr>
<tr><td>arteries generally carry oxygenated blood</td><td>veins generally carry deoxygenated blood;</td></tr>
</table>
Credit ref. to pulmonary artery carrying deoxygenated blood and pulmonary vein carrying oxygenated blood as exceptions.</td><td>4</td></tr>
<tr><td>2(a)(ii)</td><td>1 mark for:
(oxygen) carried by haemoglobin / combines with haemoglobin / oxyhaemoglobin;</td><td>1</td></tr>
</table>

Question	Answer	Marks
2(b)	1 mark for each description. (cardiac output) the volume of blood pumped out of the heart in one minute; (stroke volume) the volume of blood pumped out of the heart in one beat; (heart rate) the number of heart beats / contractions per minute; *Accept alternative wording.*	**3**

Question	Answer	Marks
3(a)(i)	2 marks for: the volume of oxygen that can be consumed while exercising at maximum capacity / maximum volume of oxygen consumed; per minute / per unit of time; *Accept correct reference to rate for second marking point.*	**2**
3(a)(ii)	1 mark for: endurance-based activity / long-duration / long-distance / aerobic activity / predominantly aerobic activity;	**1**

Question	Answer	Marks
3(a)(iii)	1 mark for each named factor. 1 mark for each description. age; oxygen up take is at its strongest in younger people and reduces with age; genetics; the type of muscle fibres you have / the size of your heart are partly dependent on the inherited characteristics; lifestyle; smoking and a sedentary lifestyle will prevent VO_2 max improving; training; if training focuses on cardiovascular fitness there will be an increase VO_2 max; *Accept other factors with relevant descriptions.*	**4**
3(b)	3 from: performer must run in time with the bleeps on a CD / equivalent; 20-metre shuttles / measured shuttles are performed; time between bleeps reduces as test progresses / bleeps get closer together / the subject must run faster; subject runs until they can no longer keep up with the bleeps; the level achieved and the number of shuttles performed within the level are recorded; scores are compared to standardised normative data;	**3**

Question	Answer	Marks
4(a)(i)	3 marks for correct placement on diagram of: A: top middle part of curve; B: lower right part of curve; C: lower left part of curve;	**3**
4(a)(ii)	Physical activity must be appropriate. 1 mark for each explanation with a different example, for example in hockey: (optimum arousal) performer has good levels of awareness / reaction times are good / makes considered judgements and decisions / performs at the highest levels **AND** hockey player can react quickly to stop a ball hit towards them from a short distance away; (overarousal) becomes too aggressive causing possible injuries to themselves and others / poor decision making so a performer may not follow the routine that they have trained as they have lost concentration / reaction time can be reduced as the performer has too much muscle tension / the performer has greater levels of emotion **AND** player is more likely to dispute decisions such as arguing with an umpire in hockey; (underarousal) performer bored and lacking interest so performance lacks concentration / effort / energy / mistakes are made **AND** hockey player does not chase back when beaten by an opponent;	**3**
4(b)(i)	1 mark for: mental rehearsal / deep breathing; *Accept other suitable named relaxation techniques.*	**1**
4(b)(ii)	2 marks for: physiological: reduce heart rate / lowers rate of adrenaline production / increase oxygen intake / remove tension from muscles / control breathing / reduce blood pressure; psychological: increase concentration / focus / positive thoughts / control emotions;	**2**

Question	Answer	Marks
5(a)	1 mark for each component. 1 mark for each explanation of a benefit, for example: balance; batsman can play a hook shot without falling over; cardiovascular endurance / stamina; a fast bowler can bowl continuously for a number of overs; coordination; batsman can watch the flight of the ball and hit it with the bat; flexibility; fielder can reach to catch a ball; muscular endurance; wicket keeper can squat continuously for every ball; power; batsman can hit the ball hard to score a 6; reaction time; slip fielder can make a catch when the ball deflects off the bat from a short distance away; speed; fielder can run fast to chase a ball; strength; fielder on the boundary can throw the ball to the stumps;	**6**
5(b)	1 mark for: Illinois (Agility Test);	**1**

Question	Answer	Marks
6(a)(i)	1 mark for advantage. 1 mark for disadvantage, for example: advantages (1 mark max.): easily adapted for different sports / fitness levels; can train many muscle groups; good for sports that have a change of pace; effective for developing different fitness components; no specialised equipment required / easy to set up; can be carried out in groups / individually; variety makes training more interesting; disadvantages (1 mark max.): difficult to monitor effort; easy to avoid challenging parts / needs to be motivated; if done incorrectly then injury can occur / increased risk of injury; needs creativity when planning session / requires time to plan / set up; *Accept other relevant advantages and disadvantages.*	**2**
6(a)(ii)	1 mark for naming the method of training. 1 mark for description, for example: continuous training; consists of continuous activities / running / swimming / cycling / rowing / max. heart rate between 60% and 80%; **OR** weight training; using free weights / weight machines to perform repetitions / sets of exercises; **OR** plyometric training; performing explosive movements / box jumping; **OR** fartlek training; involves fast and slow activity over a variety of terrain or hills / speed play; **OR** high-intensity interval training (HIIT); periods of intense exercise followed by periods of rest;	**2**

Question	Answer	Marks
6(b)	1 mark for each named phase. 1 mark for each description of a relevant example. pulse raiser; familiarisation / skill-related activities; for example in hockey: (pulse raiser) e.g. continuous jogging / low intensity dribbling / running drills; (familiarisation / skill-related activities) e.g. passing / shooting drill;	**4**

Question	Answer	Marks
7	1 mark for each characteristic described with an appropriate example from the relevant named physical activity. for example in tennis: cognitive (sub-max. 3 marks) beginner / try to understand demands of skill **AND** trying to hit the tennis ball with a racket; learning a new skill **AND** learning to play a forehand drive; inconsistent performance / lot of mistakes **AND** misses the ball when trying to hit it; needs lot of guidance **AND** coach needs to place the learner's arm in the correct position / lot of demonstrations; consciously thinks about what to do **AND** performer has to think about each part of the service; autonomous (sub-max. 3 marks) able to perform the skill without conscious thought **AND** can play a series of volleys at the net; few mistakes made **AND** can serve ball where intended; consistent successful outcome **AND** hits the ball just inside the baseline every time during a rally; able to adapt to different situations **AND** can switch easily from backhand to forehand; able to analyse own performance / has the ability to use intrinsic feedback **AND** after serving the ball out, adjusts the power so the ball lands in; link skills at pace / smoothly **AND** changing strokes during a rally without hesitation; able to use verbal feedback as understands the technical language **AND** can adapt the service after listening to the coach's comments;	**6**

Question	Answer	Marks
8(a)	Physical activity must be appropriate. 1 mark for each appropriate cause explained, for example in hockey: bruise: (impact with hard object) being hit with a ball; cuts / grazes: (contact with a sharp object / scraping or rubbing against a rough surface) falling on dry / hard ground; blisters: (repeated rubbing of the skin / burning) ill-fitting shoes that rub / continuous hitting can cause blisters on the hands; winding: (a blow to the abdomen) collision with an opponent when both going for the ball;	**4**
8(b)	1 mark for naming part of RICE method. 1 mark for each description. rest; immobilise / stop activity; compression; wrap area in (elastic) bandage / apply pressure; elevation; raise injured part above level of the heart;	**6**

Question	Answer	Marks
9(a)	1 mark for: a push or pulling action applied upon an object; *Accept alternative wording.*	**1**
9(b)	1 mark for identification of each force. 1 mark for each appropriate explanation, for example: gravity; pulls the ball back down towards the ground; air resistance; slows the ball down / reduces distance the ball travels; force applied at release / muscular force; the greater the force applied the further the ball will travel / speeds the ball up; *Accept other relevant forces.*	**6**

Question	Answer	Marks
10(a)	2 marks for: X: gastrocnemius; Y: tibialis anterior; *Accept soleus for X.*	**2**
10(b)	1 mark for: concentric;	**1**

Question	Answer	Marks
10(c)	1 mark for naming the muscle fibre type. 1 mark for each explanation (max. 2). muscle fibre type: fast twitch; 2 marks from: produces a large amount of force so can push off the blocks; low fatigue tolerance / tire quickly so cannot maintain maximal speed over longer distance; good for strength and power so can maintain fast running speed; contract quickly so can maintain fast leg speed; anaerobic energy supply so they do not need to take in oxygen for the duration of the sprint;	**3**

Question	Answer	Marks
11	1 mark for each appropriate description, for example: (performers) can use movement analysis software to improve performance / sports medicine / specialist clothing / footwear, e.g. lightweight football boots / training aids, e.g. timing gates / safety equipment, e.g. helmets; (spectators) football grounds have big screens to show replays / VAR / Hawkeye in tennis / closing roofs in stadia / can watch games from home; (officials) in tennis, the use of Hawkeye helps the officials to check if the ball was in or out / goal-line technology / VAR / TMO in rugby / automatic timing and measuring in athletics / more accurate decisions;	**3**

Question	Answer	Marks
12	6 from: improvement / building of stadia / facilities which can be used both before and after the event; home advantage with more support from spectators / competing in familiar surroundings; international status and recognition / raised profile of country; feel-good factors / national pride; cultural exchange / increase in tourism; job creation / increased employment / staffing of facilities; trade may be boosted before, during and after the event / economic benefit; legacy created; success of home nations / increase participation rates of population; improvement of transportation systems / improvement of infrastructure; may get automatic qualification;	**6**

Question	Answer	Marks
13	2 from: helps reduce oxygen debt; clears lactic acid from muscles / reduces DOMS; gradually lowers body temperature; gradually reduces breathing rate;	**2**

Question	Answer	Marks
14(a)	aerobic (2 marks max.): uses oxygen; breaks down glucose; produces carbon dioxide **AND** water; anaerobic (2 marks max.): no oxygen used; breaks down glucose; produces lactic acid; *Accept appropriate equations*.	**4**
14(b)	1 mark for each situation with justification, for example in hockey: (aerobic) a defender continually passing the ball around the back with very little movement / running **AND** the action is low intensity / long duration (so there is enough oxygen supplied to provide the energy needed); (anaerobic) a striker sprinting to get on the end of a pass down the sideline **AND** the action is high intensity / short duration (so oxygen cannot be supplied fast enough to provide the energy needed);	**2**

Question	Answer	Marks
15	1 mark for naming each factor (3 marks max.). 1 mark for an appropriate explanation (3 marks max.), for example: 3 from: age; some sports have age restrictions to protect a person from injury / as a person gets older their level of fitness reduces which limits the type of sports that they can take part in / as people get older they often take part in activities that have a greater social aspect; interests; people develop interests in a sport in a variety of ways such as through the media that makes certain activities fashionable / certain activities are shown more often / made to seem more exciting / people like certain activities more; social circumstances; the cost of certain sports may prevent a performer from taking part / certain activities / sports clubs may still have a social class bias so access may be restricted; family influences; some families may (may not) encourage their children to take part in activities / if a family has a tradition in playing a certain sport / parents may act a sporting role model for their children; peer influences; a person is likely to take part in activities that their friends are involved in / younger people are more influenced by their peers; facilities available; the facilities that are close to where a person lives are more likely to use them than travel to other facilities / the sports that are on offer locally makes it easier to participate and allow younger people to be more independent in their participation; area where you live; the geography / culture / tradition of a country or area will determine the activities available / there may be basketball courts in local areas that people can play at any time / in some countries there are restrictions on female dress which make some activities difficult; *Accept other appropriate examples.*	**6**

Question	Answer	Marks
16	1 mark for each relevant description, for example: (input) receives information (from their senses) about where their teammates / opponents are; (decision making) choosing which player to pass to; (feedback) if pass is intercepted then wrong decision was made / repeat the action or change the action; *Accept alternative descriptions.*	**3**