



Cambridge International AS & A Level

PHYSICAL EDUCATION

9396/33

Paper 3

October/November 2022

MARK SCHEME

Maximum Mark: 90

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.

This document consists of **15** printed pages.

PUBLISHED**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.

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| Question | Answer | Marks |
|-----------------|--|--------------|
| 1(a) | 4 marks for any 4 of: 1 glycolytic system / glycolysis; 2 (glucose broken down to) pyruvic acid / pyruvate; 3 (by-product) lactic acid / lactate; 4 (in) sarcoplasm; 5 (net) 2 ATP produced (per molecule of glucose); 6 (enzymes) glycogen phosphorylase / GP / GPP / phosphofructokinase / PFK / lactate dehydrogenase / LDH; | 4 |
| 1(b) | 4 marks for any 4 of: 1 reduces risk of injury / DOMS; 2 increases flexibility / stretch / elasticity (of muscle / connective tissue) OR increases range of motion; 3 increases / redirects flow of blood / oxygen to working muscles ; 4 activates vascular shunt OR dilates blood vessels to working muscles ; 5 improves rate of dissociation of oxygen to myoglobin ; 6 increases enzyme activity; 7 increases speed of nerve impulses OR improves response time OR faster muscle contractions; | 4 |
| 1(c) | 6 marks for any 6 of: 1 macrocycle is 1–4 years / long-term plan; 2 (example) swimmer aiming for personal best at Olympic Games; 3 mesocycle is 1–4 months / medium-term plan; 4 (example) swimmer focuses training on increasing their speed OR improving swimming technique; 5 microcycle is 1–4 weeks / short-term plan; 6 (example) swimmer focuses on improving tumble turn; 7 microcycles consist of several different training sessions OR may focus on different elements OR weekly training programme; 8 pre-season AND season AND post- / off-season; 9 preparatory phase AND competitive phase AND transition phase; 10 double periodisation for 2 peaks within a season; 11 tapering / reducing the training load in the run-up to an event; | 6 |

| Question | Answer | Marks | | | | | | | | | | | | | | | | | | |
|----------|--|---|--------------------------|-------------|---|-----------------------------------|--|---|---|--------------------------|---|---|----------------------------------|---|--|---|---|--|---|----------|
| 1(d) | 2 marks for: 1 (reaction time) ability to respond to a stimulus OR the time between a stimulus and the start of response / movement; 2 (coordination) the ability to move two or more body parts at the same time with control; Accept other suitable definitions. | 2 | | | | | | | | | | | | | | | | | | |
| 1(e) | 4 marks for any 4 of: <table border="1" data-bbox="349 517 1921 1015"> <thead> <tr> <th></th> <th>multi-stage fitness test</th> <th>PWC170 test</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>performer runs (shuttles);</td> <td>performer cycles (on an ergometer);</td> </tr> <tr> <td>2</td> <td>20-metre (shuttles) (in time with bleeps on CD);</td> <td>heart rate is monitored;</td> </tr> <tr> <td>3</td> <td>bleeps get progressively faster (each minute / level) OR less time between bleeps;</td> <td>at (2 or 3) different workloads;</td> </tr> <tr> <td>4</td> <td>(when performer cannot keep up with bleeps) the level AND number of shuttles is recorded;</td> <td>results are plotted on a graph OR power output AND HR are recorded;</td> </tr> <tr> <td>5</td> <td>result / score is compared to (normative) table (to give predicted VO₂ max);</td> <td>graph is extrapolated / calculation done to predict power output at 170 bpm;</td> </tr> </tbody> </table> | | multi-stage fitness test | PWC170 test | 1 | performer runs (shuttles); | performer cycles (on an ergometer); | 2 | 20-metre (shuttles) (in time with bleeps on CD); | heart rate is monitored; | 3 | bleeps get progressively faster (each minute / level) OR less time between bleeps; | at (2 or 3) different workloads; | 4 | (when performer cannot keep up with bleeps) the level AND number of shuttles is recorded; | results are plotted on a graph OR power output AND HR are recorded; | 5 | result / score is compared to (normative) table (to give predicted VO ₂ max); | graph is extrapolated / calculation done to predict power output at 170 bpm ; | 4 |
| | multi-stage fitness test | PWC170 test | | | | | | | | | | | | | | | | | | |
| 1 | performer runs (shuttles); | performer cycles (on an ergometer); | | | | | | | | | | | | | | | | | | |
| 2 | 20-metre (shuttles) (in time with bleeps on CD); | heart rate is monitored; | | | | | | | | | | | | | | | | | | |
| 3 | bleeps get progressively faster (each minute / level) OR less time between bleeps; | at (2 or 3) different workloads; | | | | | | | | | | | | | | | | | | |
| 4 | (when performer cannot keep up with bleeps) the level AND number of shuttles is recorded; | results are plotted on a graph OR power output AND HR are recorded; | | | | | | | | | | | | | | | | | | |
| 5 | result / score is compared to (normative) table (to give predicted VO ₂ max); | graph is extrapolated / calculation done to predict power output at 170 bpm ; | | | | | | | | | | | | | | | | | | |
| 1(f) | 4 marks for any 4 of: <ol style="list-style-type: none"> 1 (target heart rates give the) training zone OR maintain appropriate intensity while training; 2 60–80% of maximum HR; 3 upper / higher values more suitable for trained athletes OR lower values for untrained individuals; 4 max HR = 220 minus age OR is calculated using a progressive / physical test; 5 Karvonen's principle / formula; 6 uses maximal heart rate reserve OR HR max – resting HR; 7 training HR = resting HR + % (HR max – resting HR); | 4 | | | | | | | | | | | | | | | | | | |

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| Question | Answer | Marks |
|-----------------|---|--------------|
| 1(g) | 6 marks for: 1 (caffeine) is a stimulant OR reduces (perception of) fatigue; 2 speeds up reactions OR improves focus at start of / during race; 3 (creatine) increased PC stores; 4 increased strength / power / speed OR delays exhaustion of ATP/PC system OR enables ATP/PC system to work for longer; 5 (EPO) increased haemoglobin / red blood cells / haemocrit; 6 improved oxygen uptake / transport / delays OBLA; | 6 |

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| Question | Answer | Marks |
|-----------------|---|--------------|
| 2(a) | 2 marks for any 2 of: 1 avoidance behaviours; 2 does not like a challenge / avoids 50:50 situations / avoids risks / takes easy option; 3 is prone to social loafing / lacks effort; 4 dislikes evaluation / feedback OR only wants positive feedback; 5 has low self-confidence / efficacy; 6 is prone to learned helplessness; 7 does not take responsibility for own actions OR blames others for performance; 8 attributes success externally; 9 attributes failure internally; 10 attributes failure to uncontrollable factors; | 2 |
| 2(b)(i) | 6 marks for any 6 of: 1 level of success OR shared experiences / situations; 2 motivational reasons OR drive for success OR social loafing OR level of effort; 3 personal satisfaction with group / task; 4 clarity of roles / responsibilities; 5 level of communication / interaction; 6 quality of group dynamics / relationships / characteristics OR presence / absence of cliques; 7 similar / different goals / norms / values; 8 level of group coordination / cooperation / social support / Ringelmann; 9 smaller groups may have greater cohesion; 10 similarity / differences in ages of group members; 11 how close / far apart the group members live; 12 disparity of contracts / wages / money; 13 level of group stability OR turnover of group members; 14 presence / absence of collective identity / kit / team name; | 6 |

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| Question | Answer | Marks | | | | | | | | | | | | | | | |
|-----------|--|---|----------|------------|---|-----------------------------|------------------------------|---|-----------------------------|------------------------------|---|---|---------------------------------|---|---------------------------------|---|----------|
| 2(b)(ii) | <p>3 marks for any 3 of:</p> <table border="1" data-bbox="347 284 1883 611"> <thead> <tr> <th></th> <th>emergent</th> <th>prescribed</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>comes from within the group</td> <td>(can be) from outside group;</td> </tr> <tr> <td>2</td> <td>chosen / supported by group</td> <td>imposed by higher authority;</td> </tr> <tr> <td>3</td> <td>knows the (personalities of) members of group</td> <td>may not know the group members;</td> </tr> <tr> <td>4</td> <td>maintains group norms / harmony</td> <td>may change group norms / disrupt harmony;</td> </tr> </tbody> </table> | | emergent | prescribed | 1 | comes from within the group | (can be) from outside group; | 2 | chosen / supported by group | imposed by higher authority; | 3 | knows the (personalities of) members of group | may not know the group members; | 4 | maintains group norms / harmony | may change group norms / disrupt harmony; | 3 |
| | emergent | prescribed | | | | | | | | | | | | | | | |
| 1 | comes from within the group | (can be) from outside group; | | | | | | | | | | | | | | | |
| 2 | chosen / supported by group | imposed by higher authority; | | | | | | | | | | | | | | | |
| 3 | knows the (personalities of) members of group | may not know the group members; | | | | | | | | | | | | | | | |
| 4 | maintains group norms / harmony | may change group norms / disrupt harmony; | | | | | | | | | | | | | | | |
| 2(b)(iii) | <p>4 marks for any 4 of:</p> <ol style="list-style-type: none"> 1 shows how a leader interacts with the situation; 2 task-oriented AND person-oriented leadership styles; 3 dependent on favourableness of the situation; 4 favourableness depends on relationship between leader and group / ability / motivation of group; 5 task-oriented leader more effective in very / most favourable situations; 6 task-oriented leader more effective in unfavourable / least favourable situations; 7 person-oriented leaders more effective in moderately favourable situations; | 4 | | | | | | | | | | | | | | | |
| 2(c) | <p>4 marks for:</p> <ol style="list-style-type: none"> 1 (broad external) wide range of stimuli from environment; 2 (example) e.g. footballer assessing the location of teammates and opponents; 3 (narrow internal) thoughts / feelings about a limited number of stimuli; 4 (example) e.g. tennis player mentally rehearsing a serve; <p>Accept other suitable examples.</p> | 4 | | | | | | | | | | | | | | | |

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| Question | Answer | Marks |
|-----------------|---|--------------|
| 2(d) | 4 marks for any 4 of: 1 (adaptation of inverted-U theory) to consider the effect of (state) anxiety on performance; 2 best performances occur when performer is in a zone of optimum state anxiety / zone of optimum arousal ; 3 optimum arousal is a band width rather than a point (for a given skill); 4 optimum arousal is not always at the mid-point of (the band width) of arousal; 5 optimum arousal depends on the situation / type of skill; 6 optimum arousal depends on the (ability / personality of the) performer; 7 peak flow experience; | 4 |
| 2(e) | 3 marks for any 3 of: 1 focus / concentrate on relevant cues; 2 filter out irrelevant cues OR block out distractions of crowd; 3 reduce arousal / anxiety; 4 increase self-confidence / efficacy; 5 remember successful past performances; 6 causes social facilitation ; | 3 |
| 2(f) | 4 marks for any 4 of: 1 attribution retraining; 2 attribute failure to unstable / changeable / controllable factors; 3 attribute success to stable / internal factors / ability; 4 work on improving technique / fitness / different tactics; 5 set achievable / performance goals; 6 allow success; 7 vicarious experiences OR show role models of similar ability succeeding OR remind them of previous success; 8 give positive feedback / reinforcement / encouragement; 9 give individual attention; 10 avoid social comparisons with other performers; | 4 |

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| Question | Answer | Marks |
|----------|--|----------|
| 3(a) | 6 marks for 6 of: (common features) (sub-max. 4) 1 every 4 years; 2 oath; 3 opening ceremony; 4 Olympiad; 5 Olympic flame; 6 festival nature OR sporting AND cultural event; 7 eligibility standards / specialist training; 8 values / ethics / ideals of fair play / peace; 9 (evidence of) cheating / rule-breaking; 10 supreme challenge; 11 athletes as role models / cult figures; 12 large stadium / many spectators; | 6 |

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| Question | Answer | | Marks | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------|---|---|----------|---------|--------|----|--------|---------------|----|------------------------|---|----|-------|----------|----|---------|---------|----|----------------------|----------------------------------|----|--------------------|--------------------------|----|--------------------------------|--|----|-------------|-------------------------------|--|
| 3(a) | (differences) (sub-max. 4) <table border="1" data-bbox="349 248 1861 895"> <thead> <tr> <th></th> <th data-bbox="443 248 1151 320">ancient</th> <th data-bbox="1158 248 1850 320">modern</th> </tr> </thead> <tbody> <tr> <td data-bbox="349 325 443 397">13</td> <td data-bbox="443 325 1151 397">5 days</td> <td data-bbox="1158 325 1850 397">over 2 weeks;</td> </tr> <tr> <td data-bbox="349 402 443 474">14</td> <td data-bbox="443 402 1151 474">male participants only</td> <td data-bbox="1158 402 1850 474">males AND females take part OR females allowed;</td> </tr> <tr> <td data-bbox="349 478 443 550">15</td> <td data-bbox="443 478 1151 550">naked</td> <td data-bbox="1158 478 1850 550">clothed;</td> </tr> <tr> <td data-bbox="349 555 443 627">16</td> <td data-bbox="443 555 1151 627">wreaths</td> <td data-bbox="1158 555 1850 627">medals;</td> </tr> <tr> <td data-bbox="349 632 443 703">17</td> <td data-bbox="443 632 1151 703">... for winners only</td> <td data-bbox="1158 632 1850 703">... for 1st, 2nd AND 3rd;</td> </tr> <tr> <td data-bbox="349 708 443 780">18</td> <td data-bbox="443 708 1151 780">religious festival</td> <td data-bbox="1158 708 1850 780">secular / not religious;</td> </tr> <tr> <td data-bbox="349 785 443 857">19</td> <td data-bbox="443 785 1151 857">always at same venue / Olympia</td> <td data-bbox="1158 785 1850 857">different cities / countries as hosts;</td> </tr> <tr> <td data-bbox="349 861 443 895">20</td> <td data-bbox="443 861 1151 895">Greeks only</td> <td data-bbox="1158 861 1850 895">athletes from all over world;</td> </tr> </tbody> </table> | | | ancient | modern | 13 | 5 days | over 2 weeks; | 14 | male participants only | males AND females take part OR females allowed; | 15 | naked | clothed; | 16 | wreaths | medals; | 17 | ... for winners only | ... for 1st, 2nd AND 3rd; | 18 | religious festival | secular / not religious; | 19 | always at same venue / Olympia | different cities / countries as hosts; | 20 | Greeks only | athletes from all over world; | |
| | ancient | modern | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | 5 days | over 2 weeks; | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | male participants only | males AND females take part OR females allowed; | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | naked | clothed; | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | wreaths | medals; | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | ... for winners only | ... for 1st, 2nd AND 3rd; | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | religious festival | secular / not religious; | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | always at same venue / Olympia | different cities / countries as hosts; | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | Greeks only | athletes from all over world; | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3(b)(i) | 4 marks for any 4 of: <ol style="list-style-type: none"> 1 Olympic Games get worldwide media coverage; 2 (terrorists) to gain maximum publicity; 3 (attack) very effective way to get their message across; 4 Olympic Games symbolise values that oppose terrorism; 5 to disrupt normal life; 6 it is difficult to ensure safety at all times OR easy target; 7 to undermine the authority of host country; 8 to destabilise host country's political leadership; | | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| Question | Answer | Marks |
|-----------------|--|--------------|
| 3(b)(ii) | 3 marks for any 3 of: 1 high security at all venues; 2 provide funding for high levels of policing; 3 vetting / accreditation system for all athletes / officials / support staff OR searches of spectators; 4 use of advanced policing technology / CCTV / number plate recognition; 5 awareness that Games are high risk of attack; 6 assistance / support from other countries; 7 allow athletes to make own living / security arrangements; | 3 |
| 3(c) | 5 marks for any 5 of: 1 provision of sporting venues; 2 opening / closing ceremonies; 3 transport infrastructure; 4 accommodation for athletes / officials / media; 5 accommodation for tourists / visitors; 6 meeting demands of IOC; 7 relocation of local people; 8 travel restrictions OR traffic congestion; 9 increased taxes; 10 pollution (affecting health) / environmental damage / cost of pollution mitigation; 11 meeting demands of media; | 5 |
| 3(d)(i) | 2 marks for any 2 of: 1 (money) to take time off work to play sport; 2 (money) to cover time off to travel / train ; 3 (money) to cover sporting expenses ; | 2 |

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| Question | Answer | Marks |
|----------|---|----------|
| 3(d)(ii) | <p>3 marks for any 3 of:</p> <ol style="list-style-type: none"> 1 the best athletes were excluded from participation (before professionalism); 2 the Olympic Games needed the best athletes; 3 broken-time payments meant an athlete was classed as a professional; 4 concept of shamateurism OR broken-time payments went against the ideal of amateurism; 5 (some) countries were providing the equivalent of broken-time payments in other forms, e.g. employed in armed forces; | 3 |
| 3(e) | <p>3 marks for any 3 of:</p> <ol style="list-style-type: none"> 1 female role models; 2 increased number of events for women; 3 every male event should have a female equivalent; 4 target of 50% gender balance in every event (except softball and baseball); 5 some male events have been removed to make space for female events; 6 increase in number of mixed-gender events; 7 uniforms for sports reviewed; 8 distances / duration of matches / number of rounds altered; 9 acceptance of women as judges / officials; 10 women co-opted on to IOC (in 1981) OR over 20% of IOC members are women; 11 IOC conference on women and sport; 12 more media coverage of female sport; <p>Accept other suitable changes to encourage female participation.</p> | 3 |

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| Question | Answer | Marks |
|-----------------|--|--------------|
| 3(f) | 4 marks for any 4 of: 1 first time Paralympics staged at same venue as Olympics; 2 higher media profile (than previous Paralympics); 3 some / limited support from IOC; 4 created / raised profile of role models; 5 development of classification system; 6 created greater awareness / acceptance of disabled sports; | 4 |