

May 2013 subject reports

Sports, exercise and health science

Overall grade boundaries

Standard level

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 17	18 - 34	35 - 48	49 - 58	59 - 69	70 - 79	80 - 100

Standard Level Internal assessment

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 8	9 - 16	17 - 22	23 - 27	28 - 33	34 - 38	39 - 48

General comments

The areas of the programme and examination which appeared difficult for the candidates

The areas of the programme and examination in which candidates appeared well prepared

The strengths and weaknesses of the candidates in the treatment of individual questions

Recommendations and guidance for the teaching of future candidates

Standard level paper one

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 7	8 - 13	14 - 20	21 - 22	23 - 24	25 - 26	27 - 30

General comments

Each session teachers are invited to submit comments about each exam. These forms can be downloaded from the OCC. These comments provide some of the evidence used by the senior examining team during the Grade Award meetings, it is hoped that more will be submitted in future sessions. Unfortunately, not all schools submitted G2 forms, with only three G2 forms submitted. All three stated that the level of difficulty was appropriate. One stated that M13 was of a similar standard in comparison with last year's paper, one reported that it more difficult and one suggested that it was a little easier in comparison with M12. Two reported that the clarity of wording was satisfactory and one that this aspect was good. All three indicated that the presentation of the paper was good. There was a nil response in the G2 form from teachers i.e. they did not provide any further comments about the paper. The difficulty index (i.e. the proportion of candidates giving the correct answer for each question) supports that there is a good spread of marks across the paper. The discrimination index (i.e. the extent to which a question distinguishes between the more able and the less able candidates) varied from -0.32 to 0.68. There was one question with a negative discrimination index (i.e. those which the more able candidates tended to get the wrong answer). There are some questions which did discriminate well and some that did not seem to discriminate well.

The mean score/mark was 22.53 (range 10 – 29), which is slightly down than the May 2012 P1 mean score/mark of 23.43 (range 15 – 29). The following topics/sub topics were done really well: 1.1.3 State the four types of bone; 1.1.8 Distinguish between the different types of joint in relation to movement permitted; 1.2.2 Distinguish between the different types of muscle; 2.1.1 List the principal structures of the ventilator system; 2.2.1 State the composition of blood; 3.1.1 List the macronutrients and micronutrients; 3.1.4 Identify a diagram representing the basic structure of a glucose molecule; 4.3.11 State and explain the factors that affect projectile motion at take-off or release; 5.2.8 Define the term response time; 5.3.7 Outline the different types of practice; 5.3.9 Outline the spectrum of teaching styles; 6.1.3 State that the statistic standard deviation is used to summarize the spread of values around the mean, and that within a normal distribution approximately 68% and 95% of the values fall within plus or minus one or two standard deviations respectively; 6.3.1 Distinguish between the concepts of health-related fitness and performance-related (skill related) fitness.

The areas of the programme and examination which appeared difficult for the candidates

The following areas evidenced some weaknesses and should/need to be improved upon:

2.2.3 Describe the anatomy of the heart with reference to the heart chambers, valves and major blood vessels; 2.2.4 Describe the intrinsic and extrinsic regulation of heart rate and the sequence of excitation of the heart muscle; 3.1.11 State the energy content per 100 g of carbohydrate, lipid and protein; 3.2.3 State the major sites of triglyceride storage; 3.3.9

Describe the production of ATP from glucose and fatty acids by the aerobic system; 5.1.6 Distinguish between Fleishman's physical proficiency abilities (physical factors) and perceptual motor abilities (psychomotor factors); 5.3.6 Outline the types of transfer; 6.1.1 Outline that error bars are a graphical representation of the variability of data.

The areas of the programme and examination in which candidates appeared well prepared

In general, the following areas were good but could be improved upon:

2.1.3 Define the terms pulmonary ventilation, total lung capacity, vital capacity, tidal volume, expiratory reserve volume, inspiratory reserve volume and residual volume; 2.2.9 Define the terms systolic and diastolic blood pressure; 3.2.1 Outline the terms metabolism, anabolism, aerobic catabolism and anaerobic catabolism; 4.2.1 Outline the types of movement of synovial joints; 4.3.1 Define the terms force, speed, velocity, displacement, acceleration, momentum and impulse; 4.3.7 ne Newton's three laws of motion; 4.3.12 Outline the Bernoulli principle with respect to projectile motion in sporting activities; 5.1.1 Define the term skill; 6.3.3 Outline and evaluate a variety of fitness tests.

The strengths and weaknesses of the candidates in the treatment of individual questions

The candidates were VERY well prepared for the following for the following questions: 1 (1.1.3); 3 (1.2.2); 10 (3.1.4); 11 (3.1.1); 25 (5.3.7); 26 (5.3.9)

The candidates were NOT well prepared for the following questions: 7 (2.2.3); 8 (2.2.4); 12 (3.2.3); 13 (3.3.9); 14 (3.1.11); 23 (5.3.6); 24 (5.1.6); 29 (6.1.1).

Question 1: This was one of three questions where 100% of candidates were correct. On reflection, the use of the term spongy was not a good distractor.

Question 2: 'C' was the main distractor (with 'B' and some going for 'A'). This question had a lower discrimination index.

Question 3: This question was one of the easier questions, with a poor discrimination index (0.11) i.e. both high and low ability candidates getting it correct.

Question 4: 'C' was the main distractor but there is a low discrimination index (0.21). The term ribs (used in 'D') was perhaps inappropriate for this question.

Question 5: 'A' proved to be a good distractor and there was a good discrimination index (0.42).

Question 6: One of the easier questions in the paper, with a low discrimination index (0.21) i.e. both high and low ability candidates getting it correct.

Question 7: A good question, the 2nd most difficult in the paper, with a difficulty index of 43.1, and a good discrimination index (0.53). At GA we discussed the use of the term supplies within this question, and we considered that this may have confused some candidates. Also, perhaps including the term tissue at the very end of the question might have helped with clarity.

Question 8: This proved to be a challenging question from the perspective of the candidates (fifth most difficult) and it had a high discrimination index (0.74). There were three distractors of almost equal weighting.

Question 9: A difficult question, with both 'B' and 'C' as distractors and a good discrimination index (0.47).

Question 10: An easy question where 100% of candidates were correct and it did not discriminate (0.00).

Question 11: One of the easier questions with a poor discrimination index.

Question 12: This was one of the more challenging questions, with a good discrimination index (0.53), and two distractors ('A' and 'C'), with 'C' as the main distractor.

Question 13: A good question (3rd most difficult in the paper). Both 'D' and 'A' were sound distractors and there was a good discrimination index (0.53).

Question 14: This question had a negative discrimination index (-0.32) i.e. the more able candidates tend to get it wrong. It was one of the more difficult questions with 'A' as the main distractor.

Question 15: A good question, with both 'B' and 'D' as distractors and an almost acceptable discrimination index (0.32).

Question 16: Another good question, with 'B' as the main distractor and an almost acceptable discrimination index (0.32).

.Question 17: A mid-difficulty question, with 'D' as the main distractor but a discrimination index of 0.00.

Question 18: This question could be described as one of the easier questions, with 'B' and 'D' equal 'slight' distractors but a poor discrimination index (0.11).

Question 19: This question could be described as mid-difficulty, with a discrimination index below acceptable (0.21), and there appear to be three equal distractors ('A', 'B' & 'C').

Question 20: A mid-difficulty question and a reasonably high number had 'D' (main distractor). There was an acceptable discrimination index (0.37).

Question 21: A mid-difficulty question, with 'B' and 'D' as equal distractors and a discrimination index of 0.42.

Question 22: A good question, 'B' was the main distractor and there was a discrimination index of 0.32.

Question 23: The most difficult question in the paper and 'B' was the main distractor but there was a lower discrimination index (0.26). At GA we considered that the term hard (...hard court...) might have lacked clarity for some candidates. We also considered the merits of option 'C' as a potential correct answer – both 'C' and 'D' could be correct – it depends on the skill level of the tennis player. The question's last few words (.....for the first time?) suggests that the correct answer should only be option 'D' – but it is acknowledged that the skill level of the player is not stated in the question.

Question 24: Fourth most difficult question with 'D' as the main distractor and a good discrimination index (0.58).

Question 25: An easy question with 100% of candidates getting the correct answer but a 0.00 discrimination index.

Question 26: An easy question – only one candidate got it wrong and there is a poor discrimination index (0.05). At GA there was some discussion about the distractors i.e. not considered appropriate, but as CE I was comfortable with them.

Question 27: There was a bit of a spread on the distractors and this question had a lower discrimination index (below acceptable).

Question 28: 'C' was the main distractor and the discrimination index was below acceptable.

Question 29: There appeared to be some confusion from the perspective of the candidates, with 'A' as the main distractor but a low discrimination index (0.16).

Question 30: One of the easier questions and the discrimination index was below acceptable.

Standard level paper two

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 7	8 - 15	16 - 20	21 - 26	27 - 32	33 - 38	39 - 50

General comments

Only one G2 forms were received for paper 2, and this means that one should be very cautious about drawing any firm conclusions. The level of difficulty was reported as appropriate. In comparison with M12 this year's paper was of a similar standard. The clarity of wording was rated satisfactory and the presentation of the paper was rated good. There was a nil response in the G2 form from teachers i.e. they did not provide any further comments about the paper. The mean score/mark was 28.03 (range 9 – 48) which is an increase on M12 (mean 25.79; range 8 - 41) - please note the difference in the range of marks. It may be that exam technique is improving generally by way of a partial explanation for the increase. However, I am again concerned about the widening range at the lower end of marks.

The areas of the programme and examination which appeared difficult for the candidates

There was a wide range of marks for this paper. In section A the following areas seem to have appeared difficult for some candidates:

qu.1 {c} discuss the characteristics of the three energy systems and their relative contributions during exercise [3.3.10]; qu.1{d} evaluate the relative contributions of the three energy systems during different types of exercise [3.3.11]; qu.1 {e} explain cardiovascular drift [2.2.8]; qu. 4 {a} outline the major components of fitness [6.3.2].

In section B it was pleasing to find that all three questions were attempted, with question ? being the most popular. The following areas challenged some candidates: qu. 6 {a} explain the concept of angular momentum in relation to sporting activities [4.3.10]; qu. 6{b} outline the different approaches to classifying motor skill [5.1.3]; qu. 6{c} outline the functions of the conducting airways [2.1.2]; qu. 7 {a} outline the ways in which exercise intensity can be monitored [6.4.3]; qu. 7 {b} discuss the key principles of training programme design [6.4.2]; qu. 7 {d} compare skill profiles for contrasting sports [5.1.4.]; qu. 8 {c} describe the phases (stages) of learning [5.3.2]; qu. 8 {d} discuss how systolic and diastolic blood pressure respond to dynamic and static exercise [2.2.11]; qu. 8 {e} explain the process of gaseous exchange at the alveoli [2.1.7].

The areas of the programme and examination in which candidates appeared well prepared

The average mark for paper 2 was 28.03 and the range of marks was 9 – 48. There was a spread of marks across both sections A and B. On the whole, the candidates seemed to have a reasonable understanding of what was expected of them in this paper. A few candidates really struggled with this paper whilst some candidates displayed comprehensive knowledge of factual information in the syllabus and a thorough command of concepts and principles. I anticipated candidates would have a firmer grasp of how to: explain cardiovascular drift during distance running; identify components/parts of skeletal muscle tissue; identify the (specific) component of fitness measured by the standing broad jump; outline different approaches to classifying motor skills; outline the functions of the conducting airways in the lungs; describe how a student could apply principles of training to improve their performance on the MST; compare the skill profiles for a gymnast (floor routine) and a soccer player; compare systolic and diastolic blood pressure response between a flexed arm hang and a chin-up; partial pressure at the alveoli. However, there were candidates who demonstrated a high level of knowledge and understanding and construct detailed explanations of these topics in their answers. Candidates were well prepared for questions on: objective level 2 data analysis; the skeletal system; how muscle contracts by the sliding filament theory; evaluate fitness testing from a reliability perspective; discuss the advantages and disadvantages of field testing compared to laboratory testing; define the term momentum; discuss factors that contribute to different rates of learning; explain the role of ATP in muscle contraction; outline the role of haemoglobin in oxygen transport; explain the role of insulin in the formation of glycogen and the accumulation of body fat.

The strengths and weaknesses of the candidates in the treatment of individual questions

Question 1: sections a, & b were done well, but sections c, d & e could be improved. Evaluating the contribution of all three energy systems provided a challenge for some candidates (Q1d).

I think questions 1g was a really good question, challenging & demanding an application of concepts – but it is important that some candidates need to answer the question i.e.the relative contribution during gymnastics. There were some really disappointing answers to 1e – which I thought was a straightforward question. Knowledge in response to Q1e regarding cardiovascular drift appear polarised between those that knew and were able

to access the marking points and those that failed to acknowledge any relevant marking points.

Question 2: candidates answered the human skeleton questions well.

Question 3: factual information about the structure skeletal muscle (3a) could be improved. Candidates ability to identify both parts of the sarcomere for Q3a were mainly in vain, only demonstrating an ability to identify one of the two required aspects. However, explanation within movement analysis (neuromuscular function – sliding filament theory) was sound.

Question 4: some candidates struggled to respond specifically re their answer to 4a i.e. 'strength' is too vague – it needs to be 'explosive strength/power'. However, although there were some really good answers to the reliability question (4b), outlining reliability provided a challenge for some candidates who tended to replicate a number of control variables/identical protocol in the possible belief that they would be awarded a marking point for each rather than a single marking point as a consequence of this being only one aspect ensuring reliability. Many candidates provided excellent examples to demonstrate their knowledge and understanding of study design (4c).

Question 5: there is good evidence in the answers given that many candidates have a firm grasp of the fundamentals of biomechanics (5a and 5b). However, for some of the candidates the expectation to define the terms velocity and momentum did result in a degree of confusion, with some unsuccessfully in defining both. Velocity was the more well known of the two terms.

Question 6: There was a wide range in the quality of answers to 6a, b and c. For 6b there was clearly some confusion re classifying cognitive/associative/autonomous stages of learning. Question 6c if outline the functions..... NOT outline the anatomy.....

Question 6d provided a challenge to the majority of students in attempting to discuss factors that contributed to different rates of learning. There was little variability in the subgroup of factors that candidates opted for that mainly included the 'individual difference of coaches' as the primary discussed factor. Several progressed to discuss the 'motivation' or 'task difficulty' and few mentioned anything from the other groups. There were several candidates who gave very good answers for 6e.

Question 7: many candidates presented good answers to 7c, but there were some disappointing answers to 7a and 7b. Some candidates confused qu. 7a (6.4.3 outline ways in which exercise intensity can be monitored) with AS 6.4.1 (describe the essential elements of a general training programme). For some candidates it needs to be emphasised that they must respond to the action verbs/command terms, and this was the an issue with 7b where a number of candidates did not respond to 'describe' – they answered based on 'list' – which was inappropriate and cost them marks. For those candidates answering 7d, students appeared to find it difficult to aces the term 'skill profile' in order to competently compare the gymnast and soccer player as required. For 7e there was evidence some candidates found explaining the role of insulin was a challenge with regard to formation of glycogen and accumulation of fat – but there were some excellent answers presented.

Question 8: A fairly wide range of responses. For 8a some candidates based their answers on different types of muscle tissue (1.2.2) – but the question was about the general characteristics common to muscle tissue (1.2.1). With question 8b a few candidates confused reciprocal inhibition with refractory period. Question 8d showed that some candidates have knowledge about systolic and diastolic BP – but they lack the understanding for application. In question 8e there appears to be a very real weakness in the knowledge and understanding of partial pressure re the process of gaseous exchange at the alveoli.

Recommendations and guidance for the teaching of future candidates

Try to improve knowledge, understanding AND application of: the relative contributions of the three energy systems during different exercise intensity/duration; cardiovascular drift during exercise; the major components of fitness; the characteristics and classifications of skill; ways in which exercise intensity can be monitored; key principles of training programme design; the application of knowledge and understanding of blood pressure; partial pressure of gases for gas exchange at the alveoli.

Try to work towards and achieve a greater understanding of the meaning of the action verbs used in questions. For example, question 7b is 'describe' – some candidates answered this question as though the action verb was 'list'.

Engage candidates in applying biomechanical terms to a variety of sporting contexts.

If the question sets a context e.g. 'during distance running' (7c) e.g. during gymnastics (7c) – then ensure that you build your answer (knowledge and understanding) around the context (application) of the question e.g. to improve their performance on the multistage fitness test (7b).

Familiarise candidates with the concept of skill profiles.

Teach drafting/planning for sections of questions set at objective level 3.

Continue to provide candidates with an even wider range of sporting examples to highlight concepts – this enhances responses.

Teach candidates to answer the question. For example, question 7c is asking about functions not structures, and question 8b is testing knowledge and understanding of reciprocal inhibition not refractory period.

Always ensure that all candidates follow the 'instructions to candidates' before attempting to answer questions.

Despite some MS being presented in a tabular form, it is interesting that most candidates did not organise their own response in a manner consistent with this (Qu. 1d, 7d, 8d).

Standard level paper three

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 6	7 - 13	14 - 18	19 - 22	23 - 26	27 - 30	31 - 40

General comments

There were three G2 forms received for paper 3. All three supported that the level of difficulty was appropriate. In comparison with last year's paper all three indicated that M13 was of a similar standard, and one recorded that M12 was a little more difficult. In terms of the suitability of this question paper, one of the G2s state that clarity of wording was satisfactory and the other two stated that this aspect was good. The presentation of this question paper was reported as good on all three of the G2s.

The mean score/mark was 25.61 (range 11 – 39), which was up when compared to M12 (mean 23.56; range 9 – 36). Despite this I was very impressed with the overall performance of many of the candidates and there were fewer candidates towards the lower marks compared to M12.

The paper generated a range of responses demonstrating very sound knowledge and skills within a significant number of candidates. The question paper responses of the candidates support that appropriate information and teaching had been made available to candidates, with only a few questions that generated poor responses. In many cases candidates were able to respond well to Objective 1 and 2 questions, but some could still improve on Objective 3 questions. Interpretation of data provided in questions was dealt with confidently by most candidates who were (in most cases) were able to extract specific data information and relate this to concepts. Once again it was a pleasure to assess this paper.

The areas of the programme and examination which appeared difficult for the candidates

Following the trend of recent years options A, B and D were the favoured options. However, it continues to be re-assuring that the four options are attempted by candidates. Generally, I have the impression that most (but not all) candidates were very well prepared for this exam. However, the following areas seem to have been difficult for some candidates: qu. A2b describe various methods of training [A.1.2]; qu. A2c discuss how periodization should be organised to optimize performance and avoid overtraining and injury [A.1.4]; qu. B3c evaluate the issues in personality research and sports performance [B.1.5]; qu. C3a outline the coronary circulation [C.2.1]; C3b explain the concept of risk factors in cardiovascular disease [C.2.4]; D2a list the enzymes responsible for the digestion of carbohydrates, fats and proteins from the mouth to the small intestine [D.1.5]; D2b describe the absorption of glucose, amino acids and fatty acids from the intestinal lumen to the capillary network [D.1.6].

The areas of the programme and examination in which candidates appeared well prepared

Most of the candidates demonstrated a very good knowledge and understanding of their options. However, there is a very wide spread of my total marks for this paper (range 11 – 39). On the whole most candidates have a good grasp of the expectations for this options paper. The data set questions were answered very well by the majority of candidates and some candidates evidenced a first class knowledge, understanding and application throughout their paper.

The strengths and weaknesses of the candidates in the treatment of individual questions

Option A: This option was generally answered very well by many of the candidates. It is really pleasing that the candidates seem to be comfortable with application of concepts and principles, as evidenced in their examples from sporting/exercise situations. Qu. A1a – c, data based, candidates were secure in their interpretation and analysis; Qu. 1d, A2a, A3a-c answers showed a firm grasp of their subject (although a few candidates were unable to access the term over-reaching – despite having clarity on the term overtraining). With question A2b, some candidates found it hard to articulate resistance training to improve strength. Question A2c [A.1.4], some candidates confused this question with elements of AS 6.4.1. (warm up – cool down etc) but this is a transition-preparation-competition question. Most candidates acknowledged the name of each phase of periodization, however many were either unable to build upon this through a lack of knowledge or otherwise felt they had achieved the max points available already.

Option B: Qu. B1a – b, data based, candidates were secure in their interpretation and analysis; Qu. B1c, B2a, B2b and B3a many answers showed a sound grasp of their subject. Similar to M12, an added-value aspect of answers to questions within this option is the apparent readiness of candidates to use sporting examples to clarify and strengthen their answers. This is how the candidates really show the application of their knowledge and understanding – very well done. This was evident, for example, in the answers to questions B1c and B2b. Some candidates were weaker in a couple of questions because they did not answer the question. For example, questions B2c and B3c were 'evaluate' questions i.e. make an appraisal by weighing up the strengths and limitations – please ensure candidates respond more precisely to the action verb/command term to have greater opportunity to be awarded full marks. Some of the candidates mainly considered the positive categories of self-talk (B2b) and for B2c some candidates misinterpreted the question, and attempted to outline/describe the concept of mental imagery as opposed to the required evaluation. As stated above, B3c also provided challenge to students in evaluating issues in research on the personalities of athletes and non-athletes.

Option C: Qu. C1a – b, data based, candidates were secure in their interpretation and analysis; Qu. C1c, C2a and C2b answers showed a good knowledge and understanding of their subject. There were some disappointing answers to questions C3a and C3b. For qu. C3c it is important to emphasise the need to respond appropriately to the action verb/command term.

Option D: Qu. D1a – b, data based, interpretation and analysis responses were good; Qu. D1c, D2c, D3a-c answers generally showed a good grasp of application – well done. It was pleasing that most candidates remained focused in their responses to D1c, D2c, D3a-c to 'answer the question'. This was in contrast to the weaker responses presented by a few candidates to the question on 'the absorption of glucose from the intestinal lumen to the capillary network' (question D2b; D1.6) i.e. found it difficult to fully articulate the absorption of glucose. Also, I was surprised to find that some candidates were less secure on the factual knowledge required (obj level 1 'list') for qu. D2a. It is important to note that for a few of the candidates answering D1c, some responded in error with a discussion of non-nutritional ergogenic aids.

Recommendations and guidance for the teaching of future candidates

Ensure that all candidates follow the 'instructions to candidates'. For example, at least one candidate answered all 4 options.

There were some outstanding papers presented and they were a joy to assess. To build on this try to ensure all candidates have a slightly firmer grasp of some areas: training i.e. describe various methods of training and avoid overtraining and injury i.e. discuss how periodization should be organised to optimise performance; individual differences i.e. the interactionist approach to personality i.e. issues in personality research and sports performance; cardiovascular disease i.e. the coronary circulation i.e. risk factors in cardiovascular disease; digestion & absorption i.e. enzymes responsible for digestion from the mouth to the small intestine i.e. the absorption of glucose, amino acids and fatty acids from the intestinal lumen to the capillary network.

Broaden candidates' knowledge of health risks from exercising in the cold to include frost nip and hypothermia. Further familiarise students with all psychological skills training techniques with specific reference to self-talk and mental imagery.

Continue to encourage candidates to draft key elements of possible answers, to help contribute to clarity and structure of response to questions. I find following the guideline of knowledge – understanding – application useful as a guide for revision in preparation for exams/assessment. It is of concern that one candidate attempted to answer all four options and this must be addressed by the teachers. Presence of ergogenic aids in both Option A and D may have been advantageous to some candidates.