



**GCE**

**Sport and Physical Education  
5581**

**PED4**

**Physiological, Biomechanical and  
Psychological Factors which Optimise  
Performance**

**Mark Scheme**

*2008 examination - January series*

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Set and published by the Assessment and Qualifications Alliance.

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## Sport and Physical Education

### Unit 4

#### General Instructions

In the mark scheme ; separates single marks  
 / indicates alternatives  
 CAO correct answer only  
 Equiv. means allow any equivalent answers.

- 1**
- (a) (i) 1. Situation-specific self confidence;  
 2. Belief in ability to cope. *2 marks*
- (ii) 1. Idea of watching another achieving task;  
 2. Model of similar ability;  
 3. Immediately followed by practice. *2 marks*
- (b) 1. Increases positive attitude;  
 2. Increases motivation;  
 3. Reduces fear of failure (Naf)/increases nach;  
 4. Reduces anxiety/stress;  
 5. Enhances feeling of well-being/feel good/better;  
 6. Reach optimal level of arousal. *3 marks*
- (c) 1. Muscle hypertrophy;  
 2. In fast-twitch muscle fibres;  
 3. Increased capillary density in each fibre;  
 4. Increased muscle stores of ATP and/or PC;  
 5. Increased stores of glycolytic/anaerobic enzymes;  
 6. Increased glycolytic/anaerobic capacity/increased glycogen stores;  
 7. Increased capacity to generate and/or remove lactate;  
 8. Delayed lactate threshold/OBLA;  
 9. Increased ability to recruit more motor units;  
 10. Cardiac/heart hypertrophy;  
 11. Increased ventricular wall thickness;  
 12. Increased strength/more powerful contraction;  
 13. Increased stroke/volume/ejection fraction;  
 14. Increased bone density/ligament/tendon strength. *5 marks*
- (d) 1. Dividing training into periods/sections for specific purpose;  
 2. (Macrocycle) – long term plan/goal for single year/Olympics/World Championships;  
 3. (Mesocycle) – monthly/weeks/period of training on particular aspect;  
 4. (Microcycle) – weekly/days/individual training sessions to improve specific area;  
 5. If named all three cycles without explanation;  
 6. Training year divided into competitive phase/peaking/tapering/playing season;  
 7. Involving preparation phase – pre-season training;  
 8. Transition phase – active rest/out of season recovery. *3 marks*
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- 2** (a) (i) 1. Fast-twitch for speed/anaerobic or strength/slow-twitch for stamina/aerobic;  
 2. Proportions inherited;  
 3. Unaffected by training;  
 4. But many other factors involved in activities e.g. skills/techniques;  
 5. e.g. Length of levers in sprinting;  
 6. e.g. VO<sub>2</sub> max in stamina-based activities;  
 7. Two suitable examples of other factors such as fitness, ability, physique/frame size etc. *4 marks*
- (a) (ii) 1. Motor neurone and muscle fibres;  
 2. All fast-twitch or slow-twitch/ homogenous;  
 3. All or none law. *2 marks*
- (a) (iii) 1. (Spatial summation) – Increased strength/more force in muscles;  
 2. Use bigger/larger motor units;  
 3. More motor units;  
 4. Fast-twitch units produce more force than slow-twitch units. *2 marks*
- (b) 1. Inherited/genetic/born with;  
 2. Enduring/stable/unchanging;  
 3. Predisposition to behave in a certain way;  
 4. Consistent/same behaviour all of the time;  
 5. Eysenck and introvertism/neuroticism/Catell and 16PF;  
 6. Role of Reticular Activating System (RAS) and arousal explained. *3 marks*
- (c) 1. Approach behaviours;  
 2. Take risks/enjoy challenges/50/50 situations;  
 3. Wanting to improve/be the best/stand out player;  
 4. Task persistence/keeps trying;  
 5. Welcomes feedback;  
 6. High self-efficacy/confidence;  
 7. Attribute performance/evaluative situations;  
 8. Unafraid of failure/low Naf. *4 marks*
- 3** (a) (i) 1. Cognitive – psychological thoughts/thinking/worries/fears/nerves;  
 2. Somatic – physiological responses/increased heart rate/sweating/muscle tension/nausea. *2 marks*
- (a) (ii) 1. Cognitive higher in days before competition;  
 2. Somatic rises quickly a few hours before the event;  
 3. Cognitive fluctuates/changes/varies/goes up and down/during the event due to success or failure;  
 4. Somatic decreases during the competition. *3 marks*
- (b) 1. Thought-stopping;  
 2. Cognitive;  
 3. Use of simple mental or physical action (e.g. clenching fist, counting slowly);  
 4. Switches attention into a calm/controlled mental state to reduce anxiety;  
 5. Depends on prior learning/conditioning of the response of the calm state to the stimulus of 'action';  
 6. Self-talk;  
 7. Cognitive;
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8. Develop positive thoughts to remove negative ones;
9. Used as a means of breaking 'bad habits' e.g. 'stop'/'no' or to remind ourselves of key aspects of technique e.g. jump/drive/focus/concentrate on appropriate cues/signals;
10. Depends on learning to concentrate on own thoughts;
11. Imagery/visualisation;
12. Cognitive;
13. Lock in on 'perfect performance';
14. Reduces anxiety by diverting attention away;
15. Depends on previous learning of visualised sequences of perfect performance;
16. Mediation;
17. Cognitive;
18. Use of controlled breathing to induce a 'state' of mental calmness;
19. Switches attention from anxiety-producing state to reduce anxiety;
20. Depends on prior learning to 'transcend' from anxious state to calm state through 'mantra'/word/sound;
21. Progressive Muscular Relaxation;
22. Somatic;
23. Use of alternate tension and relaxation of body muscles (coupled with breathing rhythm);
24. Progressively reduces tension of whole body and associated anxiety;
25. Depends on learned ability to systematically concentrate on tension reduction in muscles, starting at periphery and working towards the centre;
26. Autogenic training;
27. Cognitive;
28. Involves directing thoughts away from stress-causing situation;
29. To other calming influences;
30. Depends on ability to learn to re-direct thoughts;
31. Biofeedback – somatic;
32. Somatic;
33. Use of measuring device (pulseometer/electrical conductivity) to reduce level of chosen variable;
34. Reduces anxiety associated with physiological variable;
35. Depends on prior learning of ability to use monitoring device as a means of diverting attention away from anxiety. *3 marks*

- (c) (i)
1. Gravity;
  2. Friction/Air resistance;
  3. Action force/muscular forces/reaction forces/ground reaction force/GRF. *3 marks*

- (ii)
1. Muscular forces cause change in motion;
  2. Gravity limits height of flight/pulls it back down;
  3. (Gravity) reduces vertical component;
  4. Air resistance/friction affects distance of flight;
  5. (Air resistance) reduces horizontal component;
  6. Can be negligible – short duration/short passing;
  7. Can be large – long flight/passing. *4 marks*

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- 4** (a) (i) 1. Improved endurance/stamina/aerobic capacity/ $\text{VO}_2$  max;  
 2. Reduced concentration/partial pressure of oxygen at altitude;  
 3. Compensation through increased red blood cells/haemoglobin;  
 4. Erythroprotein;  
 5. Enhanced oxygen carrying capacity (on return to sea level) *3 marks*
- (ii) 1. Reduced  $\text{pO}_2$  – training very hard;  
 2. Loss of fitness/detraining effect;  
 3. Increased lactate production/accumulation;  
 4. Altitude sickness/weeks to acclimatise;  
 5. Solution – live at altitude and train at sea level;  
 6. Other physiological e.g. blood viscosity/psychological/social/environmental factors. *3 marks*
- (b) 1. Need to store more than is normal;  
 2. Insufficient glycogen for duration of race;  
 3. Required as energy source;  
 4. Dietary manipulation – reduce intake of Carbohydrates then overcompensate;  
 5. May be combined with alterations to training programme/run to exhaustion/exhaust stores. *3 marks*
- (c) 1. Change thoughts/beliefs to affect behaviour;  
 2. Persuasive communication;  
 3. High status/role model/significant others/coach;  
 4. Cognitive dissonance. *3 marks*
- (d) 1. Attribution training – changing the reasons given for failure;  
 2. Incorrect attributions affect performer's persistence/performance/expectations/satisfaction/cause learned helplessness;  
 3. Work with individual to change/improve techniques;  
 4. Encourage performer to attribute success to internal factors/ability/effort;  
 5. Help performer change attributions for failure as being due to external unstable factors/luck/task difficulty;  
 6. Attribute failure to controllable factors. *3 marks*
- 5** (a) 1. Size of group;  
 2. Similarity of status/ability/performance level;  
 3. Type of sport/interactiveness of the activity;  
 4. Stability of group members;  
 5. External threats/outside influences;  
 6. Satisfaction of team members/get on well together/share the same goals/role acceptance;  
 7. Success of group;  
 8. Leadership/style/type. *4 marks*
- (b) 1. Naming the four stages in correct order;  
 2. Forming – getting to know each other/each others' roles/find your place in the team/establish early roles;  
 3. Storming – stage of conflict/rebellion trying to establish roles/status;  
 4. Norming – become cooperative/cohesive;
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5. Performing – primary aim is group success/roles and relationships established/working towards a goal. *4 marks*
- (c)
1. Aerobic/with oxygen;
  2. Glucose/glycogen/carbohydrate/broken down to pyruvate;
  3. Glycolysis;
  4. Mitochondria/Krebs cycle;
  5. Electron transport chain;
  6. ATP production. *4 marks*
- (d)
1. Levels at which lactate/lactic acid accumulates in blood;
  2. Exercise has become anaerobic/without oxygen;
  3. Lactate threshold is some proportion/percentage of  $VO_2$  max;
  4. Proportion/percentage of lactate threshold increases as fitness increases/delayed lactate threshold/OBLA. *3 marks*

### Quality of Written Communication

The GCSE and GCE A/AS Code of Practice requires the assessment of candidates' Quality of written communication wherever they are required to write in continuous prose. In this unit, this assessment will take place for the candidates' script as a whole by means of the following marking criteria.

The candidate expresses moderately complex ideas clearly and reasonably fluently, through well linked sentences and paragraphs. Arguments are generally relevant and well structured. There may be occasional errors of grammar, punctuation and spelling. *4 marks*

The candidate expresses straightforward ideas clearly, if not always fluently. Sentences and paragraphs may not always be well connected. Arguments may sometimes stray from the point or be weakly presented. There may be some errors of grammar, punctuation and spelling, but not such as to suggest a weakness in these areas. *3 – 1 marks*

Ideas are expressed poorly and sentences and paragraphs are not connected. There are errors of grammar, punctuation and spelling showing a weakness in these areas. *0 marks*

**Total** *4 marks*