



**GCE**

**Sport and Physical Education  
6581**

**PED4**

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

**Mark Scheme**

*2009 examination - Jan series*

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1. (a) *4 marks for 4 of:*  
**Golf club**  
1. Applies force  
2. Gives acceleration/changes momentum/velocity  
**Gravity**  
3. Only affects vertical component of flight  
4. Reduces/negative effect on velocity/decelerates  
**Air resistance**  
5. Negligible  
6. Affects horizontal components  
7. Reduces/negative effect on velocity/decelerates
- (b) *4 marks for 4 of:*  
1. Left and right sides match/mirror each other/inverted U shape/symmetrical (if accompanied by diagram)  
2. Height of release – higher height above landing more distance  
3. Angle of release – closer to 45° the better/affects height and distance  
4. Speed of release – more force/speed gives more distance  
5. Design of golf ball/dimples
- (c) *4 marks for 4 of:*  
1. Trait anxiety – enduring/innate personality trait/ a pre disposition/all situations perceived as threatening  
2. State anxiety – temporary emotional response to a situation/situation specific  
3. Cognitive (state anxiety) – psychological/feelings of nervousness, apprehension, negative thoughts or worry  
4. Somatic (state anxiety) – physiological/signs of arousal – sweaty palms, high heart rate, etc
- (d) *3 marks for 3 of:*  
1. Increased drive/arousal means performer tries harder/linear relationship to performance/ $p = d \times h$   
2. Elicits dominant response/habit  
3. Beginner/early/cognitive/associative stage of learning - negative effects because of low skill levels  
4. Dominant response not fully developed/not correct  
5. Impairment effect more likely because complex task  
6. Negative effect enhanced if thought to be judged/evaluation apprehension
2. (a) *4 marks for 4 of:*  
1. Forming – get to know each other/relationships  
2. Storming – roles become established, often contentious/conflict/equiv  
3. Norming – stability/co-operation/cohesive  
4. Performing – roles and relationships established/feel part of team/working towards common goals
- (b) (i) *2 marks for 2 of:*  
1. Motivational factors  
2. Co-ordination factors
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- (ii) 2 marks for 2 of:
1. Social loafing – reduced motivation/effort
  2. Ringlemann effect – more people - less effort/co-ordination
- (c) 2 marks for 2 of:
1. Lactate threshold – accumulation of lactate/lactic acid in blood/OBLA/4 mmols in blood
  2. Too much lactate leads to fatigue/deteriorating performance
  3. Because of high acidity/low pH/increased H<sup>+</sup>/inhibiting enzymes
- (d) 5 marks for 5 of:
1. Lactate removed during EPOC
  2. Slow/lactacid component
  3. Oxygen used/needed for aerobic energy/ATP production formation
  4. Lactate mainly converted back into pyruvate
  5. Mitochondria/Kreb's cycle/to CO<sub>2</sub> and H<sub>2</sub>O
  6. In inactive muscles/other organs (liver)
  7. Some lactate converted to glucose/glycogen/protein
  8. Cori cycle
  9. Some excreted in urine and sweat
3. (a) 5 marks for 5 of:
1. Increased VO<sub>2</sub> max
  2. Increased myoglobin content/better able to store oxygen
  3. More/bigger mitochondria
  4. More oxidative enzymes
  5. Increased stores of (useable) glycogen
  6. Improved ability (more enzymes) to oxidise fat
  7. Cardiac hypertrophy
  8. Decreased resting heart rate/bradycardia
  9. Increased stroke volume/ejection/fraction/maximum cardiac output
  10. Increased blood volume/haemoglobin/red blood cell content
  11. Increased capillary density/capillarisation
  12. Increased hypertrophy/hyperplasia of slow-twitch muscle fibres
  13. Increased a-vO<sub>2</sub> difference
  14. Increase in maximal minute ventilation
  15. Increased pulmonary diffusion capacity
  16. Increased lactate accumulation/delayed or higher OBLA/lactate threshold
  17. Reduced % body fat

- (b) *5 marks for 5 of:*  
(sub-max 3)
1. Reduced  $pO_2$  at altitude/less oxygen in air/available/lower  $O_2$  concentration
  2. Body produces erythropoetin/EPO
  3. More red blood cells/haemoglobin
  4. Greater oxygen transport capacity/carry more oxygen
  5. Greater stamina/cardio-respiratory endurance/aerobic capacity/increased  $VO_2$  max/aerobic respiration
- (sub-max 3)
6. Reduced  $pO_2$  – unable to train as hard as previously/at sea level
  7. Altitude sickness/dehydration/too cold
  8. Loss of fitness/quicker to exhaustion while at altitude/detraining effect
  9. Therefore aerobic performance deteriorates
  10. Requires several weeks/months to be effective
  11. Psychological problems of lifestyle/isolated/expensive/interferes with normal training
- (c) *5 marks for 5 of:*  
(sub-max 3)
1. Leads to task persistence/perseverance
  2. Focuses learning/directs attention to certain skill
  3. Motivates performer/mobilises effort through feedback
  4. Reduces stress/anxiety
  5. Increases self-efficacy/confidence
- (sub-max 3)
6. Must be specific to performer and their sport/technique/performances
  7. Must be measurable in terms of objectivity/units
  8. Must be agreed between performer and coach
  9. Must be realistic/achievable/challenging/exciting to maintain motivation
  10. Must include short and long-term goals/targets
  11. Should be written down and reviewed/evaluated so that they can be amended
  12. Performance goals better than outcome goals
4. (a) (i) *2 marks for 2 of:*
1. Situation-specific self-confidence
  2. Perception/belief of ability to cope with demands
- (a) (ii) *4 marks for 4 of:*
1. Performance accomplishments
  2. Previous/experience success
  3. Vicarious experiences
  4. Observing others succeed (of similar ability)
  5. Verbal persuasion
  6. Being convinced that they can manage
  7. Emotional arousal
  8. Interpretation of their own levels of arousal
  9. Goal setting/targets
  10. Use of performance goals
  11. Attribute successes internally/ability
  12. Use of positive self-talk
  13. Use of visualisation/imagery/imagining doing it yourself/mental rehearsal

- (b) 3 marks for 3 of:
1. Stress is perception of inability to cope with situation/demands not matched by ability
  2. Identify that there are both cognitive and somatic methods/techniques
  3. Distract performer from cause of/block out stress/situation
  4. By occupying mind with alternative/calm thoughts
  5. Need to be learned
  6. Egs visualisation/imagery/mental rehearsal/thought stopping/biofeedback, self talk, progressive muscle relaxation, meditation, stress inoculation
- (c) (i) 2 marks for 2 of:
1. A = elite sprinter
  2. Uses fast-twitch fibres IIb/less slow-twitch fibres used
- (c) (ii) 4 marks for 4 of:
1. Fast contracting
  2. High force production/more powerful
  3. Low lactate/fatigue tolerance/lactate threshold
  4. Larger/faster motor neurone
  5. High sarcoplasmic reticulum development
  6. More/thicker myosin/larger/bigger diameter
  7. High PC stores/levels of creatine kinase
  8. High glycogen stores
  9. High glycolytic/anaerobic/ATPase enzyme capacity
5. (a) 4 marks for 4 of:  
(sub-max 2)
1. High carbohydrate diet increases glycogen level
  2. Above normal
  3. Needs to be taken 1 day prior to swim because levels fall otherwise
- (sub-max 3)
4. Super compensation/overcompensation/glycogen loading/carbo-loading
  5. Glycogen = energy source/provides ATP
  6. Aerobic/using oxygen
  7. Extra glycogen stores for high performance to last longer
- (b) 4 marks for 4 of:
1. Fat available as energy source/provide ATP
  2. Fat break down is aerobic/requires oxygen
  3. Used during low intensity exercise/available long duration exercise
  4. Insufficient glycogen to last duration of event
  5. No fatiguing by-products
  6. Fat gives buoyancy
  7. Fat as insulator
- (c) 3 marks for 3 of:
1. Behaviour is a function of personality and environment
  2.  $B = f(P.E)$
  3. Leads to stable behaviour in a certain situation
  4. Change environment change behaviour
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- (d) *4 marks for 4 of:*  
*(sub-max 1)*
1. Nach-type/need to achieve  
*(sub-max 3)*
  2. Seek out challenging situations/50:50 situations/take risks
  3. Concerned with high standards of performance
  4. Enjoy evaluative situations
  5. Not afraid of failure
  6. Value feedback from others/coach
  7. Attribute performance to internal factors/effort/ability
  8. Approach behaviour
  9. Task persistence
  10. High self efficacy/self confidence