Version 1.0: 0407

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

PED4

5581/6581 Physiological, Bio-mechanical and Psychological Factors

Post Standardisation

Mark Scheme

2008 examination - June 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.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX *Dr Michael Cresswell Director General*

1

Men and women can compete with or against each other in racket games such as badminton and tennis.

(a) Name the forces in use during a game of badminton or tennis **and** explain how they are used to move the shuttlecock or ball. *(4 marks)*

4 marks for 4 of:
1. *Muscle forces/action forces to racket/ball/ground*
2. *Reaction forces/ground reaction forces cause movements of performer*
3. *Friction force stops sliding/gives grip/eq*
4. *Gravity affects flight/trajectory/distance/height*
5. *Air resistance may affect flight/can be ignored/affects distance/slows*

(b) In racket games, men tend to produce more powerful shots than women.

Describe the *physiological* **and/or** *structural* differences that make it possible for men to exert more power than women. *(4 marks)*

4 marks for 4 of:
Men
1. *Larger frame/bigger skeleton/bones*
2. *More/bigger muscle/hypertrophy*
3. *More strength*
4. *Longer levers/limbs*
5. *Greater speed/rotational/angular velocity of limbs*
6. *Testosterone/androgens*

(c) Fiedler (1967) suggested that the effectiveness of leaders depended on the situation and the style of leadership.

(i) Describe the **two** *styles of leadership* identified by Fiedler and the situation in which each is most effective. *(2 marks)*

2 marks for 2 of:
1. *Task-orientated/autocratic <u>and</u> relationship-orientated/person-orientated/democratic*
2. *Task-orientated/autocratic – most and least favourable <u>and</u> relationship-orientated/person-orientated/democratic – moderately favourable*

(ii) The effectiveness of these styles depends on whether the situation is favourable. What factors determine the 'favourableness' of the situation? *(3 marks)*

3 marks for 3 of:
1. *Quality of leader's relationship with group*
2. *Leader's level of authority*
3. *Resources available eg facilities/equipment/time*
4. *Demands of task/environment/danger*

(d) Using examples, explain why a leader, when choosing a leadership style, needs to consider the characteristics of the group they are leading. *(2 marks)*

2 marks for 2 of:

1. *Larger group – task – orientated/autocratic or smaller group – relation-orientated/democratic*
2. *Younger teams – relation-orientated/democratic or older teams – autocratic/task-orientated*
3. *Female teams – relation-orientated/democratic or males – task orientated/autocratic style*
4. *Elite/highly skilled prefer relationship-orientated/democratic or novices/weaker players prefer task – orientated/autocratic*

2

High board diving involves performers taking turns to perform complicated manoeuvres from a 10-metre high diving board before they enter the water in a controlled body position. Big competitions are usually held in front of many spectators.

(a) The presence of spectators may lead to an increase in arousal. What do you understand by the term *arousal?* *(2 marks)*

2 marks from 2 of:

1. *State/level of activation/excitement/alertness/anticipation*
2. *Somatic = physiological eg increased heart rate/sweating etc*
3. *Cognitive = psychological eg loss of concentration/attentional narrowing etc*

(b) Explain the effects of arousal on a performer in terms of *catastrophe theory*. *(3 marks)*

3 marks from 3 of:

1. *Increasing arousal leads to increased performance up to optimal level*
2. *Further increase in arousal leads to dramatic decline in performance*
3. *From which performer may be able to use calming methods and refocus to return arousal levels to optimal*
4. *Or further arousal causes further decline in performance*

(c) The effects of audiences on performance often depend on the standard of the performer. Explain what this means in terms of *drive theory*. *(4 marks)*

4 marks from 4 of:

1. *Straight line/linear (diagram) relationship between arousal and performance*
2. *Good/elite/autonomous performer – dominant response is correct – performance improves*
3. *Called social facilitation*
4. *Learner/weak/cognitive performer – dominant response incorrect – performance deteriorates*
5. *Called social inhibition*

(d) Explain, using *Newton's First* **and** *Second Laws of Motion,* how high-board divers leave the diving board. *(3 marks)*

3 marks for 3 of:
1. *First Law/inertia – apply forces to change state of motion*
2. *Muscular forces*
3. *Second Law/acceleration – rate of change of momentum/acceleration depends on magnitude of forces applied*
4. *Gives direction*

(e) **Figure 1** shows a high-board diver twisting while performing a dive.

Explain the effect of the change in the diver's body position on their rate of spin *(3 marks)*

3 marks for 3 of:
1. *Angular momentum stays constant*
2. *Angular momentum = angular velocity x moment of inertia*
3. *Angular velocity = rate of spin/how fast diver spins/rotates*
4. *Moment of inertia = distribution/spread of mass around axis*
5. *Changing/reducing moment of inertia affects/increases angular velocity*

3

Rugby is a team game that has high psychological and physiological demands. During a rugby match there is considerable physical contact, but incidents of aggression are relatively rare.

(a) (i) Explain the terms *hostile aggression* and *instrumental aggression.* *(2 marks)*

2 marks for 2 of:
1. *Hostile – reactive/solely to harm/planned/involves anger*
2. *Instrumental – channelled/means to a goal/no anger involved/use aggression to get result*

(ii) Explain how *frustration* may lead to *aggression*. *(4 marks)*

4 marks for 4 of:
1. *Performer tries to achieve goal*
2. *Opposition block/stop/tackle*
3. *Leads to frustration and possible aggression*
4. *Build up of frustration – more likelihood of aggression*
5. *Aggression reduces frustration/catharsis*
6. *(Berkowitz's) aggressive cues – greater likelihood of aggression*

(iii) How might a coach try to reduce the aggressive tendencies of one of their players? *(3 marks)*

3 marks for 3 of:
1. *Praise/reinforce assertive behaviour*

2. *Remove cues/factors causing aggression*
3. *Remove/penalise aggressive player*
4. *Teach stress management techniques to reduce arousal/relaxation*
5. *Teach cognitive techniques/imagery/self-talk*
6. *Encourage performance-related rather than outcome related goals*
7. *Stop encouraging/reinforcing aggressive behaviour*

(b) Elite games players require a high VO_2 max in order to perform well.

What do you understand by the term *VO^2 max* **and** why is it an important requirement of elite games players? *(3 marks)*

3 marks for 3 of:
1. *Maximum volume of oxygen used/consumed per minute*
2. *Measure of aerobic fitness/stamina/endurance*
3. *Matches last 80 minutes/over an hour*

(c) During and following a game of rugby, performers will experience *Excess Post-exercise Oxygen Consumption* or EPOC.

What is this excess oxygen being used for? *(3 marks)*

3 marks for 3 of:
1. *Re-saturation of myoglobin (with oxygen)*
2. *To restore/remake/resynthesis/ATP/PC/ATP-PC*
3. *Used to remove lactate/lactate acid*
4. *Maintain high breathing rate/heart rate/metabolic rate/temperature*

4

Elite athletes will complete each heat in a 100-metre competition in 10-12 seconds. The athletes will need to finish in the first three or four in order to progress to the next round of races.

(a) (i) What are the main *energy sources* used by a performer during a 100-metre sprint? *(2 marks)*

2 marks for 2 of:
1. *ATP*
2. *Phosphocreatine/PC*
3. *Glycogen/glucose*

(ii) How is the **majority** of energy produced during a 100-metre sprint? *(6 marks)*

6 marks for 6 of:
1. *Splitting/breakdown of ATP*
2. *Resynthesis/regeneration of ATP*
3. *Energy from phosphocreatine/PC <u>breakdown</u>/PC → P + C*
4. *PC found in muscles*
5. *Lasts 5-8 seconds/limited supply*
6. *Anaerobic/without oxygen*
7. *Glycogen/glucose <u>breakdown</u>*

8. Glycolysis
9. To pyruvate
10. Lactate formed from 8 to 9

Performers may attribute their performance in the 100 metres to various factors. Weiner (1972) suggested that the reasons people give for their success or failure could be categorised into four types. Weiner's model is shown in **Figure 2.**

Figure 2

	Internal attribution	**External attribution**
Stable attribution	**A**	**B**
Unstable attribution	**C**	**D**

(b) (i) The following statements about their performances were made by 100-metre sprinters:

1. 'I didn't concentrate enough.'
2. 'I'm not as good as her.'
3. 'I always run badly on that track.'
4. 'I arrived late and didn't have time to warm up properly.'

Using **Figure 2,** match each of the statements (**1-4**) given by the sprinters about their performances to attributions **A, B, C** and **D.** *(3 marks)*

4 correct – 3 marks; 2 correct – 2 marks; 1 correct – 1 mark

1.	*1 = C*	*or*	*A = 2*
2.	*2 = A*		*B = 3*
3.	*3 = B*		*C = 1*
4.	*4 = D*		*D = 4*

(ii) In terms of attribution theory, explain what is meant by *self-serving bias* **and** *learned helplessness.* *(4 marks)*

Sub max 2 marks
1. Self-serving bias – blaming success on internal factors/failure on external factors
2. Maintains self-esteem/feel better about themselves
Sub max 3 marks
3. Learned helplessness – failure is inevitable
4. Eventually give up/stop trying
5. Attributed failure to internal factors/success to external factors
6. Can be specific or global

Team games, such as basketball, require individuals to work together. Steiner (1972) suggested that the relationship between the individual members of a team and their overall performance may be expressed as:

actual productivity = potential productivity – losses due to faulty group processes

(a) (i) Explain the terms *actual productivity* and *potential productivity* **and** identity factors that might affect the **potential** productivity of a team. *(4 marks)*

4 marks for 4 of:

1. *Actual productivity – performance achieved by a team*
2. *Potential productivity – teams' possible best performance*
3. *Depends on resources eg ability/skills/knowledge/fitness/experiences etc*
4. *Second eg given*

(ii) What are the possible causes of *losses due to faulty group processes?* *(4 marks)*

4 marks for 4 of:

1. *Co-ordination losses*
2. *Player's skills are not interwoven into unity/tactical failings/lack of teamwork*
3. *More interactive sports suffer the more difficult co-ordination losses/accept reverse*
4. *Ringlemann effect*
5. *Less interactive/co-active sports suffer less from co-ordination losses/accept reverse*
6. *Motivational losses*
7. *Social loafing*
8. *Players feel they can expect others to do the work*

(b) Basketball players need considerable power in their legs to be able to jump high for the ball.

(i) Explain the role of the *muscle spindle apparatus* in adjusting the strength of contraction of a muscle to allow a basketball player to achieve the required height in their jump. *(3 marks)*

3 marks for 3 of:

1. *Muscle spindles stretched when/detect muscle tension changes*
2. *Sensory nerve impulses to CNS/spinal cord/brain*
3. *Reflex/corresponding impulses to intrafusal/muscle fibres*
4. *Adjust strength of contraction*
5. *Eccentric contraction initiates stretch reflex*
6. *Muscle spindle fibres contract/added to increase strength of contraction*

(ii) Basketball players need flexibility to play effectively. Explain how *PNF stretching* may be used to increase flexibility. *(4 marks)*

4 marks for 4 of:

1. *May work with partner*
2. *Stretch to limit of movement and hold position*
3. *Isometric contraction/position held for some seconds*

4. *Inhibits stretch reflex*
5. *Removes role of/inhibits muscle spindles*
6. *Allows subsequent greater stretch/CRAC*
7. *Increased range of movement*

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.

3 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.

2 – 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 3 marks