VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

# 2007 Physical Education GA 3: Written examination

## GENERAL COMMENTS

The 2007 Physical Education examination was well done by the majority of students sitting the examination paper. Once again, students who used correct terminology and gave specific examples in their responses were more likely to receive full marks. Teachers should make students aware of the examination criterion 'Understanding and appropriate use of key terms and concepts'. A number of questions asked students to 'outline' a specific concept or strategy and, although these questions were worth only one mark, it is imperative that students and teachers understand that an 'outline' should consist of more then a one or two word response.

Students who related their responses back to the question and referred to the information provided in the stem of the question were generally able to score highly.

Students need to be reminded that the use of abbreviations in examinations must by limited to those which are commonly used and scientifically acceptable (for example, $O_2$ for oxygen and CHO for carbohydrate) and not those that are merely perceived to be quicker to write (for example ppl for people or PA for physical activity). Assessors must have a clear understanding of what the student is saying in their response and should not be expected to interpret shorthand responses.

## SPECIFIC INFORMATION

### Section A – Multiple-choice questions

**The table below indicates the percentage of students who chose each option. The correct answer is indicated by shading.**

| Question | % A | % B | % C | % D | Comments |
|---|---|---|---|---|---|
| **1** | 3 | 2 | 56 | 39 | |
| **2** | 94 | 1 | 4 | 0 | |
| **3** | 6 | 47 | 31 | 16 | |
| **4** | 5 | 17 | 60 | 19 | |
| **5** | 13 | 41 | 35 | 11 | Many students failed to recognise that this was the formula for the breakdown of carbohydrates in the presence of oxygen and therefore glycogen would be converted to pyruvic acid prior to being broken down into carbon dioxide, water, heat and energy. |
| **6** | 14 | 37 | 15 | 34 | Students were asked to think about ethical considerations from a different perspective, and many were unaware of the principles that make up the sporting ethical charter. |
| **7** | 53 | 15 | 26 | 6 | This question was taken directly from the advice provided by the VCAA on Lactate inflection point (LIP) in 2007, yet students overwhelmingly thought that LIP was the point where lactate accumulates in the blood (A) and not the balance between lactate entry into and removal from the blood (C). |
| **8** | 8 | 43 | 46 | 2 | |
| **9** | 1 | 14 | 2 | 83 | |
| **10** | 77 | 9 | 8 | 6 | |
| **11** | 71 | 5 | 6 | 18 | |
| **12** | 28 | 9 | 15 | 48 | |
| **13** | 22 | 42 | 29 | 7 | |
| **14** | 1 | 8 | 85 | 5 | |
| **15** | 28 | 5 | 16 | 51 | |

### Section B – Short answer questions

For each question, an outline answer (or answers) is provided. In some cases the answer given is not the only answer that could have been awarded marks.

  

**Question 1**

| Marks | 0 | 1 | 2 | Average |
|---|---|---|---|---|
| % | 12 | 38 | 50 | **1.4** |

Possible responses included:

- whether he was able to give informed consent
- whether it was fair to his opponent – would he be taking an unfair advantage
- whether he was being a good role model
- it is within the rules of the game, therefore he was not cheating
- the health consequences of his actions – whether there was a risk of further aggravating the existing injury
- the pain killers would allow him to play but not enhance his performance
- it would allow the game to be played to please spectators and sponsors.

Good responses stated the consideration as a question that Wayne would have asked himself.

**Question 2**

**2a.**

| Marks | 0 | 1 | 2 | Average |
|---|---|---|---|---|
| % | 19 | 63 | 18 | **1.0** |

- Pedometers raise self awareness of physical activity levels.
- Pedometers are an easy tool to use with large groups of people.

**2b.**

| Marks | 0 | 1 | 2 | Average |
|---|---|---|---|---|
| % | 13 | 36 | 50 | **1.4** |

Possible responses included any two of:

- cannot provide information about physical activity type and/or context
- is a poor measure of physical activity intensity
- can only assess one physical activity behaviour (walking/running)
- cannot be used for aquatic activities
- cannot be used for measuring upper body activity
- cannot record data in real time/is a poor measure of physical activity duration
- unable to detect the magnitude of movement or incline (for example, walking on flat ground or uphill)
- pedometers do not take into account body size and speed of locomotion and therefore are not suitable for comparing children with different levels of maturation
- provides no information about frequency
- energy expenditure estimates are often based on studies of adults, and therefore may be inappropriate for use with older people, people with disabilities and/or children.

This question was well handled by most students. A common error was to repeat that pedometers are a cost effective tool when it was stated in the stem of the question.

**Question 3**

**3a–b.**

| Marks | 0 | 1 | 2 | Average |
|---|---|---|---|---|
| % | 12 | 64 | 24 | **1.1** |

**3a.**

| Work Time | Intensity | Repetitions | Sets | Rest period | Work to rest ratio | Frequency per week |
|---|---|---|---|---|---|---|
| 5 seconds | 95% Max heart rate | 8 | 3 | 25 seconds | 1:5 | 3 |
| *4.5 seconds* | 95% Max heart rate | *9* | *No change* | *22/23 seconds* | *3:10* | 3 |

Most students only changed one variable; however, they often increased the variable by greater than 10 per cent.

**3b.**

ATP-PC

**3c.**

| Marks | 0 | 1 | 2 | Average |
|---|---|---|---|---|
| % | 38 | 41 | 21 | **0.9** |

**3ci.**
Rest/passive recovery

**3cii.**
Rest/passive recovery allows the most **rapid** resynthesis of ATP-PC.

Many students correctly identified passive recovery but did not state that it allowed for a rapid resynthesis of ATP-PC and consequently received only one mark.

**3d.**

| Marks | 0 | 1 | 2 | Average |
|---|---|---|---|---|
| % | 17 | 29 | 54 | **1.4** |

Any two of:

- muscles used
- actions performed
- intensity of performance
- duration, and therefore the energy system used (W:R).

**Question 4**

| Marks | 0 | 1 | 2 | Average |
|---|---|---|---|---|
| % | 46 | 43 | 11 | **0.7** |

Possible responses included any two of:

- start the season earlier when the grounds are in better condition
- group several club together to share facilities, this way fewer grounds need to be maintained and watered, therefore grounds can be watered and be in better condition
- use grey/recycled water to maintain the grounds
- play on both Saturday and Sunday so that more games are played in a shorter period of time when grounds are in better condition
- change the timing of the season
- pool resources with other clubs
- schedule different game times
- change the surface to synthetic or drought tolerant grass
- change the rules of the game
- change the training venue to a different location
- check for damage to the ground caused by the drought (for example, holes/cracks).

This question was answered poorly as students did not refer to the information provided in the stem of the question. Too many students read risk management strategy and gave prepared responses such as ‘cover sprinkler holes’ and ‘taping and bracing’ which are **not** the role of the administrator or related to the drought. Students must realise that information provided in the stem of the question is given for a reason and that good responses will provide a link back to the question.

**Question 5**
**5a–b.**

| Marks | 0 | 1 | 2 | 3 | Average |
|---|---|---|---|---|---|
| % | 7 | 37 | 36 | 20 | **1.7** |

**5a.**
Increases

**5b.**
Fatigue will increase because (any two of):

- there is greater reliance on the anaerobic energy system at these intensities
- of accumulation of the by-products caused by anaerobic metabolism

- accumulation of H+ ions inhibits glycolytic enzymes
- there is insufficient oxygen available to break down by-products.

Most students realised that blood lactate increases beyond LIP and could explain why.

**5c.**

| Marks | 0 | 1 | 2 | 3 | Average |
|---|---|---|---|---|---|
| % | 55 | 29 | 10 | 6 | **0.7** |

**5ci.**
Lactate inflection point

**5cii.**
The athlete is able to sustain a higher intensity over a prolonged period.

Students had difficulty answering this part. LIP is a new introduction to the course, and many students confused it with lactate tolerance and could not explain that an athlete with a higher LIP will be able to go 'harder for longer' in a race.

**Question 6**

**6a–b.**

| Marks | 0 | 1 | 2 | 3 | 4 | Average |
|---|---|---|---|---|---|---|
| % | 13 | 19 | 20 | 24 | 25 | **2.3** |

**6a.**
Preparation

**6b.**
Possible responses included **behavioural** strategies such as:

- enlist social support from a friend, partner or family member
- use reminder systems, such as putting a sign on her fridge or mirror
- give herself rewards for being active regularly
- make plans, or commitments, to be active – she may even write down on which days she will be active
- substitute alternative activities when she is feeling tired/stressed/bored.

Questions 6a. and 6b. were well answered and most students realised that if the subject was in the action stage then a behavioural strategy was needed. Students who listed, instead of outlined, a strategy were not awarded any marks for this question.

**6c.**

| Marks | 0 | 1 | 2 | 3 | Average |
|---|---|---|---|---|---|
| % | 60 | 4 | 4 | 32 | **1.1** |

**6ci.**
Self-report/recall

**6cii.**
At 85 years old Loris may have recall/memory or cognitive limitations and not be capable of accurately reporting her physical activity.

Part c. was not done well. Students needed to relate their response back to the age of the subject, as stated in the stem of the question. Some students confused a measure of physical activity with a fitness test.

**Question 7**

**7a–b.**

| Marks | 0 | 1 | 2 | 3 | 4 | Average |
|---|---|---|---|---|---|---|
| % | 14 | 37 | 21 | 16 | 11 | **1.8** |

**7a.**
To evaluate either of:

- the training program/effectiveness

- motivation.

**7b.**
Possible responses included any three of:
- same warm up prior to the test
- test at the same time of day
- same environmental conditions were present
- similar nutritional and fluid intake for the athlete prior to the test
- same activity levels prior to the test
- same equipment, shoes, etc.
- same health state.

**7c–d.**

| Marks | 0 | 1 | 2 | 3 | Average |
|---|---|---|---|---|---|
| % | 71 | 18 | 6 | 5 | **0.5** |

**7c.**
Line B

**7d.**
Due to an increase in other cardiorespiratory parameters, the oxygen uptake required at a sub-maximal level is less than prior to training as the system is more efficient.

Students had great difficulty with parts c. and d. of Question 7. Many failed to read the title of the graph, which stated that the results showed the oxygen uptake at a sub-maximal level, and selected line A. They were then unable to correctly explain the change.

**7e.**

| Marks | 0 | 1 | 2 | Average |
|---|---|---|---|---|
| % | 56 | 3 | 42 | **0.9** |

Possible responses included any of:
- increased mitochondria density and number
- increased myoglobin store
- improved oxidative capacity via increased oxidative enzymes
- increased capillary density
- increased use of fat during sub-maximal exercise
- increased stores and use of intramuscular triglycerides
- increased muscle glycogen synthase and storage.

In this part, students still did not read the type of chronic adaptation required, in this case muscular, and often gave either a cardiovascular or respiratory adaptation.

**Question 8**

| Marks | 0 | 1 | 2 | 3 | 4 | Average |
|---|---|---|---|---|---|---|
| % | 65 | 2 | 12 | 1 | 21 | **1.1** |

| Duration (maximal intensity work) seconds | Total energy release ml/kg | Aerobic ml/kg | Anaerobic ml/kg |
|---|---|---|---|
| 60 | 100 | 50 | 50 |
| 120 | 150 | *100* | *50* |
| 180 | 200 | *150* | *50* |

The concept of the finite capacity of the anaerobic system has been a difficult one for students to understand and responses to this question reflected that. While the question examined the same knowledge as previous years, the format was different and many students were unable to apply their understanding of this key concept.

**Question 9**

**9a–b.**

| Marks | 0 | 1 | 2 | 3 | 4 | 5 | Average |
|---|---|---|---|---|---|---|---|
| % | 7 | 11 | 17 | 24 | 19 | 23 | **3.1** |

**9a.**

Continuous

**9bi–ii.**

- Aerobic capacity (power): The duration is 20 minutes; therefore the aerobic system is the predominant system being used. Also, his heart rate is around 80% of maximum, which would place it in the aerobic training zone.
- Local muscular endurance: Arms and legs are subjected to significant local muscular fatigue due to having to continuously perform the same action (strokes) for an extended period of time (20 minutes).
- Muscular strength: Isometrically gripping the handle against the resistance produced by the much larger leg muscles.

**9c–e.**

| Marks | 0 | 1 | 2 | 3 | 4 | 5 | 6 | Average |
|---|---|---|---|---|---|---|---|---|
| % | 18 | 14 | 16 | 20 | 13 | 17 | 3 | **2.6** |

**9c.**

A rest day taken between exercise sessions to allow for a full recovery.

**9d.**

Possible responses included any two of:

- cardiac hypertrophy (ventricle volume)
- increased stroke volume/cardiac output
- increased a-$VO_2$ difference
- increased capillarisation
- increased blood volume (plasma/haemoglobin).

Cardiovascular adaptations would improve performance because they lead to an increase in oxygen delivery to working muscles, making more oxygen available for energy production.

Some students restated the same adaptation and gave the same justification. For example, stroke volume and cardiac output are the same and students could not list these as two different adaptations.

**9e.**

Fartlek or Long interval training

Students demonstrated a good understanding of training methods and fitness components in Question 9.

**Question 10**

**10a.**

| Marks | 0 | 1 | 2 | Average |
|---|---|---|---|---|
| % | 46 | 15 | 40 | **1.0** |

Students needed to compare a context to an intensity level. For example;

- as the student moves from teacher instruction to fitness work, the amount of vigorous intensity physical activity increases
- skill practice is associated with the highest level of moderate-intensity physical activity, whereas the fitness context displays the highest level of vigorous-intensity physical activity.

Some students had difficulty in describing the association in the graph; however, this appeared to be due to not understanding the context rather than not being able to interpret the graph.

**10b.**

| Marks | 0 | 1 | 2 | 3 | Average |
|---|---|---|---|---|---|
| % | 8 | 12 | 24 | 55 | **2.3** |

**10bi.**
No

**10bii.**
The school provides three hours (180 minutes) per week of physical education and sport; this is not sufficient to meet the recommended 60 plus minutes per day (that is, 60 × 7 days = 420 plus minutes per week) of moderate to vigorous physical activity.

Part b. was done particularly well by many students, demonstrating a thorough understanding of the National Physical Activity Guidelines for children.

**Question 11**
**11a.**

| Marks | 0 | 1 | 2 | 3 | Average |
|---|---|---|---|---|---|
| % | 3 | 23 | 0 | 74 | **2.5** |

From highest to lowest:
- Athlete A
- Athlete C
- Athlete B.

Most students were able to correctly identify the total amount of oxygen consumed.

**11b.**

| Marks | 0 | 1 | 2 | 3 | Average |
|---|---|---|---|---|---|
| % | 13 | 52 | 0 | 35 | **1.6** |

From highest to lowest:
- Athlete B
- Athlete A
- Athlete C.

Few students managed to correctly rank the athletes' oxygen consumption post exercise.

**11c.**

| Marks | 0 | 1 | 2 | Average |
|---|---|---|---|---|
| % | 46 | 27 | 27 | **0.8** |

Either of:
- ultra-marathon runners need to use fats early in the race (glycogen sparing) to delay the depletion of carbohydrates
- ultra-marathon runners need to use fats early in the race to delay 'hitting the wall' when carbohydrates are depleted and the heart has to work harder because more oxygen is required to break down FFA.

Many students were unable to recognise that fats would be important in an event of this duration.

**11d.**

| Marks | 0 | 1 | 2 | 3 | Average |
|---|---|---|---|---|---|
| % | 45 | 33 | 17 | 4 | **0.8** |

Possible responses included any three of:
- delay in intake of carbohydrates after exercise
- inadequate amount of carbohydrates
- reliance on carbohydrate-rich foods with a low glycaemic index
- high-intensity exercise during recovery
- damage to the muscle
- drinking water instead of a sports drink
- insufficient rest
- inadequate protein with carbohydrates.

Part d. was very poorly done. Students were not specific enough in identifying three factors and gave responses such as 'not eating enough', 'not eating the right food' or 'not doing the right recovery', which did not receive any marks.

**Question 12**

| Marks | 0 | 1 | 2 | 3 | 4 | 5 | Average |
|---|---|---|---|---|---|---|---|
| % | 6 | 23 | 14 | 34 | 8 | 14 | **2.6** |

- A – PC
- B – carbohydrates/glycogen/glucose
- C – fats/FFA/triglycerides
- D – carbohydrates/glycogen/glucose
- E – protein

This question was reasonably well handled by many students.

**Question 13**

**13a–b.**

| Marks | 0 | 1 | 2 | 3 | Average |
|---|---|---|---|---|---|
| % | 4 | 15 | 38 | 43 | **2.2** |

**13a.**

Possible responses included any two of:

- moodiness/depression/anger/irritability
- increased anxiety
- loss of competitiveness/motivation/enthusiasm
- reduced concentration
- decreased performance
- loss of appetite
- tiredness/fatigue
- increased sweating
- hyperactivity.

**13b.**

Strategies for preventing overtraining included any of:

- have a well designed training program suited to the individual
- ensure there is adequate rest and recovery in the training program
- carefully monitor the athlete's performance
- ensure there is variety in the training
- balance rest and work
- gradually increase training loads
- maintain adequate nutrition
- use a training log to monitor performance.

**13c.**

| Marks | 0 | 1 | 2 | 3 | 4 | Average |
|---|---|---|---|---|---|---|
| % | 10 | 10 | 28 | 31 | 21 | **2.5** |

| Athlete's daily training log | |
|---|---|
| Week A | Date 06/02/2007 |
| Training notes | |
| Physiological data | Psychological data |
| Distance<br>Intensity<br>Resting heart rate<br>Weight<br>Fatigue level<br>Muscle soreness<br>Sleep patterns<br>Energy levels<br>General health | Emotional state<br>Attitude to work<br>Attitude to training<br>Attitude to team<br>Attitude to competition<br>Motivation levels<br>Confidence/self esteem<br>Communication with coach |

Question 13 was very well done by the majority of students, although common errors were listing fatigue or tiredness as psychological data and not giving specific examples of data.

**Question 14**

**14a.**

| Marks | 0 | 1 | 2 | 3 | 4 | Average |
|---|---|---|---|---|---|---|
| % | 1 | 7 | 29 | 35 | 28 | **2.8** |

- Line A – A 200 metre sprinter
- Line B – A midfield player in a team sport such as hockey or soccer
- Line C – A person walking a dog at a brisk (moderate-intensity) even pace
- Line D – A person at rest

**14b.**

| Marks | 0 | 1 | 2 | Average |
|---|---|---|---|---|
| % | 52 | 25 | 23 | **0.7** |

At the start of exercise there is always a slight rise in lactic acid due to an increase in exercise intensity and a delay in increasing oxygen supplies to break down the lactic acid.

Most students' responses to part b. showed a clear lack of knowledge regarding the interplay of the three energy systems at the beginning of exercise.

**Question 15**

**15a.**

| Marks | 0 | 1 | 2 | Average |
|---|---|---|---|---|
| % | 44 | 46 | 10 | **0.7** |

- Line A – Total energy supply
- Line C – ATP-PC system

**15b.**

| Marks | 0 | 1 | 2 | 3 | Average |
|---|---|---|---|---|---|
| % | 44 | 14 | 26 | 16 | **1.2** |

**15bi.**

Lactic Acid system

**15bii.**

- The ATP and PC stored in muscles are exhausted.
- There is insufficient oxygen to produce energy aerobically at this point.

Students failed to recognise this graph or to read the title and labels and consequently were unable to correctly identify the total energy supply line and the ATP-PC line from the graph. This indicated a lack of student knowledge in the area of energy system contribution. Many students incorrectly said that the dominant energy system at 10 seconds is the ATP-PC system. This was most likely because they had answered without looking at the graph.

**Question 16**

**16a–b.**

| Marks | 0 | 1 | 2 | 3 | Average |
|---|---|---|---|---|---|
| % | 28 | 33 | 25 | 14 | **1.3** |

**16a.**

People in the termination stage have been regularly active for over five years and it is ingrained in their lifestyle, so they would therefore be gaining the health benefits.

A number of responses reflected that students thought that the termination stage was where the participant had ceased doing physical activity. These students therefore could not show a link to health benefits for the population.

**16b.**

Possible responses included two cognitive strategies such as:

- increase awareness of the benefits of being active
- increase awareness of the effect that the individual's inactivity has on significant others such as family members, partners or friends
- increase awareness of physical activity opportunities
- increase knowledge of the health benefits of regularly being active.

**16c.**

| Marks | 0 | 1 | 2 | 3 | Average |
|---|---|---|---|---|---|
| % | 23 | 20 | 26 | 31 | **1.7** |

Possible responses included any three of:

- increase the aesthetics of parks and walking trails
- increase access to walking trails to specific destinations
- introduce new facilities specifically designed for different age groups and cultural interests
- publish distances to walking destinations on signs
- increase physical activity opportunities within shopping centres by reducing the visibility of escalators and elevators and placing stairs in convenient locations
- increase access to public transport to specific local destinations
- introduce traffic calming around routes to schools in order to encourage walking.

Students received full marks for giving specific examples of strategies and not general statements such as 'build more facilities'.

**Question 17**

**17a.**

| Marks | 0 | 1 | 2 | 3 | Average |
|---|---|---|---|---|---|
| % | 10 | 16 | 43 | 31 | **2.0** |

**17ai.**

Subject B

**17aii.**

Possible responses included both of:

- starts with a lower $VO_2$ max. as she is predominately an anaerobic athlete, being a goalkeeper
- there is a more rapid increase in $VO_2$ max. with the training program (diminishing returns).

Question 17a. was done well by many students, who identified that a goalkeeper would have lower initial $VO_2$ max. than a midfield player and that by starting with a lower $VO_2$ max. the gains from training would be greater.

**17b.**

| Marks | 0 | 1 | 2 | Average |
|---|---|---|---|---|
| % | 88 | 10 | 2 | **0.2** |

Through overload: By working to a percentage of maximum heart rate, as aerobic fitness increased the subject will have to work at a greater workload (run further and more quickly) to maintain the same percentage of maximum heart rate or heart rate reading, therefore built in overload is achieved.

Part b. was very poorly understood by most students. The concept of built in overload, and that the subject would need to run further and/or faster in the same time to maintain the given heart rate, was a very difficult concept for students to grasp.

**Question 18**

**18a–c.**

| Marks | 0 | 1 | 2 | 3 | 4 | Average |
|---|---|---|---|---|---|---|
| % | 23 | 16 | 20 | 22 | 19 | **2.0** |

**18a.**

Direct observation/SOPLAY (System for Observing Play and Leisure Activity in Youth)

**18b.**

Possible responses included:

- direct observation provides information about context and types of physical activity, whereas heart-rate telemetry does not
- direct observation can assess all dimensions of physical activity, whereas heart-rate telemetry can mask the sporadic nature of children's physical activity due to the lag-time between intensity and heart rate during activity
- fitting of heart rate monitors to large numbers of children is not practical or feasible, whereas direct observation allows the collection of data about a large number of people within a specific context or area.

Many responses to this part did not compare the two measures. Students were unable to achieve full marks if they did not say why the measure selected was a better choice for Mr Jacobs.

**18c.**

- Multiple visits by the researcher could reduce reactivity as the children get used to being observed (or ignore data collected during first few visits).
- Observe students over a greater period time to decrease reactivity.
- Ensure that children are unaware they are being observed. For example, the researcher could view the playground from a hidden location (such as inside a school building) or view the playground from behind one way mirrors or glass.

Many students correctly stated that the children needed to be unaware of the researcher to reduce reactivity.