

## Physical Education GA 3: Written examination

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### GENERAL COMMENTS

Most students attempted all questions on the paper. Some students had difficulty in providing a response that accurately met the requirements of the question and instead re-worded the question in an attempt to provide an answer.

Many students made errors as a result of having misread the question. Examples of this included: Question 1b. where many students answered 'anaerobic system' when the question asked 'which' of the anaerobic systems, and in Question 6b. in which many students responded with a method of stretching rather than a type of stretch.

Students must be aware that **list, outline, discuss, explain and identify** are important in the response when given as part of the question. Many students gave a single word answer when a more detailed response was required.

Where more than one reason, factor or characteristic was asked for many students had difficulty in making it clearly understood that their responses were different. This was a problem in many of the questions relating to Unit 4 work.

Some students provided more than the required number of responses. If a student supplies three answers and only two are asked for, only the first two responses are considered.

Many students showed a misunderstanding of the varying contribution of the energy systems to exercise of differing duration and intensity. It is highly likely that these misunderstandings affected the students' ability to correctly answer questions relating to training principles and methods. This could be seen in Question 4a. with very few students able to identify the aerobic system as the major provider of energy late in an endurance event.

### SPECIFIC INFORMATION

#### Question 1

Most students were able to accurately interpret the graph and answered this question well.

**a.**

A large increase in energy (anaerobic energy) output.

**b.**

Lactic acid system or anaerobic glycolysis.

**c.**

PC stores are depleted (1 mark).

Reason: for example he enters the 2<sup>nd</sup> minute of high intensity work following a prolonged rest, or most of the work during 8<sup>th</sup> minute is anaerobic therefore he will have exhausted the ATP-PC system.

**d.**

Anaerobic capacity

Speed

Muscular endurance

Cardiovascular endurance/aerobic fitness/aerobic power.

One mark was given for the component and the second mark for a detailed explanation of how the graph indicates that it is important.

For example:

Aerobic – 10 minutes of work therefore a high proportion of energy is aerobic

Speed /anaerobic capacity – high intensity work is indicated on the graph therefore speed will be a significant component for locomotion and/or skill execution

Muscular endurance – continuous activity, and the activity lasts for 10 minutes.

#### Question 2

Most students showed an understanding of the size difference between fast twitch and slow twitch fibres and answered this question well. A number of students did not identify plyometrics as the solution to part e despite having answered part d correctly. In part c, students did not have to state which contraction type they were referring to.

**a.**

Fast twitch (white or type 2).

**b.**

Lauren's cross sectional area per fibre will be greater because it is a fast twitch fibre and anaerobically trained.

**c.**

The H-zone shortens/contracts/disappears (concentric).

The H-zone lengthens/extends (eccentric).

The H-zone remains the same (isometric).

**d.**

Isotonic eccentric or just eccentric.

e.  
Plyometrics.

### Question 3

Most students did very well on this question. Those who did not receive full marks failed to provide a detailed explanation in part b.

a.  
Likely to increase participation.

b.  
Acceptable responses included:

- clearer career path for those ambitious to work in this area
- role models encourage participation
- females may be less intimidating in coaching/administration roles.

### Question 4

Students generally answered part a and parts bi and bii correctly. Very few students were able to correctly answer part biii. In part c many students identified the food source (carbohydrate) rather than the fuel. Question 4dii and Question 4. required students to understand that the difference between the two swimmers is the result of an increased ability to use anaerobic glycolysis to produce energy in this part of the race. The training method identified in part d. had to be one that would improve this ability. Few students were able to demonstrate this understanding.

a.  
Allowable range 80–95%.

bi.  
ATP-PC (no mark for anaerobic)

bii.  
Aerobic

biii.  
Aerobic.

c.  
Glycogen or glucose **not** carbohydrate.

di.  
Lever length/long arms  
Large hands or feet  
A greater % fast twitch fibres.

dii.  
An increased anaerobic capacity, or increased capacity of the LA system, or higher LA tolerance **not** higher anaerobic threshold.

These responses are related to the ability of the athlete to use anaerobic glycolysis to produce energy towards the end of the race.

Other possible correct responses included more glycolytic enzymes, a greater % of fast twitch fibres, greater muscle mass.

e.  
Interval training. Higher quality responses identified short interval, speed interval or sprint interval training.

### Question 5

This question was done well by most students, although some students were not 'specific' in the development they identified in part i. Many wrote 'better racquets' rather than 'larger racquet heads' or 'increased string tension'.

Many students did not understand the word 'prolong' and read it to mean the opposite of increase. These students tended to state one way in which technology increased participation and one way in which it might decrease participation.

ai.  
One mark for identifying the relevant development in equipment or technique.

aii.  
One mark for explaining the development identified in part ai the second mark was awarded for explaining how this improves performance.

Possible correct responses included: biomechanical analysis, racquet head size, video feedback, racquet technology, e.g. kevlar, carbon fibre frames, larger heads, stringing, type of string, tension, increased ball pressure.

b.  
Higher quality responses identified the group and how they will be encouraged to participate.  
Examples include:  
Children or older players, larger sweet spot, lighter racquets.

Big servers: Increased speed and more success so they will continue playing.

Students could be awarded full marks for a detailed more general explanation. For example, racquets are becoming lighter so fewer injuries may result meaning people can play more often.

**c.**

Suitable answers included two points for each of the two professionals chosen.

These may have included:

Nutritionist

- plan diet prior to tournament/CHO loading
- provide advice regarding recovery diet after matches/training
- advise on glucose and electrolyte mix during matches
- advise regarding dietary supplements
- ensure player is aware of banned drugs and check medications

Sports Psychologist

- provide motivational strategies
- assist with relaxation techniques
- assist in player focusing, avoiding distractions, obtaining ideal arousal level, dealing with stress

Physiotherapist

- massage
- assessment of injuries
- injury treatment
- provide a program to help prevent injury.

### **Question 6**

A number of students were unable to identify the correct heart rate response in part c, indicating a poor understanding of acute cardiac responses to exercise.

**a.**

Flexibility.

**b.**

Ballistic stretching.

**c.**

Graph A.

### **Question 7**

A significant number of students identified anabolic steroids as a stimulant and continued to answer subsequent parts of the question incorrectly as a result. It is important that students are familiar with a range of legal and illegal drugs and other ergogenic aids. In part d students were expected to list effects other than 'death'.

**a.**

Amphetamine (speed), Ritalin, Dexamphetamine, ADD medication, clenbuterol cocaine, ephedrine, pseudoephedrine, mesocarb, salbutamol, terbutaline, salmeterol, ecstasy.

**b.**

Stimulants act on CNS to speed up brain function – they increase heart rate.

**c.**

Stimulants reduce tiredness, increase alertness, and increased aggression.

**d.**

Possible responses include: increased body temperature (overheating), increased heart rate/breathing rate, coordination and balance problems, disqualification from the sport, excess aggression, problems sleeping, dehydration, weight loss, tremors, addiction, increased anxiety, inability to 'go the distance'.

**e.**

Cough and cold, asthma, sinus and hay fever medications.

### **Question 8**

Most students did poorly on part a. of this question. This may reflect a poor understanding of the meaning of the physiological capacities targeted, and confusion in regard to their training.

Parts c and d were generally well done however some students did not identify the fibre type likely to hypertrophy in response to each training type. A number gave respiratory rather than cardiovascular adaptations in part c. A smaller number did not clearly indicate that they understood that anaerobic training increases the thickness of the ventricle wall while aerobic training will increase the size of the left ventricle cavity.

**a.**

Ten minutes allows ATP-PC and lactic acid to replenish.

One minute only allows ATP-PC to replenish.

**b.**

Any track event 400 m up to 5000 m.

**c.**

Correct responses included:

Training focused on improving	Cardiovascular adaptation	Muscular adaptation
Anaerobic capacity	Include size of left ventricle wall (hypertrophy)	Muscle hypertrophy (FT), > glycolytic enzymes > glycogen stores > force of contraction > ATP and PC stores
Aerobic capacity	Increased volume of left ventricle < resting heart rate > stroke volume > haemoglobin count > blood volume > cardiac output (Q)	> capillarisation, > size and number of mitochondria > myoglobin > oxidative enzymes > lactic acid tolerance > glycogen and triglyceride stores > size of ST fibres

**d.**

Fast twitch (White or Type 2) fibres.

### Question 9

Most students successfully completed this question. Those who did not receive full marks often had reworded the same answer or had not clearly indicated to which sex the answer applied, e.g. 'greater muscle bulk', rather than 'males have greater muscle bulk'.

**a.**

Performance has improved over time or males run faster than females.

**b.**

Possible responses included: lower fat levels in males, higher % muscle in males, males have narrower hips, lower haemoglobin levels in females, males have larger hearts, males have greater blood volume, males have higher VO<sub>2</sub> max.

### Question 10

This question was well done. A common error in part a. was stating that increased lactic acid levels will lead to exhaustion in an aerobic endurance event. In part b, many students listed a food type, e.g. carbohydrates, rather than the specific food asked for.

**a.**

Dehydration

Depleted blood glucose or depleted liver glycogen

Decreased transmitter (ACH) function

CNS inhibition

Elevated body temperature.

**b.**

Must be a specific food, e.g. pasta, sweets, banana, soft drink, fruit juice.

**c.**

24 –48 hours but up to 5 days.

**d.**

Increased blood flow, remove lactic acid faster, decrease stiffness or soreness.

Improved recovery time, less likelihood of delayed onset of muscle soreness (DOMS), pain relief, reduce or prevent venous pooling.

**e.**

Possible responses include:

Initial glycogen levels higher so graph will start higher (line is above the existing one).

Exhaustion will be delayed so graph will go for longer.

Increased rate of glycogen depletion early in the race.

### Question 11

Most students were able to identify anaerobic threshold occurring at the 10 minute mark as a result of the gradient change in Graphs A (or B). It was expected that the rapid increase in the gradient after 10 minutes would clearly indicate that Graph A represented minute ventilation. Only students who were performing well on most questions appeared to understand this.

**a.**

Graph A.

**b.**

Ventilation increased linearly (1 mark) until anaerobic threshold is reached and then increases rapidly (exponentially) (1 mark).

*Note:* students were not required to use the words linear and exponential.

**c.**

The mark should have been placed on the ventilation Graph A at the point at which it changes gradient. Students who marked it at the correct time (10 minutes) on one of the other graphs also received a mark for their response.

### **Question 12**

Some students encountered difficulty in relating the benefits they identified to the group specified in the question, with many providing the same answer to the different parts of the question.

Suitable answers included:

**ai.**

For the individual: specific health benefits, improved health and fitness or increased social interaction, learn new skills, improved mental health.

**aii.**

For government: decreased health costs, increased output for workforce, decreased disease levels, perception that the government is looking after all citizens.

**aiii.**

For the local community: more involvement in local clubs, reduced social problems like violence and vandalism, improved facilities, greater sense of community, more money being spent locally on sporting equipment, membership.

### **Question 13**

It was expected that students would be able to determine that strength remains constant for a longer period during young adulthood than VO<sub>2</sub> max and maximum heart rate, which decrease at a constant rate from the early 20s.

**a.**

Line B

**b.**

decrease in cross-sectional area (atrophy) or decreased muscle size

**c.**

decrease in activity levels and decreased ability to synthesise protein.

**d.**

Any two of these were acceptable:

- Decreased cardiac output (Q) or decreased stroke volume (only one of these allowable)
- Decreased tidal volume, lung capacity, or ventilation (only one of these allowable)
- Decreased maximum heart rate
- Decreased respiratory efficiency
- Decreased a - vO<sub>2</sub> difference
- Decreased ability of the muscle to utilise oxygen
- Increased body fat
- Increased heart size
- Increased number of mitochondria
- Increased blood volume.

### **Question 14**

Students were generally able to provide high quality answers to this question. Most identified characteristics of a coach from the responses in the graph. Some students had difficulty in providing clearly different characteristics and did not receive marks for closely related responses.

**a.**

Any four characteristics or skills of a coach relevant to junior girls.

Possible correct answers included:

- coach must allow the student flexibility to miss training if she has homework
- coach must give all players equal court time (be fair to all players)
- coaches must not be focused just on winning (show interest in the players)
- coach must be equally interested in all players
- coach must discourage barrackers from yelling at the players
- coach must not yell at players.

### Question 15

As in the previous question, some students provided answers to part a. which were very similar, e.g. 'warm up' and 'stretching'. In addition, the question asked for an outline and single word responses clearly cannot be considered an outline. Part b was well answered by most students.

**a.**

Suitable responses included:

- ensuring training is appropriate
- having players do a (specific) warm-up
- checking equipment to make sure it is safe
- coach must know the rules
- coach must teach skills based on the (physical) stage of development of the players
- ensure that protective equipment is used
- be qualified in first aid and ensure first aid kit is available
- competitive games (drills) must be balanced (age specific)
- follow the 'coaches code of conduct'.

**b.**

The type of injury must be broadly consistent with the response (above). Explanation must also be consistent with type of injury listed.

An example of a suitable answer is:

Response	Code of conduct
Injury	Concussion
Explanation	Players are instructed and monitored to ensure that they play within the rules, ensuring no head high contact.

### Question 16

Many students received most of the marks for Question 16. A common mistake was to state that dehydration was a symptom of heat exhaustion in part a. rather than a cause. The treatment in part b. involved the same actions as the strategies in part d. for many students but was considered correct in most cases.

**a.**

Any two of: cramp, nausea, blurred vision, headache, dizziness, lack of coordination, increased skill errors, higher body temperature.

**b.**

Any two of: sit in the shade/cool place, drink lots of fluids, discontinue playing, apply cool or wet towels, ingest glucose drinks, intravenous rehydration.

**c.**

One mark for answering 'No'. Second mark was for providing an explanation, such as 'because salt draws water from the blood vessels into the gut, actually increasing dehydration'.

**d.**

Drink plenty of fluid before and during event  
Wear an ice vest at breaks  
Carbohydrate loading (will increase fluid stored)  
Acclimatisation  
Change his playing strategy to conserve energy  
Have a fan on during breaks  
Have a haircut and/or shave.  
Wear loose and or light coloured clothing.

### Question 17

Many students listed strategies but higher quality answers discussed the strategy as instructed by the question. Many students attempted to answer this question without reference to the data presented. More successful answers provided strategies that were clearly discernible as linked to the data presented. In a significant number of answers students discussed strategies in part b which would attract new players to the club rather than encourage existing members to stay.

**a.**

One mark was awarded for the strategy and one mark for the explanation of how it will act to increase participation (increase the number of members).

These included: providing activities for the parents, reduce fees for juniors, allow free/reduced cost round for parents, running clinics in schools, provide vouchers for young people to play, club sponsored school competitions and (the ubiquitous) bring a friend days.

**b.**

One mark for the strategy and 1 mark for the explanation of how it will act to ensure continued participation.

These included: allow players to choose their own fours for competitions, provide fitness activities other than golf, provide social activities other than golf, specific types of competition such as 'Ambrose', provide fitness testing and or advice, guest speakers on the topic of nutrition, or similar.

**Question 18**

Most students performed very well on this question.

Any two of:

- increase in role models (number and exposure)
- greater media coverage of athletics
- TV promotion of specific events
- increased funding and or improved facilities
- greater financial incentive or other extrinsic rewards like medals.

**Question 19**

This question required students to analyse three different approaches to the provision of health and fitness services each of which targeted a particular group within the population. Most students were able to successfully answer the question. Some had difficulty in discussing and explaining as asked and tended to list one or more of the bullet points from the advertisements as an answer.

Samples of acceptable answers are included in the table.

Advertisement Chosen	A	B	C
Part a.	Busy people, long work hours. Self conscious people. Lacking motivation or uncomfortable in gym. Enjoy individual attention. Those wanting fitness assessment.	Women focused on weight loss. Those with lapsed health or fitness programs. People focused on health rather than fitness. People with low disposable income.	Easily bored so enjoy variety of activities. Like to socialise. Younger people.
Part b.	Meeting the greater demand for personal training as people like the individual attention. Young professionals with high disposable incomes catered for. Many people scared of the 'macho' gym scene.	Focus on health rather than fitness. Focus on weight loss for women meets a great consumer demand. Focuses on activity rather than just diet to reduce weight.	Longer opening hours are response to longer working hours. Variety of general and specialised activities much greater.
Part c. (positive)	Little time required. Likely to attract busy people and get them started.	Health emphasis. Likely to attract those who are not attracted to fitness per se and get them involved.	Time it is open. Allows greater access. Wider range attracts greater variety of people.
Part c. (negative)	Cost – Personal training is expensive. Distance from home or work.	Activity may not reduce body weight initially causing drop in motivation. Distance from home or work.	Many people are scared of the competitive gym scene. Distance from home or work. Gym is big and may be crowded.

**Question 20**

Parts a. and b. of this question were well done. In part c. most students were able to state that the subject with lower fitness would have a higher systolic blood pressure. Few were able to explain why this was so in part e. Many students believed that diastolic blood pressure would rise as a result of exercise.

**a.**

Subject A

**b.**

Subject A has

- Higher resting heart rate
- Higher working heart rate.

**ci.**

Age – Subject A is older.

Somatotype (explanation required).

**cii.**

Subject A has lower stroke volume, cardiac output, VO<sub>2</sub>max, or proportion of FT fibres.

**d.**

Subject A.

**e.**

Subject A has lower fitness so higher pressure generated to force blood to muscles or more blood required at the muscles because they do not extract oxygen as efficiently or higher cardiac output (SV X HR) but not just heart rate (HR).

**f.**

It will not change or will show very slight increase or decrease (exercise does not alter the diastolic blood pressure).

### **Question 21**

Most students were able to identify appropriate leg power and agility tests but had difficulty with a test of local muscular endurance in the legs. Responses in the sports specific training activity were generally poorly done. Common difficulties were copying the typical action into this column and explaining a use of the component of fitness in a game situation rather than a training activity.

**i.**

Phosphate recovery or bench jump test.

**ii.**

Interval or (leg) circuit or repeated short sprints.

**iii.**

Standing broad jump or vertical jump, Margaria stair test.

**iv.**

Plyometric activities, bounding, depth jumps or leg press weights or squats.

**v.**

Illinois, SEMO or Vicfit agility tests

**vi.**

Fast dribbling intervals or short sprint intervals or a description of a drill involving these.

**vii**

Long or continuous run or long interval or an example of this.