PHYSICAL EDUCATION
Written examination

Friday 5 November 2004
Reading time: 3.00 pm to 3.15 pm (15 minutes)
Writing time: 3.15 pm to 5.15 pm (2 hours)

QUESTION AND ANSWER BOOK

Structure of book

<table>
<thead>
<tr>
<th>Number of questions</th>
<th>Number of questions to be answered</th>
<th>Number of marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>28</td>
<td>133</td>
</tr>
</tbody>
</table>

• Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners and rulers.
• Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.
• No calculator is allowed in this examination.

Materials supplied
• Question and answer book of 25 pages.

Instructions
• Write your student number in the space provided above on this page.
• All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other electronic communication devices into the examination room.

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Question 1

Acute responses to aerobic exercise occur in the muscular, cardiovascular and respiratory systems.

a. List one acute response occurring in each of these systems.
   i. Muscular system
   ii. Cardiovascular system
   iii. Respiratory system

b. List one chronic respiratory training effect resulting from a long-term aerobic training program.

Total 4 marks

Question 2

The Australian Bureau of Statistics recently released data showing that over 367,000 Australians reported having a recent sports injury resulting from participation in organised sport.

The data also showed
   • two-thirds of those reporting injuries were male
   • participants exercising at high to moderate levels had a higher rate of injury than those who exercise at lower levels
   • the two most common types of injuries were sprains and strains.

a. Provide two strategies, other than warm up, which could be used immediately prior to competition to prevent sprains or strains occurring.
   i. 
   ii. 

b. State one reason why the total number of Australian males suffering injuries is greater than the total number of Australian females suffering injuries.

Males also suffer more injuries per 1000 participants than females.

c. Suggest a likely reason for this. (Your answer must be different to part b.)

Total 4 marks
Question 3

SALTAPS, RICER, DRABC and NOHARM are all acronyms used to detail the actions which should be taken following an injury occurring in a sporting situation.

a. Which of these actions should be applied **first** if a player is **unconscious**?

b. Which action should be applied **first** if the player is **conscious**?

The ‘I’ in RICER stands for ‘ice’.

c. What are three intended short-term outcomes of applying ice as part of a first-aid procedure?

Total 5 marks
Question 4

The following table outlines a **Fixed Load Circuit Training Program** for a 17-year-old female state-level field hockey player who plays on the **wing**.

When undertaking this circuit the player performs three sets of each exercise using the half score from the initial test. Her aim is to reduce the time taken to complete the three sets from 20 minutes to 17 minutes. Each time she performs a training session she records her working heart rate and the time and date of the training session.

<table>
<thead>
<tr>
<th>Stations</th>
<th>Score for 1 minute</th>
<th>Half score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sit-ups</td>
<td>60 reps</td>
<td>30</td>
</tr>
<tr>
<td>Agility run</td>
<td>10 reps</td>
<td>5</td>
</tr>
<tr>
<td>Push-ups</td>
<td>40 reps</td>
<td>20</td>
</tr>
<tr>
<td>Shuttle sprints</td>
<td>12 reps</td>
<td>6</td>
</tr>
<tr>
<td>Medicine ball throw</td>
<td>20 reps</td>
<td>10</td>
</tr>
<tr>
<td>Initial time (3 sets)</td>
<td>20 minutes</td>
<td></td>
</tr>
<tr>
<td>Target time</td>
<td>17 minutes</td>
<td></td>
</tr>
</tbody>
</table>

**a.** How can the training principle of **frequency** be applied to this training method if this player is to improve?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

2 marks

**b.** How does the medicine ball throw fulfil the principle of **specificity** for this athlete?

__________________________________________________________________________

__________________________________________________________________________

1 mark

**c.** Outline two advantages of circuit training.

Advantage 1 __________________________________________________________________

__________________________________________________________________________

Advantage 2 __________________________________________________________________

__________________________________________________________________________

2 marks

Total 5 marks
Question 5
Jana Pitman won a gold medal in the 400 m hurdles at the 2003 World Athletics championships.

a.  
   i. List one factor that may have influenced Jana to initially participate in athletics.

   ii. Explain how this factor led to Jana’s initial participation in athletics.

   1 + 2 = 3 marks

b.  
   i. List one factor different from the one in part a. that may have influenced Jana to continue participation in athletics.

   ii. Explain how this factor led to Jana’s continued participation in athletics.

   1 + 2 = 3 marks

Total 6 marks
**Question 6**

The following table compares the difference in level of structured physical activity for a girl at age 8 and then, the **same girl**, six years later when she is 14.

<table>
<thead>
<tr>
<th>Female aged 8</th>
<th>Female aged 14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturday – Little Athletics</td>
<td>Saturday – No activity</td>
</tr>
<tr>
<td>Tuesday – Basketball</td>
<td>Tuesday – Netball</td>
</tr>
<tr>
<td>Thursday – Netball</td>
<td>Thursday – No activity</td>
</tr>
</tbody>
</table>

**a.** Outline two factors that may have influenced **this girl** to reduce the amount of physical activity she does over the years.

Factor 1

Factor 2

2 marks

**b.** Name a state or national program and explain how it aims to increase the level of participation in physical activity in **teenage girls**.

Name a state or national program

Explanation

1 + 2 = 3 marks

Total 5 marks
**Question 7**

Lauren Jackson is one of Australia’s leading female basketball players. She was named ‘Most Valuable Player’ in 2003 in the Women’s American Basketball Association (WABA). The figure below shows her performing a jump shot.

In performing a jump shot Lauren predominantly uses the ATP-PC energy system and her predominant fitness component is muscular power in the legs.

a. What muscle fibre type is predominantly used by the leg muscles when performing the jump shot? 

b. Name one appropriate standard fitness test for assessing muscular power in the legs.

c. What is the most effective training method that can be used to improve muscular power in the legs?

d. Describe one possible effect on young Australian females who currently play basketball, as a result of Lauren being named WABA Most Valuable Player in 2003.

Total 4 marks
Question 8

Many sporting bodies have developed a ‘Code of Behaviour’ for spectators, similar to that shown below. The code provides guidelines on appropriate behaviour for spectators.

Spectators Code of Behaviour

• Remember that young people participate in sport for their enjoyment and benefit, not yours.
• Applaud good performance and efforts from all individuals and teams. Congratulate all participants on their performance regardless of the game’s outcome.
• Respect the decisions of officials and teach young people to do the same.
• Never ridicule or scold a young player for making a mistake. Positive comments are motivational.
• Condemn the use of violence in any form, whether it is by spectators, coaches, officials or players.
• Show respect for your team’s opponents. Without them there would be no game.
• Encourage players to follow the rules and the officials’ decisions.
• Do not use foul language, sledge or harass players, coaches or officials.
• Respect the rights, dignity and worth of every young person regardless of their gender, ability, cultural background or religion.

Explain how implementation of such a code of behaviour will encourage a child to continue participation in their chosen sport.

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

2 marks
Question 9

In recent years the number of people employing a **personal trainer** in order to improve their level of fitness has dramatically increased.

a. i. Outline two advantages of using a personal trainer.

   Advantage 1

   Advantage 2

ii. Outline one disadvantage of using a personal trainer.

   

2 + 1 = 3 marks

Many people prefer to exercise in the privacy of their home, using equipment such as treadmills and exercise bikes, rather than go to a gym.

b. Outline two reasons for this trend.

   Reason 1

   Reason 2

2 marks

Advertisements in magazines, newspapers and television often promote programs that guarantee to result in weight loss from a specific body area; for example, the abdomen. The result guaranteed in these programs is called 'spot reduction' and does not work.

c. i. Explain why this is the case.

   

ii. Outline a more suitable form of exercise that could reduce the amount of abdominal fat.

   

2 + 2 = 4 marks

Total 9 marks

TURN OVER
Question 10
In 2003 Layne Beachley received a great deal of media coverage for winning a record of six women’s world surfing titles in succession from 1998 to 2003.

a. State one possible benefit of Layne’s achievements on surfing in Australia.

b. Name two sociocultural factors that may be more likely to discourage girls than boys from taking up the sport of surfing.

Factor 1

Factor 2

Total 3 marks

Question 11
Melbourne will host the 20th Deaflympics (an international sporting competition for the hearing impaired) in 2005 and over 3500 athletes from 83 countries are expected to compete in a variety of sports. The sports are not modified except to replace sound commands with visual signals. For example, swimming and running events will start with a green light rather than the sound of a starting pistol.

a. Name one other sporting or recreational program that caters for people with a disability.

b. Outline how the program you have named in part a. may increase the level of participation in physical activity for people with a disability.

Total 2 marks
Question 12

Bicycle Victoria has the slogan, ‘more people riding more often’. Programs such as Ride to Work, Around the Bay in a Day and the Great Victorian Bike Ride attract people of all ages to participate in cycling.

a. Outline one strategy that Bicycle Victoria could use to increase the number of **primary school aged** children riding their bikes to school.

One of the reasons for children not riding their bikes to school is the risk associated with traffic on the roads.

b. Explain how each of the groups listed below could make it safer for children to ride to school. You **must** state what the group could do (strategy) and explain how it may lead to higher levels of participation in cycling by children.

<table>
<thead>
<tr>
<th>Group</th>
<th>Strategy</th>
<th>Explanation of impact on participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>City/Shire council (Local government)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School administration</td>
<td></td>
<td></td>
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</tbody>
</table>

4 marks
Total 5 marks
Question 13

In the diagram below, the athlete is using an exercise ball to perform a type of sit-up.

![Diagram of an athlete performing a sit-up on an exercise ball]

a. What term is used to describe the action of the trunk in the exercise shown in the diagram above as the athlete moves from position 1 to position 2?

b. What is the main muscle group responsible for moving the body from position 1 to position 2, as shown in the diagram?

c. What type of contraction is occurring in the muscle group named in part b during the downward phase of the exercise (from position 2 back to position 1)?

d. Explain why the athlete’s feet are placed on the exercise ball to create the hip position shown in the diagram.

Total 5 marks
Question 14
The gymnast in the picture below is performing a ‘crucifix’ on the Roman Rings. The deltoid muscle is primarily responsible for abduction of the shoulder.

Due to copyright restriction, this material is not supplied.

a. What type of contraction is occurring in the deltoid muscle when the crucifix position is held for five seconds?

b. What fibre arrangement is found in the deltoid muscle?

c. What somatotype would be most beneficial for elite male gymnasts?
The graph below shows the relationship between the number of motor units contracting and the total tension developed in a muscle.

![Graph showing the relationship between the number of motor units contracting and the total tension.]

**d.** Describe the effect of increasing the number of motor units contracting on muscle tension.

1 mark

A motor unit consists of a motor neuron and the muscle fibres it stimulates. Motor units respond to stimuli according to the ‘all or none law’.

**e.** What is meant by the **all or none law**?

2 marks

Total 6 marks
Question 15
The incidence of childhood obesity in Australia has increased in recent years. Currently 30% of children are either overweight or obese. One factor contributing to this trend is the declining number of children participating in regular physical activity.

a. List two reasons why physical activity levels may have dropped in primary school aged children.

Reason 1 ____________________________________________________________

Reason 2 ____________________________________________________________

2 marks

b. List one state or national initiative, other than modified sports, that aims to increase the participation of primary school aged children in regular physical activity.

______________________________________________________________

1 mark

c. Discuss how the program named in part b. may lead to increased participation in physical activity for the target group.

______________________________________________________________

______________________________________________________________

2 marks

Total 5 marks

Question 16
African-American sprinters have had reasonable success in the 100 m track event at the Olympic Games in recent times.
State and explain one musculo-skeletal factor, often found in African-Americans, that assists athletes to be successful in sprint events.

Factor __________________________________________________________

Explanation _______________________________________________________

1 + 2 = 3 marks
Question 17
Elite athletes often find that the combination of physical ability, body type and training are not enough to achieve success. Overcoming their psychological limits is also a challenge that athletes face and many use sports psychologists to assist in this area.
Outline one method a sports psychologist may use to assist an athlete with their preparation for a major event.

Question 18
‘Smartplay’ is a safety and sports injury initiative of Sports Medicine Australia that aims to reduce the incidence of sports injuries in Australian sporting clubs. Its motto is *Warm up, Drink up, Gear up*. These three pieces of advice are aimed at reminding people who play sport to prepare their body for exercise in order to prevent injury.
State one specific way in which each of these pieces of advice may assist in preventing injury.

<table>
<thead>
<tr>
<th>‘Warm up’</th>
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<tbody>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>‘Drink up’</th>
<th></th>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>‘Gear up’</th>
<th></th>
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<tbody>
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<td></td>
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</tbody>
</table>
Question 19
This question refers to a variety of individual athletes, sports, training methods and physiological factors.

a. A female runner has a personal best time in the 400 m event of 54.60 seconds.
   i. What is the predominant anaerobic energy system used during this event?
   ii. What is the predominant fitness component being used during this event?

   2 marks

The sports of shot put and power lifting both rely heavily upon the ATP-PC energy system but have different predominant fitness components.

In shot put the athlete is required to throw a ball weighing approximately 7 kg as far as possible.
In power lifting the athlete is required to lift the heaviest weight possible in a variety of ways including the bench press.

b. Indicate which fitness component is predominant in each event.
   i. Shot put
   ii. Power lifting

   2 marks

One of the reasons that older athletes competing in the Masters Games run slower times than younger athletes is their decreased capacity to form lactate.

c. Explain why this difference will result in reduced performance levels in the 200 m track event.

   2 marks

An elite triathlete suffers fatigue late in an event. The athlete has eaten and drunk correctly before and during the event and has a high lactate tolerance and aerobic capacity. The likely source of fatigue is the central nervous system.

d. i. Explain how the central nervous system can contribute to fatigue in an endurance event.

   ii. Suggest one way in which the athlete could avoid or delay this source of fatigue.

   2 + 1 = 3 marks
A promising 16-year-old tennis player is told by his coach that he needs to improve his ability to perform repeated sprints. In order to meet this objective, the coach prescribes an aerobic training program that is designed to improve the player’s aerobic capacity.

e. Explain why aerobic training will improve the player’s ability to perform repeated sprints.

High \( \text{VO}_2 \) maximum is not the only physiological factor that is highly associated with excellent endurance running performance.

f. What is the other major physiological factor that is highly associated with excellent endurance running performance?

Tennis player Martina Navratilova won a record 167 singles titles and 172 doubles titles. In 2004 she competed in events on the women’s tour at the age of 47 years.

The following two changes occur with ageing and will have decreased Martina’s aerobic capacity and performance.

g. Explain how each of these factors will lead to a decrease in aerobic capacity.

i. decreased size and number of skeletal muscle mitochondria

ii. decreased heart volume

2 + 2 = 4 marks

Total 16 marks
Question 20
The graph below shows the energy system contributions in track athletes during simulated running events on a treadmill.

![Graph showing energy system contributions]

a. Explain why the amount of oxygen deficit in the 400 m, 800 m and 1500 m events is approximately the same.

b. Explain how this similarity in total oxygen deficit during the 400 m, 800 m, and 1500 m running events affects the speed that an athlete is able to achieve in these events.

Question 21
Exercise physiologists often measure venous blood lactate levels to determine what is taking place in the athlete’s muscles. However, blood lactate levels often do not accurately reflect muscle lactate production.

a. Explain why this is the case.

b. What other factor related to lactate accumulation do exercise physiologists also measure in order to give a more accurate indication of muscle fatigue?

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TOTAL 4 MARKS

TOTAL 3 MARKS

**TURN OVER**
**Question 22**
As part of a Physical Education task at school you perform a battery of fitness tests on two male students, Alex and Sam. Both boys are approximately the same physical size and are 16 years old. Both boys are trying for a place in the school soccer team and both have similar skill levels.

<table>
<thead>
<tr>
<th>Component of fitness being tested</th>
<th>Fitness test used</th>
<th>Alex’s result</th>
<th>Sam’s result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agility</td>
<td>Illinois Agility Test</td>
<td>Excellent</td>
<td>Above average</td>
</tr>
<tr>
<td>Anaerobic power</td>
<td>Margaria Stair Test</td>
<td>Very good</td>
<td>Good</td>
</tr>
<tr>
<td>Dynamic flexibility</td>
<td></td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Aerobic capacity</td>
<td>Leger Shuttle Run Test</td>
<td>Average</td>
<td>Excellent</td>
</tr>
<tr>
<td>Leg strength</td>
<td></td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Speed</td>
<td>40 metre sprint</td>
<td>Above average</td>
<td>Above average</td>
</tr>
</tbody>
</table>

**a.** Name or describe an **appropriate** test to assess

i. Dynamic flexibility

ii. Leg strength

**2 marks**

**b.** Based on the results of these tests, **discuss** which boy would be best suited to the role of a **midfield (centre)** player in the soccer team.

**2 marks**

Total 4 marks
**Question 23**

When food containing carbohydrate is consumed, the carbohydrates are broken down and absorbed into the bloodstream as glucose. Glucose is either transported to muscles where it is used; or stored as glycogen in the muscles and liver. These reserves of glycogen can be released at a later time when they are needed to produce energy for muscular contraction.

**a.** What substance is released into the bloodstream resulting in the storage of glucose as glycogen in the liver and skeletal muscle?

---

1 mark

Glucose is an energy rich molecule and energy is released when it is broken down. **Aerobic glycolysis** releases more energy from a glucose molecule than **anaerobic glycolysis**.

**b.** Explain why this is the case.

---

2 marks

When glucose and glycogen levels are depleted following an event, athletes are usually instructed to consume foods with a high **glycaemic index**.

**c.** Why are foods with a high glycaemic index best suited to rapid restoration of muscle glycogen levels?

---

2 marks

The table below shows two post-game meals.

<table>
<thead>
<tr>
<th>Meal A</th>
<th>Meal B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiled white rice</td>
<td>Baked Beans</td>
</tr>
<tr>
<td>Watermelon</td>
<td>Apple</td>
</tr>
<tr>
<td>Sports drink</td>
<td>Yoghurt</td>
</tr>
<tr>
<td>Pancakes</td>
<td>Pasta</td>
</tr>
</tbody>
</table>

**d.** Which of the meals, A or B, would be considered a ‘high GI’ meal?

---

1 mark

Total 6 marks
**Question 24**
During aerobic exercise the body uses fats and carbohydrates to provide energy. Their relative contribution depends on the intensity of the exercise.

**a.** Explain the relationship between intensity of aerobic exercise and relative usage of carbohydrates and fats as fuel.

A long-term aerobic training program has an effect on the way the body uses carbohydrates and fats to provide energy during aerobic exercise.

**b.**

i. What is the name given to this effect?

ii. Explain how this effect is likely to improve performance.

iii. Outline what has occurred at a muscular level to produce this change.

1 + 2 + 2 = 5 marks

Total 7 marks

**Question 25**
There are a number of illegal substances and techniques that are used by athletes to increase red blood cell count. International sports authorities have banned these substances and techniques.

List two illegal substances or techniques that will increase an athlete’s red blood cell count.

1. 

2. 

2 marks
Question 26
The Australian Sports Drug Agency website states that the anabolic steroid ‘Nandrolone’ has legitimate medical uses but is prohibited under the World Anti-Doping Code 2004. In recent years a number of elite performers have tested positive for Nandrolone.

a. Which component of fitness would most likely improve as a result of Nandrolone use?

1 mark

b. List two possible side effects of using Nandrolone, other than death.

1. 

2. 

2 marks

Total 3 marks
Question 27
At the Australian Institute of Sport, elite rowers must undergo a **VO₂ Maximum Rowing Test** at various stages throughout the year. This fitness test uses a rowing ergometer and is conducted in a laboratory. In the test the subject is required to work to exhaustion while equipment measures their inspired and expired air.

a. Name the predominant fitness component being tested.

b. Name the predominant energy system being used in this fitness test.

If a subject suffered from an **asthma** attack during this test the VO₂ maximum measured would be reduced.

c. Describe the change that occurs in lung structure and function to produce this reduction in VO₂ maximum.

d. Explain why a coach at the Australian Institute of Sport would test a rower’s VO₂ maximum at the beginning and again at the end of a training macrocycle.

e. Outline two reasons why a Physical Education class of 20 VCE students would **not** normally undertake a VO₂ maximum test using gas analysis, such as the VO₂ Maximum Rowing Test.

Reason 1

Reason 2

Total 8 marks
Question 28
The following diagram is of a fitness test that VCE Physical Education students may use as part of a fitness-testing program. The subject is required to complete the course as fast as possible.

a. Which fitness component is most likely to be measured by this fitness test?

b. Explain why the coach of a tennis player may be more likely to use this fitness test rather than another common test which measures the same fitness component.

Total 2 marks