PHYSICAL EDUCATION
Written examination

Monday 14 November 2011
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>Section</th>
<th>Number of questions</th>
<th>Number of questions to be answered</th>
<th>Number of marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>B</td>
<td>11</td>
<td>11</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total 120</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
- Answer sheet for multiple-choice questions.

Instructions
- Write your student number in the space provided above on this page.
- Check that your name and student number as printed on your answer sheet for multiple-choice questions are correct, and sign your name in the space provided to verify this.
- All written responses must be in English.

At the end of the examination
- Place the answer sheet for multiple-choice questions inside the front cover of this book.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.
SECTION A – Multiple-choice questions

**Instructions for Section A**

Answer all questions in pencil on the answer sheet provided for multiple-choice questions.
Choose the response that is correct or that best answers the question.
A correct answer scores 1, an incorrect answer scores 0.
Marks will not be deducted for incorrect answers.
No marks will be given if more than one answer is completed for any question.

- **Question 1**
  As the coach, you are completing fitness testing on an under-15 soccer team. Some of your friends have siblings in the team. Your friends know you are completing the testing and ask you about how their brother or sister performed in the test.
  As the person conducting the test, what do you need to consider about releasing information about the results?
  A. accuracy  
  B. reliability  
  C. specificity  
  D. confidentiality

- **Question 2**
  Eloise’s goal in netball this year is to become a premiership player and achieve a top five finish in her team’s best and fairest count.
  Her goal is an example of
  A. a process goal.  
  B. a sensible goal.  
  C. an outcome goal.  
  D. a performance goal.

- **Question 3**
  A 3-km runner wants to participate in the sport of cross-country running. He begins a training program running 5 km once a week at 70% of heart rate max. After four months he notices little improvement in his race time.
  Which is the most likely training principle that has not been implemented correctly into his program?
  A. duration  
  B. intensity  
  C. frequency  
  D. specificity
Use the following information to answer Questions 4–6.

The golfer below is performing swissball training.

**Question 4**
By completing a golf swing at a reduced speed from the top of a swissball, which of the following is this athlete trying to develop?
A. balance and core strength  
B. balance and muscular power  
C. muscular power and strength  
D. flexibility and muscular power

**Question 5**
What other method can improve the fitness components being developed in the image above?
A. yoga  
B. pilates  
C. plyometrics  
D. ballistic stretching

**Question 6**
Two physiological benefits of swissball training for a golfer may include
A. improved accuracy through the development of strength.  
B. improved stability and ability to control movement when off balance.  
C. increased flexibility and range of motion of the major joints involved in golf.  
D. improved concentration and ability to focus on the golf ball when striking the ball.

**Question 7**
The ‘inverted U’ theory of optimal arousal states that
A. as arousal decreases performance increases.  
B. there is an optimal level of arousal for optimal performance.  
C. there is an optimal level of performance that creates optimal arousal.  
D. the relationship between arousal and performance is a direct linear relationship.
Question 8
In which of the following exercises does the load change as the exercise progresses?
A. the up phase of a chin up
B. the down phase of a push up
C. sitting down performing a static hamstring stretch
D. the up phase of a leg extension using a Cybex machine

Question 9
Which sports drinks contain comparable concentrations of carbohydrates and electrolytes to the human body?
A. caffeine drinks, as they are rapidly absorbed by the body
B. isotonic drinks, as they have the same osmolality as the body
C. hypotonic drinks, as they have lower osmolality than the body
D. hypertonic drinks, as they have higher osmolality than the body

Question 10
The Hawthorn Football Club’s training ground was redesigned so that the size was exactly the same as its home playing ground, the Melbourne Cricket Ground (MCG).
The strategy of replicating the game setting in training is called
A. simulation.
B. mental imagery.
C. mental rehearsal.
D. confidence building.

Question 11
At rest, the arteriovenous oxygen difference (a-VO₂ diff.) is
A. less than during exercise.
B. the same as during exercise.
C. greater than during exercise because O₂ is redistributed to vital organs.
D. greater than during exercise because O₂ consumption increases to repay excess post-exercise oxygen consumption (EPOC).

Question 12
Which food and drink list below would be the most suitable list for an elite tennis player to consume immediately post match to aid the replenishment of muscle fuel stores?
A. honey on bread, jube lollies, sports gel
B. crumpets, barley, apple juice, baked beans
C. apple juice, fruit bars, corn chips, noodles
D. baked beans, chips, skim milk, peanuts
Leanne, 40 years old, is a ‘weekend warrior’ – a term used to describe individuals who participate in physical activity on Saturday and Sunday but are relatively sedentary Monday to Friday. Leanne travels over an hour to and from work, where she sits in an office working at a computer. On Saturday mornings, Leanne goes to a group fitness training session and does continuous and resistance training for an hour. She then does a 40-minute continuous running session in the afternoon. On Sundays she runs on her own, generally running 10–15 km. The cost of community-based fun run events deter Leanne from entering.

**Question 13**
The most accessible and suitable method for determining if Leanne meets the National Physical Activity Guidelines would be
- A. pedometry.
- B. accelerometry.
- C. self-report diary.
- D. direct observation.

**Question 14**
The amount of time Leanne spends exhibiting sedentary behaviour would include
- A. when she is not physically active.
- B. physical activity that is less than 30 minutes.
- C. activities that do not allow her to meet the national physical activity guidelines.
- D. activities that do not increase her energy expenditure substantially above resting levels.

**Question 15**
Which of the following is a factor, within the policy level of influence, that could be targeted by her employer to increase Leanne’s physical activity levels at work?
- A. implementation of ‘walk and talk’ meetings
- B. provide access to shower and change facilities
- C. educational programs explaining the benefits of regular physical activity
- D. social support for employees who participate in lunchtime walking groups
SECTION B – Short answer questions

Instructions for Section B
Answer all questions in the spaces provided.

Question 1

b. i. On the graph, which two lines represent the two anaerobic pathways (A, B or C)? Place your answer in the first column of the table below.

<table>
<thead>
<tr>
<th>Anaerobic pathways (A, B or C)</th>
<th>Intensity</th>
<th>Duration</th>
<th>Fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(&gt;95%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maximal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(&gt;85%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ii. State the duration and fuel required for the anaerobic pathways identified in part b. i. by completing the table above.

2 + 4 = 6 marks
Question 2
The causes of fatigue during exercise are multi-factorial. Fuel depletion is one cause of fatigue during exercise.

a. List three factors that affect the rate of fuel depletion during exercise.

1. 
2. 
3. 

3 marks

b. Select two strategies that may be used to delay fatigue caused by fuel depletion and explain why physiologically the strategy is thought to work.

Strategy __________________________________________
Explanation __________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Strategy __________________________________________
Explanation __________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

4 marks
Question 3

Blood test results taken from four 26-year-old males under regulated conditions are given in the table below. The subjects were

- an elite 1500-m runner
- an elite high jumper
- a sedentary individual
- an elite cross-country skier.

<table>
<thead>
<tr>
<th>Test results</th>
<th>Subject A</th>
<th>Subject B</th>
<th>Subject C</th>
<th>Subject D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haematocrit (% of red blood cells in blood)</td>
<td>50</td>
<td>54</td>
<td>37</td>
<td>45</td>
</tr>
<tr>
<td>Haemoglobin count (g/dl)</td>
<td>16.5</td>
<td>18.5</td>
<td>12.5</td>
<td>14.0</td>
</tr>
<tr>
<td>Red blood cells (cells/mcL)</td>
<td>5.7</td>
<td>5.9</td>
<td>4.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

a.  
    i. From the data provided in the table, which subject (A, B, C or D) is most likely to be the elite male cross-country skier?

ii. Justify your answer with reference to the data.

b. What is EPO and how does it physiologically enhance the performance of an elite distance cyclist?
It is alleged that cyclists using EPO will set their alarm each night to wake them in the middle of their sleep. They then ride for 10 minutes, on a stationary bike, before returning to their beds to resume sleep.

c. Outline a potential harm associated with the use of EPO and explain how the strategy given above is designed to alleviate the problem.

3 marks

There has been a sharp increase in the number of athletes who have been caught using EPO since the year 2000.

d. Provide two reasons that could explain why there has been an increase.

2 marks

Hypoxic tents are a legal practice which may produce a similar physiological benefit to EPO.

e. Describe how an athlete may utilise a hypoxic tent as part of their preparation for an event.

2 marks
Question 4

CycleSmart

The average Australian adult needs to exercise for about 30 minutes a day to maintain good health. An easy way to build this into any daily routine is by cycling to work.

CycleSmart is a multifaceted online tool that can be used to encourage people to change their travel behaviour. It was developed by TravelSmart Victoria to specifically encourage employees to cycle all or part of the way to work.

CycleSmart requires participants to use a cycle computer to calculate their daily kilometres. Cycle computers are great motivators because individuals can see how far they have cycled and track their progress over time. Anyone with a cycle computer can register on the CycleSmart website and enter the kilometres they have travelled. Participants can set daily or weekly email prompts to remind them to enter their kilometres and also elect to receive regular news updates, handy tips and useful advice.

TravelSmart Victoria encourages the use of CycleSmart at Victorian workplaces that are part of a travel planning program by

• creating an account or internal site on the CycleSmart website
• assisting workplaces to develop site-specific information
• surveying participating staff on their current travel behaviour
• measuring how this behaviour changes over time
• reporting on overall staff cycling performance
• providing information on purchasing cost-effective cycle computers.

www.transport.vic.gov
Copyright © State of Victoria 2011

a. Identify the three remaining components in the social-ecological model, and provide an outline of an example of each component, accounting for how that component may influence an employee’s involvement in the CycleSmart initiative.

The first component has been completed for you as an example.

Component: Individual

Example and explanation: Motor skills – an individual’s level of competence in riding a bike will influence their ability to participate in this program.

Component ________________________________

Example and explanation __________________________________________

______________________________________________________________

Component ________________________________

Example and explanation __________________________________________

______________________________________________________________
b. Discuss the relationship between the multiple levels of influence of the social-ecological model using the CycleSmart initiative as an example.

Component

Example and explanation

6 marks

3 marks
Question 5
Bruno, a 40-year-old male, has been training for nine months to complete his first marathon. He hopes to complete the marathon in three and a half hours. On the day of the marathon the predicted temperature is 29°C. The temperature peaks during the event at 35 °C. Bruno has trained in much lower temperatures and is not acclimatised to the conditions.
Despite following his normal hydration plan, at the 21-km mark of the marathon Bruno is fatiguing badly and slowing down. He is sweating, complaining of headaches and dizziness, and his pulse is abnormally high.

a. What is the most likely physiological cause of Bruno’s fatigue?

b. Discuss the physiological process that has led to this condition and explain why Bruno has slowed down.

c. Compare and contrast the hydration methods of consuming water orally and intravenous hydration.
Question 6
Muscular power, strength and endurance (local) are all fitness components that relate to specific capabilities of skeletal muscles.

a. In the table below provide a definition, an example of a recognised fitness test and a specific training method, for each component of fitness. Some answers have already been completed. Each training method must be different.

<table>
<thead>
<tr>
<th>Component of fitness</th>
<th>Definition</th>
<th>Example of a recognised fitness test</th>
<th>Specific training method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscular power</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muscular strength</td>
<td></td>
<td>1 RM bench press</td>
<td>Weight/resistance training</td>
</tr>
<tr>
<td>Muscular endurance (local)</td>
<td>Ability of a muscle or muscle group to perform repeated muscular contractions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. List two factors and explain how each factor affects the strength of a muscle.

Factor 1

Explanation

Factor 2

Explanation

6 marks
**Question 7**
A local school runs an annual triathlon that involves students from all year levels and fitness abilities. The triathlon involves a 400-m swim, 10-km bike ride and 4-km run. The following is a description of two Year 10 students who competed this year.

<table>
<thead>
<tr>
<th>Student</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tiffany</td>
<td>Tiffany has been entering and competing in triathlons for two years. A year ago she joined a triathlon club and recently came third in her age group at a locally sponsored triathlon. Her coach believes she has great potential in the sport based on the improvement she has made in the last two years. Tiffany has an average resting heart rate of 55 beats per minute.</td>
</tr>
<tr>
<td>Michelle</td>
<td>Michelle does not play competition sport but recently joined a gym to improve her fitness and self-esteem. Her initial fitness assessment from the gym rated her fitness as average. The training program designed by the gym instructor involved basic weights as well as various aerobic machines to improve her aerobic fitness. Michelle has an average resting heart rate of 75 beats per minute.</td>
</tr>
</tbody>
</table>

One minute prior to the start of the triathlon both girls have a heart rate in the range of 100–120 beats per minute.

a. Outline two reasons for the increase in heart rate from resting levels.

1. 

2. 

b. i. List two types of data that could be collected as part of an activity analysis on a triathlon.

1. 

2. 

ii. From the data given in part b. i., explain how a coach could use the information in designing a training program for an athlete.

2 + 4 = 6 marks
c. Outline the requirements of informed consent in relation to conducting a VO₂ max. test at a sports science laboratory on a 19-year-old triathlete compared to conducting the test on the two Year 10 students.

2 marks
**Question 8**

Accelerometer data was collected from two eleven-year-old boys. The two boys are in Year 6 at two different primary schools in the same suburb. The data was collected during lunchtime on the same day. The data is shown in the graph below.

![Graph showing movement counts for boy 1 and boy 2 across different activity levels: sedentary, light, moderate, vigorous.]

**a.** Using the information in the graph, describe the activity patterns of boy 1 throughout lunchtime.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

3 marks

**b.** Using the data, suggest two likely reasons for the difference between the two boys in terms of their physical environment.

1. _______________________________________________________________________
   _______________________________________________________________________
   _______________________________________________________________________

2 marks

**c.** Name and outline a population-based government or nongovernment initiative or strategy that could be implemented in schools to increase the physical activity levels of primary school aged children.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2 marks
Question 9
Cardiac output is the combination of two factors.

a. List the two factors. Do not use abbreviations in your answer.

b. Describe the relationship between cardiac output and oxygen uptake, and the role of the two factors listed in part a., when moving from a resting state to exercising.
Question 10

Tim, Harry and Nadia are Year 12 physical education students who want to determine the physical activity levels and sedentary behaviour patterns of 100 Year 1 students (6 years old) in their school to determine if they are meeting the national physical activity guidelines.

The students have pedometers, accelerometers and a 5-day physical activity recall questionnaire available to use. Tim suggests that a pedometer is the most appropriate tool to use; Nadia disagrees and thinks an accelerometer is a better choice and Harry suggests that the questionnaire would be the best choice.

Compare the use of pedometers, accelerometers and a 5-day physical activity questionnaire. Other than cost, describe the relevant advantages and limitations, and recommend the most suitable method for the students to use with the Year 1 students.
Question 11

Male swimming records (50-metre pool)

<table>
<thead>
<tr>
<th>Freestyle event</th>
<th>World record</th>
<th>Australian national record</th>
<th>Recreational swimmer</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 m</td>
<td>20.91 seconds</td>
<td>21.19 seconds</td>
<td>29.45 seconds</td>
</tr>
<tr>
<td>100 m</td>
<td>46.91 seconds</td>
<td>47.05 seconds</td>
<td>1:04.36 minutes</td>
</tr>
<tr>
<td>200 m</td>
<td>1:42.00 minutes</td>
<td>1:44.06 minutes</td>
<td>2:25.76 minutes</td>
</tr>
<tr>
<td>400 m</td>
<td>3:40.07 minutes</td>
<td>3:40.08 minutes</td>
<td>5:36.52 minutes</td>
</tr>
<tr>
<td>800 m</td>
<td>7:32.12 minutes</td>
<td>7:38.65 minutes</td>
<td>11:57.13 minutes</td>
</tr>
<tr>
<td>1500 m</td>
<td>14:34.56 minutes</td>
<td>14:34.56 minutes</td>
<td>21:59.37 minutes</td>
</tr>
</tbody>
</table>

a. For each of the following freestyle events, identify a different health-related fitness component needed to complete each event.

50-metre freestyle ____________________________________________________________

800-metre freestyle __________________________________________________________

1500-metre freestyle _________________________________________________________

b. A chronic respiratory adaptation to aerobic training is an increase in pulmonary diffusion.

i. State what occurs physiologically with an increase in pulmonary diffusion.

___________________________________________________________________________

ii. Identify and explain how one chronic cardiovascular and one chronic muscular adaptation enables the 1500-metre swimmer to utilise the benefits provided by an increase in pulmonary diffusion.

Cardiovascular adaptation ___________________________________________________

Explanation __________________________________________________________________

____________________________________________________________________________

Muscular adaptation ___________________________________________________________

Explanation __________________________________________________________________

____________________________________________________________________________

1 + 4 = 5 marks
The world record for the 100-metre swim is 46.91 seconds compared to the 400-metre record of 3:40.07 minutes. It takes the 400-metre swimmer approximately 51 seconds to complete each 100-metre split.

c. Explain why this occurs by discussing energy system interplay and by making reference to the data provided.

______________________________________________________________________________________________________________________________________________________________

4 marks

d. Compare an interval training program for a 1500-metre freestyler to a 50-metre freestyler. Make reference to the work to rest ratio (W:R) and one other variable of an interval training program.

______________________________________________________________________________________________________________________________________________________________

4 marks
As part of the Australian national record holder’s training for the 100-metre freestyle, the swimmer trains at 75–90% of VO$_2$ max.

**e.** Discuss why the 100-metre swimmer trains at this intensity and how this intensity affects performance and blood lactate levels at the end of a 100-metre swim.

4 marks