PHYSICAL EDUCATION

Written examination

Wednesday 2 November 2016

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>13</td>
<td>13</td>
<td>105</td>
</tr>
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<td></td>
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<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 correction fluid/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
Steve is 13 years old. In order to achieve health benefits and to meet Australia’s Physical Activity and Sedentary Behaviour Guidelines for Young People (13–17 years), how many days per week should Steve engage in activities that strengthen muscle and bone?
A. at least one day per week
B. at least two days per week
C. at least three days per week
D. at least five days per week

Question 2
The Heart Foundation’s ‘Jump Rope for Heart’ is a physical activity program that provides resources for teachers. The provision of resources and equipment is an example of an initiative designed to increase physical activity.
Which level of the social-ecological model does this address?
A. policy
B. individual
C. social environment
D. physical environment
Question 3

The image above shows a fitness test in progress.
Which of the following correctly identifies the fitness component being tested, the type of test being undertaken and the variable being measured?

<table>
<thead>
<tr>
<th>Fitness component</th>
<th>Type of test</th>
<th>Variable measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. aerobic capacity</td>
<td>maximal test</td>
<td>oxygen uptake</td>
</tr>
<tr>
<td>B. muscular endurance</td>
<td>sub-maximal test</td>
<td>blood lactate</td>
</tr>
<tr>
<td>C. muscular strength</td>
<td>maximal test</td>
<td>oxygen uptake</td>
</tr>
<tr>
<td>D. aerobic capacity</td>
<td>sub-maximal test</td>
<td>blood lactate</td>
</tr>
</tbody>
</table>

Question 4
The use of which one of the following is considered illegal under the World Anti-Doping Agency’s (WADA) code?
A. energy drinks
B. hypotonic drinks
C. hypertonic drinks
D. intravenous hydration
**Question 5**

Arousal levels for both golf and basketball need to be optimal.
Which one of the following graphs demonstrates optimal arousal for both golf and basketball?

**Key**

<p>| | | | |</p>
<table>
<thead>
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</tbody>
</table>

### A. 

![Graph A](image1.png)

### B. 

![Graph B](image2.png)

### C. 

![Graph C](image3.png)

### D. 

![Graph D](image4.png)

**Question 6**

Jacqui is a 16-year-old student who plays soccer. She trains twice a week for 60 minutes and plays a 90-minute game every weekend. Jacqui records her activity using an accelerometer.

What frequency, duration and intensity of physical activity does Jacqui need to accumulate per week to meet Australia’s Physical Activity Guidelines for young people (13–17 years) for health benefits?

A. 75–150 minutes of vigorous-intensity physical activity each week
B. at least 30 minutes of moderate-to-vigorous-intensity physical activity every day
C. at least 60 minutes of moderate-to-vigorous-intensity physical activity every day
D. at least three hours of moderate-intensity physical activity every day, spread throughout the day

**Question 7**

The ability to work at a higher intensity aerobically can be attributed to an increase in

A. Type II fibres.
B. lactate tolerance.
C. mitochondria.
D. ATPase.
Question 8
Fats are the primary fuel source for energy at
A. 60% of VO₂ max.
B. 70% of VO₂ max.
C. 80% of VO₂ max.
D. 90% of VO₂ max.

Question 9
Which one of the following initiatives, designed to increase the physical activity levels of adults, addresses the social environment component of the social-ecological model?
A. organising a workplace team for a fun run
B. displaying information posters at work
C. providing a secure storage area for active transport
D. a workplace introducing 15-minute breaks for physical activity

Question 10
The predominant energy system used during a training session depends on the
A. duration of the session.
B. intensity of the session.
C. athlete’s training status.
D. frequency of the sessions.

Question 11
Which one of the following energy systems has the slowest rate of energy (ATP) production?
A. ATP-CP
B. aerobic lipolysis
C. aerobic glycolysis
D. anaerobic glycolytic

Question 12
A suitable psychological strategy to improve recovery between events at an international swimming competition would be
A. massages.
B. hydrotherapy.
C. compression garments.
D. sleep and rest.
Use the following information to answer Questions 13 and 14.

![Graph showing heart rate (beats per minute) vs. oxygen consumption with two lines, one for trained athlete and one for untrained athlete.]

**Question 13**
What chronic adaptation is shown in the graph above?
A. increased stroke volume
B. decreased stroke volume
C. decreased resting heart rate
D. increased resting heart rate

**Question 14**
The adaptation shown in the graph is possible because
A. stroke volume increases so the heart does not need to beat as often.
B. oxygen consumption increases so the heart does not need to beat as often.
C. resting heart rate increases to increase the amount of oxygen delivered to the working muscles.
D. stroke volume and heart rate decrease due to an increase in the efficiency of the cardiovascular system.

**Question 15**
The relationship between stroke volume, heart rate and cardiac output is best represented as
A. stroke volume ÷ heart rate = cardiac output
B. stroke volume × heart rate = cardiac output
C. heart rate × cardiac output = stroke volume
D. cardiac output × stroke volume = heart rate
Question 1 (4 marks)
The ‘Couch to 5K®’ training app is designed to get sedentary people running 5 km over a nine-week training program.

a. Which of Australia’s Physical Activity Guidelines for adults (18–64 years) does this program specifically target? 1 mark

b. Other than duration, identify one training principle shown in Week 7 of the program. 1 mark

c. A coach advises Jordan that if he runs for 25 minutes every time he runs, he could overload his training program.

Explain how Jordan could overload his training program without any increase in run time per session. 2 marks
Question 2 (4 marks)

a. List two chronic adaptations to the cardiovascular system that result from aerobic training. 2 marks

b. Select one of the chronic adaptations listed in part a. and explain how it leads to an increase in aerobic fitness. 2 marks

Question 3 (10 marks)

The LaunchPad program aims to develop children’s fundamental movement skills in order to improve confidence and competence for lifelong participation in physical activity and sport.

Source: Gymnastics Australia
(www.gymnastics.org.au)

a. Developing fundamental movement skills to support participation in physical activity targets which level of the social-ecological model? 1 mark
b. Apply the social-ecological model to critique the use of the LaunchPad program to increase the physical activity levels of children aged five to eight years. 4 marks

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c. Outline one example of an initiative that targets the physical environment level that could be used with LaunchPad to encourage physical activity or reduce the sedentary behaviour of children aged five to eight years. 1 mark

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Max (an eight-year-old boy) completed a self-report physical activity diary for a week. He completed two one-hour sessions of LaunchPad.

d. i. Outline one advantage and one disadvantage of using a self-report diary as a method of assessing the physical activity levels and sedentary behaviour of a child. 2 marks

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ii. Other than a self-report diary, provide one subjective and one objective method of assessing the physical activity levels of a child. 2 marks

Subjective __________________________________________________________

Objective __________________________________________________________
Question 4 (10 marks)

a. Describe the similarities and differences in the process of ATP production via the aerobic and anaerobic pathways.  
4 marks

b. The graph below shows the aerobic training zone as being between 70% and 90% of maximum heart rate.

Due to copyright restrictions, this material is not supplied.


Describe the acute physiological changes that occur when an athlete works above the aerobic training zone.  
2 marks

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SECTION B – Question 4 – continued
c. Explain how an improved lactate inflection point (LIP) would be an advantage for a distance runner. 2 marks

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d. Describe how an increase in the oxidative enzymes leads to an improved LIP. 2 marks

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Question 5 (7 marks)

a. Demonstrate your understanding of Australia’s Physical Activity Guidelines by designing a weekly physical activity plan to achieve health benefits for an adult who is currently not doing any physical activity. Your program must show the correct frequency, intensity and duration of the activity. 4 marks

<table>
<thead>
<tr>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
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</tbody>
</table>

b. Each session of your plan should include a warm-up, conditioning phase and cool-down.

Outline the purpose of each component. 3 marks

Warm-up ________________________________________________________________

Conditioning phase __________________________________________________

Cool-down ____________________________________________________________

SECTION B – continued
**Question 6** (5 marks)

a. Explain the process of carbohydrate loading and how it could improve an endurance athlete’s performance.  

b. Explain how consuming a high-carbohydrate diet rather than a low-carbohydrate diet can help restore muscle glycogen levels and how this could influence training performance.
Question 7 (13 marks)
The following image is of a hurdler.

![Image of a hurdler](Source: Stephen Mcsweeny/Shutterstock.com)

a. Identify one health-related fitness component required to perform the action shown. Justify your answer.  

b. The hurdler in the image has a very focused facial expression. Describe one strategy the hurdler may have used to develop her concentration skills, enabling her to perform successfully at a high level.
c. The hurdler uses interval training to improve her performance in the 110 m hurdles.

Describe interval training and explain how the variables involved can be manipulated to develop any of the three energy systems. Provide an example of an appropriate work-to-rest ratio.  

3 marks

The graph below shows blood lactate concentration following a set of five repetitions of interval training at three different intensities.

![Blood lactate concentration graph](image)

Source: reprinted with permission of WL Kenney, JH Wilmore and DL Costill, *Physiology of Sport and Exercise*, 6th edn, Human Kinetics, Champaign (IL), 2015, p. 235; no further use of this figure is permitted without written permission from the publisher.

d. Identify the energy system being trained in each of the three different interval intensities shown.  

3 marks

A

B

C

e. Using the data in the graph, explain why blood lactate levels are higher for A and B compared to C.  

3 marks
**Question 8 (7 marks)**

Michelle Payne is the first female jockey to win the Melbourne Cup. After the race she stated, ‘...you know what? It’s not all about strength, there is so much more involved, getting the horse into a rhythm, getting the horse to try for you, it’s being patient’.

*Source: Isabelle Westbury, ‘Michelle Payne’s Melbourne Cup win should be a game-changer for women’s sport’, *Sydney Morning Herald*, 4 November 2015*

a. Payne says, ‘It’s not all about strength’.

List **one** other fitness component that may also be important for a jockey and justify your response. 2 marks

b. Males have higher levels of testosterone than females, producing more muscle mass. This results in greater absolute strength.

State **two** other factors that affect strength. 2 marks
c. Physiological data from two athletes is shown in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Athlete 1</th>
<th>Athlete 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VO₂ max.</strong></td>
<td>63 mL/kg/min</td>
<td>52 mL/kg/min</td>
</tr>
<tr>
<td><strong>Type II muscle fibres</strong></td>
<td>24%</td>
<td>75%</td>
</tr>
<tr>
<td>(gastrocnemius)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Type I muscle fibres</strong></td>
<td>76%</td>
<td>25%</td>
</tr>
<tr>
<td>(gastrocnemius)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Leg press</strong></td>
<td>220 kg</td>
<td>300 kg</td>
</tr>
<tr>
<td><strong>1 repetition maximum (RM)</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on the data, justify which athlete is likely to perform better in 100 m and 200 m sprint events.

3 marks
Question 9 (11 marks)
The local primary school is trying to increase the number of students who ride their bikes to school.

a. The initiatives that the school has implemented are listed below.

Identify the component of the social-ecological model that each initiative addresses. 4 marks

- Secure bike racks installed at the school ________________________________________
- Bike education taught in Grades 2, 4 and 6 ________________________________________
- Meeting points for students en route to school ________________________________________
- 40 km/hr zone in surrounding streets ____________________________________________

b. The school has addressed all four components of the social-ecological model and yet many students do not ride to school.

Explain, with three specific examples, how an initiative that targets all four components of the social-ecological model may still not change the behaviour of an individual. 3 marks

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c. The principal of the school would like to determine if there has been any change in the physical activity levels of the students as a result of the initiatives. The principal has access to pedometers and direct observation as methods of assessing the physical activity levels of the students.

Critique each method of assessment by outlining the advantages and disadvantages of its use with this population group. 4 marks
Question 10 (8 marks)
In a game of netball there are similarities and differences between the energy requirements of different positions. All players on a netball court engage in short, sharp, high-intensity movements throughout the game.

The centre player is allowed to move over the whole court, except the goal circles. As well as maintaining high-intensity efforts throughout the game, the centre player is constantly on the move and has significantly shorter periods of walking or standing still than the goal shooter.

The goal shooter is only allowed within the goal third and must have good spatial awareness. Compared to the centre player, the goal shooter completes similar high-intensity movements but spends a significantly greater amount of time walking or standing still.

a. Using the information given above, discuss the similarities and differences between the energy requirements of a centre player and a goal shooter.  

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b. The following skill–frequency table shows the skills performed by the goal shooter in one quarter of a game.

<table>
<thead>
<tr>
<th>Skill</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>passes</td>
<td></td>
</tr>
<tr>
<td>• chest</td>
<td>10</td>
</tr>
<tr>
<td>• overhead</td>
<td>4</td>
</tr>
<tr>
<td>• shoulder</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19</strong></td>
</tr>
<tr>
<td>rebounds</td>
<td>6</td>
</tr>
<tr>
<td>shots taken</td>
<td>13</td>
</tr>
<tr>
<td>intercepts/steals</td>
<td>3</td>
</tr>
<tr>
<td>penalties</td>
<td>4</td>
</tr>
<tr>
<td>guards/defends</td>
<td>18</td>
</tr>
</tbody>
</table>

i. Outline **two** examples of physiological information that can be gained from data collected in a skill–frequency table.  

ii. Choose **one** skill from the skill–frequency table and draw and/or explain a resistance training exercise that can be completed in the gym to improve this skill.
**Question 11** (10 marks)

Thermoregulation is particularly important in warm climates as core body temperature increases. Fatigue is more likely to occur when core body temperature reaches 40 °C.

a. Explain what occurs physiologically when a person’s core body temperature increases. 3 marks

b. Other than drinking fluids, list two strategies that tennis players could use during a match to decrease the risk of dehydration. 2 marks

c. Explain how the psychological effects of dehydration could impair a tennis player’s performance. 2 marks
d. A tennis player was evaluating the benefits of two different post-match rehydration strategies: water and isotonic sports drinks.

Assess both strategies and suggest the most suitable strategy for the tennis player in this situation. 3 marks

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**Question 12** (10 marks)

Some athletes improve performance through blood doping and the use of erythropoietin (EPO), both of which are illegal practices.

a. Using the table below, outline two similarities and two differences between blood doping and the use of EPO.  

<table>
<thead>
<tr>
<th>Similarities</th>
<th>Differences</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>1.</td>
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<tr>
<td>2.</td>
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</tbody>
</table>

b. Explain the physiological benefit of using EPO for an endurance athlete.  

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________________________________________________________________________________
c. Name an alternative practice that is legal and outline how it could provide the endurance athlete with similar benefits to EPO.  

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2 marks

d. Using the World Anti-Doping Agency (WADA) criteria, explain why your answer in part c. is a legal practice.  

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2 marks
Question 13 (6 marks)

Muscle metabolism during exercise


a. At the onset of exercise, oxygen consumption does not increase to a steady state immediately. How is the energy for exercise produced in this situation? Use data from the graphs above to support your answer.

3 marks
b. Trained athletes are able to achieve a steady state more rapidly than untrained individuals.

Other than an increase in the oxidative enzymes, what are **three** chronic adaptations to the muscular system that facilitate the rate of reaching a steady state for the trained athlete? 3 marks