VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

Victorian Certificate of Education 2016

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER | | | | | | | | | | Letter |

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

Section	*Number of questions*	*Number of questions to be answered*	*Number of marks*
A	15	15	15
B	13	13	105
			Total 120

- 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
- Question and answer book of 27 pages.
- 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?

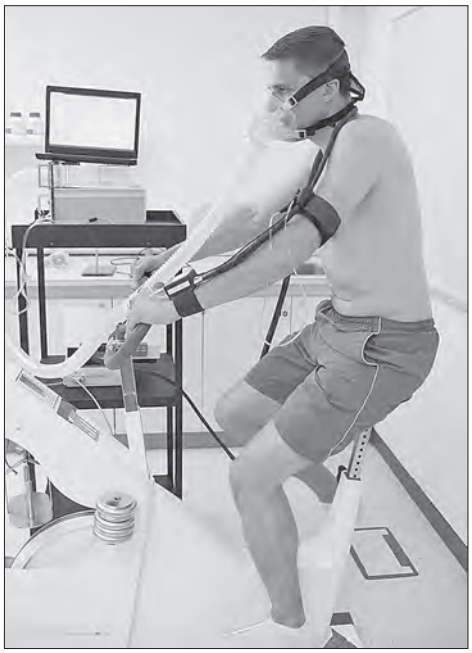
A. policy

B. individual

C. social environment

D. physical environment

Question 3



Source: wavebreakmedia/Shutterstock.com

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?

	Fitness component	Type of test	Variable measured
A.	aerobic capacity	maximal test	oxygen uptake
B.	muscular endurance	sub-maximal test	blood lactate
C.	muscular strength	maximal test	oxygen uptake
D.	aerobic capacity	sub-maximal test	blood lactate

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

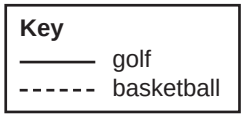
C. hypertonic drinks

D. intravenous hydration

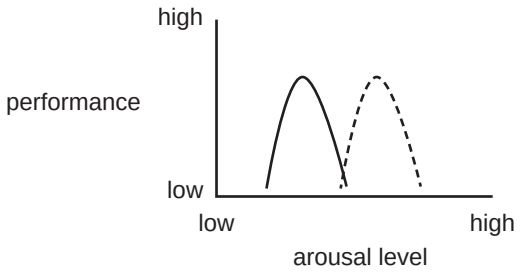
Question 5

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?



A.



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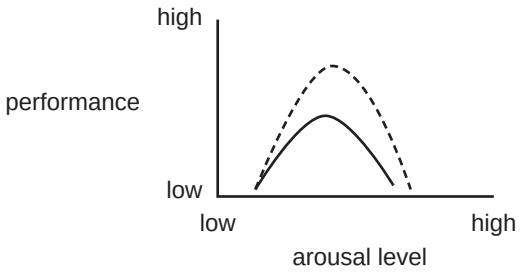

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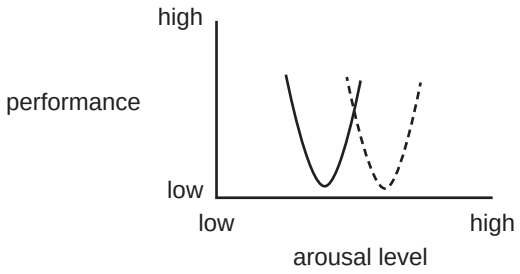

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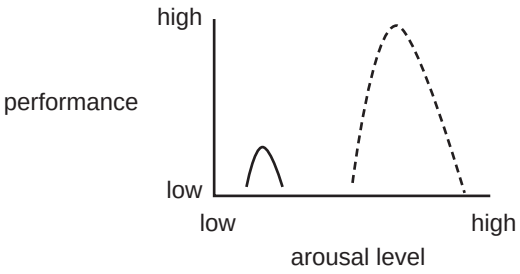


Question 6

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 VO_2 max.

B. 70% of VO_2 max.

C. 80% of VO_2 max.

D. 90% of VO_2 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

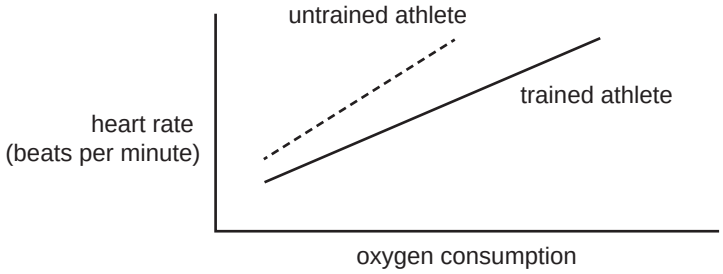
A. massages.

B. hydrotherapy.

C. compression garments.

D. sleep and rest.

Use the following information to answer Questions 13 and 14.



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

END OF SECTION A

SECTION B

Instructions for Section B

Answer **all** questions in the spaces provided.

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

Week 7 of the program

Workout 1	Workout 2	Workout 3
Brisk five-minute warm-up walk, then jog 4 km or jog for 25 minutes	Brisk five-minute warm-up walk, then jog 4 km or jog for 25 minutes	Brisk five-minute warm-up walk, then jog 4 km or jog for 25 minutes

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

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

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

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.

Source: WD McArdle, FI Katch and VL Katch, *Exercise Physiology: Nutrition, Energy, and Human Performance*, 8th edn, Wolters Kluwer Health/Lippincott Williams & Wilkins, Baltimore/Philadelphia, 2015, p. 481

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

c. Explain how an improved lactate inflection point (LIP) would be an advantage for a distance runner. 2 marks

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

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

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

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 _____

_____

Question 6 (5 marks)

a. Explain the process of carbohydrate loading and how it could improve an endurance athlete's performance. 2 marks

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. 3 marks

Question 7 (13 marks)

The following image is of a hurdler.

Source: Stephen Mcsweeny/Shutterstock.com

a. Identify **one** health-related fitness component required to perform the action shown. Justify your answer. 2 marks

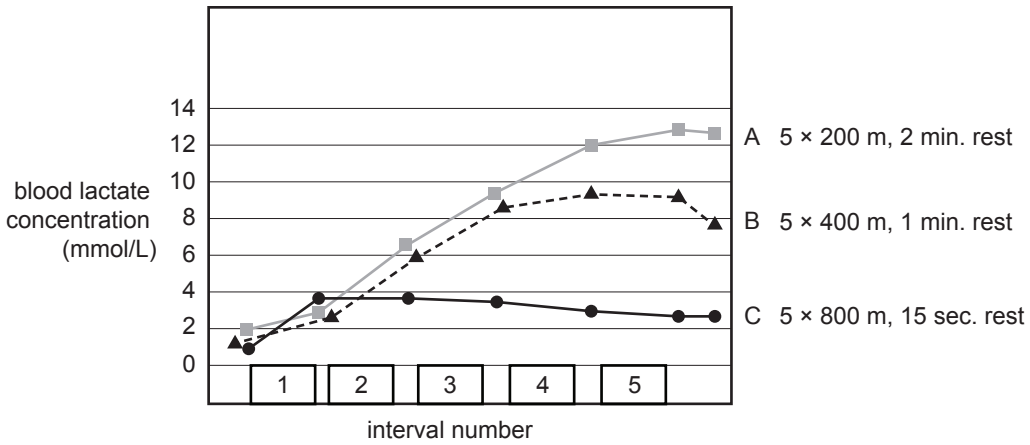
b. The hurdler in the image has a very focused facial expression.

Describe **one** strategy the hurdler may have used to develop her concentration skills, enabling her to perform successfully at a high level. 2 marks

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.



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.

	Athlete 1	**Athlete 2**
VO_2 max.	63 mL/kg/min	52 mL/kg/min
Type II muscle fibres (gastrocnemius)	24%	75%
Type I muscle fibres (gastrocnemius)	76%	25%
Leg press 1 repetition maximum (RM)	220 kg	300 kg

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

_____

_____

_____

_____

_____

_____

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. 5 marks

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

Skill	Frequency
passes • chest • overhead • shoulder **Total**	 10 4 5 **19**
rebounds	6
shots taken	13
intercepts/steals	3
penalties	4
guards/defends	18

i. Outline **two** examples of physiological information that can be gained from data collected in a skill–frequency table. 2 marks

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. 1 mark

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

During the Australian Open tennis tournament in January, players used suitable cooling strategies to help them perform at their best.

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

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. 4 marks

Similarities	Differences
1.	1.
2.	2.

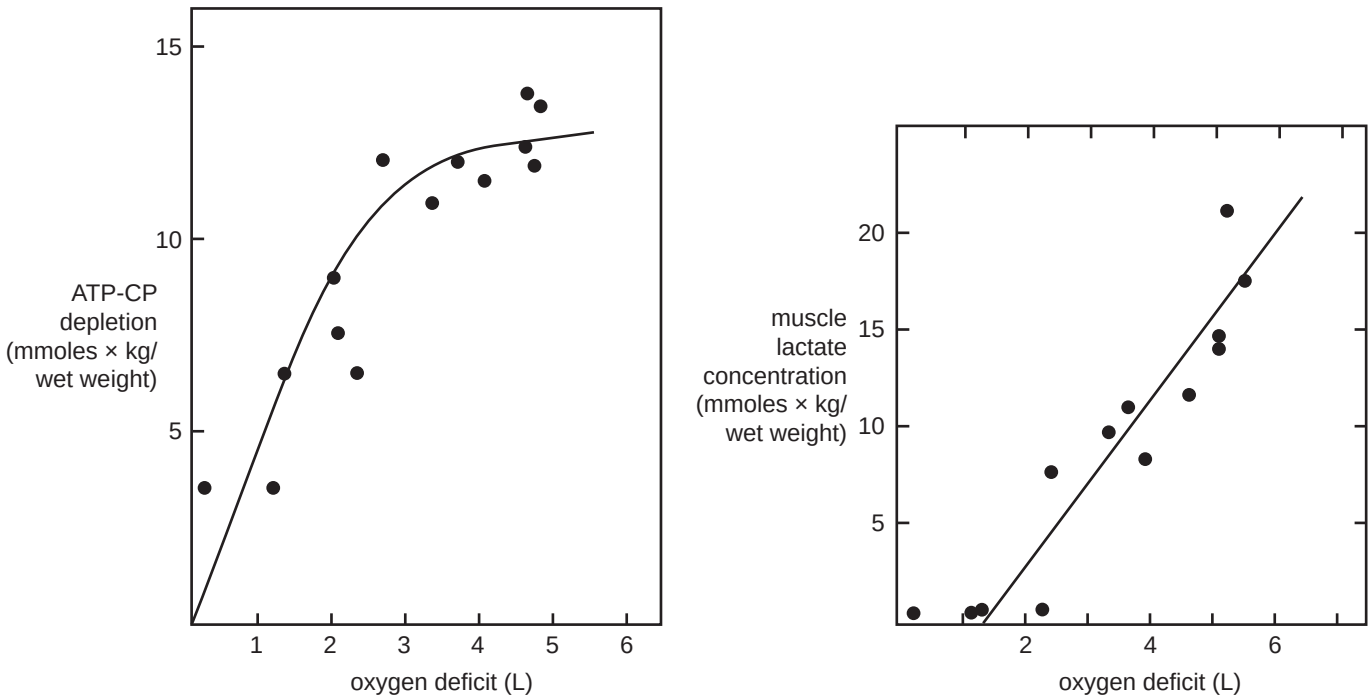
b. Explain the physiological benefit of using EPO for an endurance athlete. 2 marks

c. Name an alternative practice that is legal and outline how it could provide the endurance athlete with similar benefits to EPO. 2 marks

d. Using the World Anti-Doping Agency (WADA) criteria, explain why your answer in **part c.** is a legal practice. 2 marks

Question 13 (6 marks)

Muscle metabolism during exercise



Source: J Karlsson, 'Muscle ATP, CP, and Lactate in Submaximal and Maximal Exercise', in B Pernow et al. (eds), *Muscle Metabolism During Exercise*, Plenum Press, New York, 1971, p. 390

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

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END OF QUESTION AND ANSWER BOOK