

**Victorian Certificate of Education  
2014**

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER           Letter

**PHYSICAL EDUCATION**  
**Written examination**

**Thursday 6 November 2014**

**Reading time: 11.45 am to 12.00 noon (15 minutes)**  
**Writing time: 12.00 noon to 2.00 pm (2 hours)**

**QUESTION AND ANSWER BOOK**

**Structure of book**

<i>Section</i>	<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
A	15	15	15
B	17	17	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 white out liquid/tape.
- No calculator is allowed in this examination.

**Materials supplied**

- Question and answer book of 23 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**

Partner support for physical activity is a factor of which component of the social-ecological model?

- A. policy
- B. individual
- C. social environment
- D. physical environment

**Question 2**

The most likely cause of fatigue for a runner in a 100 m sprint is

- A. dehydration.
- B. depletion of CP stores.
- C. depletion of muscle glycogen.
- D. accumulation of hydrogen ions (H<sup>+</sup>).

**Question 3**

During a period of oxygen deficit

- A. oxygen supply is less than oxygen demand.
- B. oxygen demand is less than oxygen supply.
- C. oxygen supply is equal to oxygen demand.
- D. the aerobic energy system is predominant.

**Question 4**

Which of the following loads (% of 1 repetition maximum, or RM), repetitions and sets are appropriate to develop the given fitness component?

	<b>Fitness component</b>	<b>Load (% of 1 RM)</b>	<b>Repetitions</b>	<b>Sets</b>
A.	strength	40–60	1–6	3–12
B.	power	30–70	3–12	3–6
C.	endurance	70–90	15–100	2–5
D.	hypertrophy	40–60	20–30	3–6

**Question 5**

Which one of the following is a by-product of aerobic respiration?

- A. lactic acid
- B. calcium ions ( $\text{Ca}^+$ )
- C. hydrogen ions ( $\text{H}^+$ )
- D. carbon dioxide ( $\text{CO}_2$ )

**Question 6**

When working at your lactate inflection point (LIP), the predominant energy system being used is

- A. ATP-PC.
- B. aerobic lipolysis.
- C. aerobic glycolysis.
- D. anaerobic glycolysis.

**Question 7**

Which initiative addresses the policy component of the social-ecological model, designed to increase the physical activity levels of school students?

- A. enforcing a 'no hat, no play' rule
- B. installation of secure bicycle racks
- C. designated play spaces for different year levels
- D. installation of water fountains near the sports ovals and courts

**Question 8**

Most of the lactic acid produced during submaximal exercise is

- A. converted to protein.
- B. excreted in urine and sweat.
- C. used as a fuel for the aerobic system.
- D. converted to glycogen in the liver and muscles.

**Question 9**

An appropriate test of muscular strength is the

- A. 1 RM bench press test.
- B. vertical jump test.
- C. 60-second sit-up test.
- D. standing broad jump test.

**Question 10**

The most effective and appropriate recovery strategy to use within 30 minutes of an Australian Rules football match would be

- A. an ocean plunge.
- B. contrast therapy.
- C. passive stretching.
- D. consuming sports drinks.

**Question 11**

One advantage of using an accelerometer to measure physical activity is

- A. low cost.
- B. collecting contextual data.
- C. recording movement in real time.
- D. accurately measuring low-impact physical activity.

**Question 12**

As a result of a carbohydrate-loading diet, a triathlete reports bloating and heaviness.

This may be accurately explained by increased

- A. weight.
- B. water storage.
- C. glycogen stores.
- D. kilojoules stored in the form of fat.

**Question 13**

The Australian Sports Anti-Doping Authority's (ASADA) rationale for introducing the World Anti-Doping Code includes

- A. the public identification of drug cheats.
- B. role modelling for children.
- C. the replacement of traditional testing measures.
- D. measuring the effect of doping on performance.

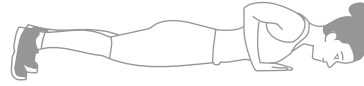
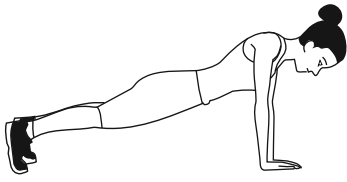
**Question 14**

Which response correctly matches the fitness component to the training method and chronic adaptation?

	<b>Fitness component</b>	<b>Training method</b>	<b>Chronic adaptation</b>
<b>A.</b>	muscular power	resistance training	increased oxidative enzymes
<b>B.</b>	aerobic capacity	plyometric training	increased LIP
<b>C.</b>	muscular endurance	circuit training	increased glycolytic capacity
<b>D.</b>	anaerobic capacity intensity	short interval training	increased mitochondrial density

**Question 15**

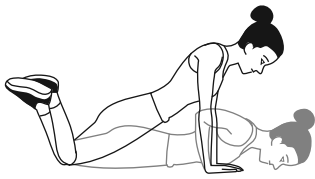
Melanie wants to improve the muscular strength of her pectorals and triceps, but cannot do the required repetitions as the original exercise (the push-up) is too difficult.



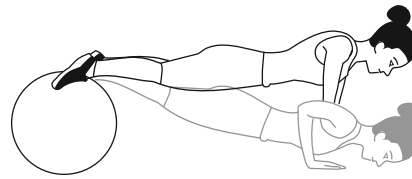
push-up (original exercise)

Which one of the following shows an appropriate modification of the exercise so that Melanie will be able to complete the required repetitions and still develop the muscular strength of her pectorals and triceps?

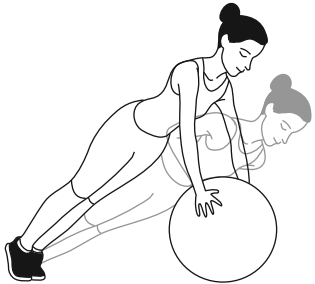
**A.**



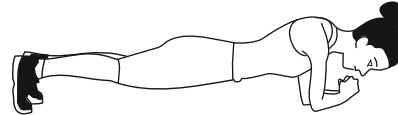
**B.**



**C.**



**D.**



**SECTION B**

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

**Question 1** (4 marks)

Outline two advantages and two limitations of direct observation as a method of assessing physical activity.

Advantages

- 1. \_\_\_\_\_  
\_\_\_\_\_
- 2. \_\_\_\_\_  
\_\_\_\_\_

Limitations

- 1. \_\_\_\_\_  
\_\_\_\_\_
- 2. \_\_\_\_\_  
\_\_\_\_\_

**Question 2** (3 marks)

Katie and Matthew are discussing designing a training program. Katie suggests that they should do fitness testing first, but Matthew disagrees and says that they need to do an activity analysis first.

Who is correct – Katie or Matthew?

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Justify your choice.

\_\_\_\_\_  
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\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Question 3** (7 marks)

In 2014, for the first time since 2005, Australian Football League (AFL) club Collingwood did not travel overseas for pre-season high-altitude training. Instead, the club used an altitude facility in Melbourne. The altitude facility simulates altitudes up to 5000 m and can fit about 40 players.

- a.** State two perceived physiological benefits of using high-altitude training. 2 marks

1. \_\_\_\_\_

2. \_\_\_\_\_

- b.** Explain how these physiological benefits would occur. 3 marks

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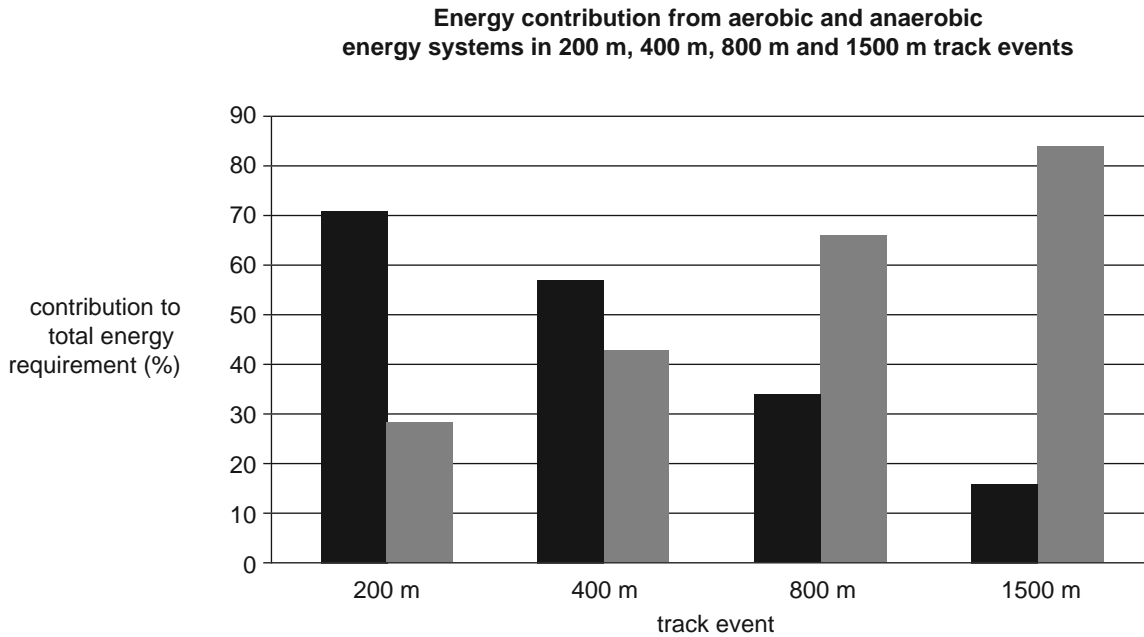
- c.** State two potential harms associated with high-altitude training. 2 marks

1. \_\_\_\_\_

2. \_\_\_\_\_

**Question 4** (8 marks)

The graph below shows the contribution of the anaerobic and aerobic energy systems to the total energy requirements for four different track events: 200 m, 400 m, 800 m and 1500 m.



Source of data: MR Spencer and PB Gatin,  
 'Energy system contribution during 200- to 1500-m running in highly trained athletes',  
 in *Medicine & Science in Sports & Exercise*, 33(1), 2001, pp. 157-162

- a. i. Which column – black or grey – represents the contribution from the anaerobic systems? 1 mark

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- ii. With reference to the data provided, justify your answer above. 3 marks

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b. What is the role of the anaerobic systems in the 1500 m event? In your response, refer to the data provided.

4 marks

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**Question 5** (3 marks)

Australia has a high world ranking in canoe sprint racing and is usually in the top five nations at the World Championships or Olympic Games. Canoe sprint racing is about speed on flat water over distances of 200 m, 500 m and 1000 m. The aim of many canoe sprint paddlers is to increase muscle mass, and it is common for paddlers to use a mix of dietary sports supplements and nutritional aids.

Name one legal nutritional supplement or aid that a canoe sprint paddler may use to increase power and explain how the supplement or aid may increase performance.

Nutritional supplement or aid \_\_\_\_\_

Explanation \_\_\_\_\_

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**Question 6** (6 marks)

Three government secondary schools in Victoria with similar physical activity (PA) levels implemented a number of different initiatives to increase the level of physical activity of their Year 7 students. The amount of time students were physically active during school hours was measured using direct observation before and after the implementation of the initiatives, as shown in the table below.

	<b>Policy</b>	<b>Physical environment</b>	<b>Social environment</b>	<b>Total PA pre-implementation (minutes/week)</b>	<b>Total PA post-implementation (minutes/week)</b>
<b>School 1</b>	<ul style="list-style-type: none"> <li>mandated physical education and sport</li> <li>access to sports equipment and facilities at lunchtime and recess</li> </ul>	designated Year 7 play space with equipment, line markings and grassed open spaces	lunchtime: <ul style="list-style-type: none"> <li>'walk and talk' groups</li> <li>dance classes</li> <li>joggers' club</li> <li>sports competitions</li> </ul>	150	550
<b>School 2</b>	<ul style="list-style-type: none"> <li>mandated physical education and sport</li> <li>active transport policy</li> </ul>	secure bicycle racks and storage facilities		150	200
<b>School 3</b>	<ul style="list-style-type: none"> <li>mandated physical education and sport</li> </ul>			150	200

- a. Why did School 1 have greater success in increasing the Year 7 students' physical activity levels? In your response, refer to the social-ecological model.

1 mark

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- b.** Consider the initiatives implemented in School 2 and School 3. Explain why the total physical activity levels of students in both schools increased by the same number of minutes. 3 marks

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- c.** By referring to the individual component of the social-ecological model, describe how mandated physical education and sport may increase the likelihood of a Year 7 student being active. 2 marks

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**Question 7** (8 marks)

- a. Explain, physiologically, how regular aerobic training leads to an increase in an athlete's lactate inflection point (LIP).

4 marks

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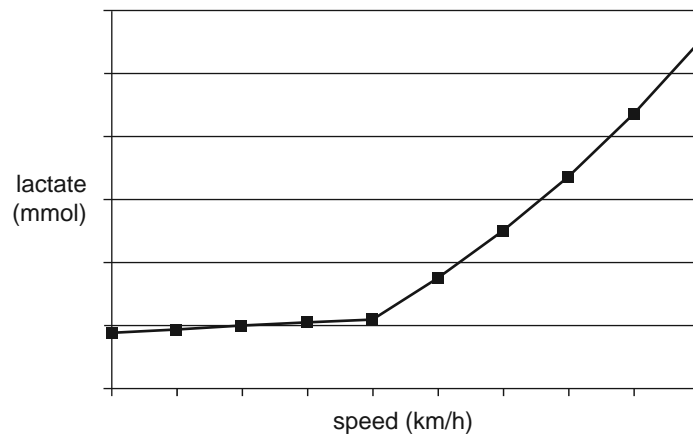
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- b. On the graph below, draw a curve that would represent the chronic adaptation explained in part a.

1 mark



- c. If an athlete works at an exercise intensity level above their LIP, what occurs physiologically? 3 marks

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**Question 8** (6 marks)

After 12 weeks of training, an untrained runner brings their 5 km run time down from 45 minutes to 40 minutes, while a trained runner only brings their time down from 13:23 minutes to 13:11 minutes.

- a. Name the training principle that accounts for the greater improvement by the untrained runner. 1 mark

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The untrained runner decided to use continuous training as a method to improve their aerobic capacity.

- b. Outline **two** advantages to the untrained runner of choosing continuous training over long interval training. 2 marks

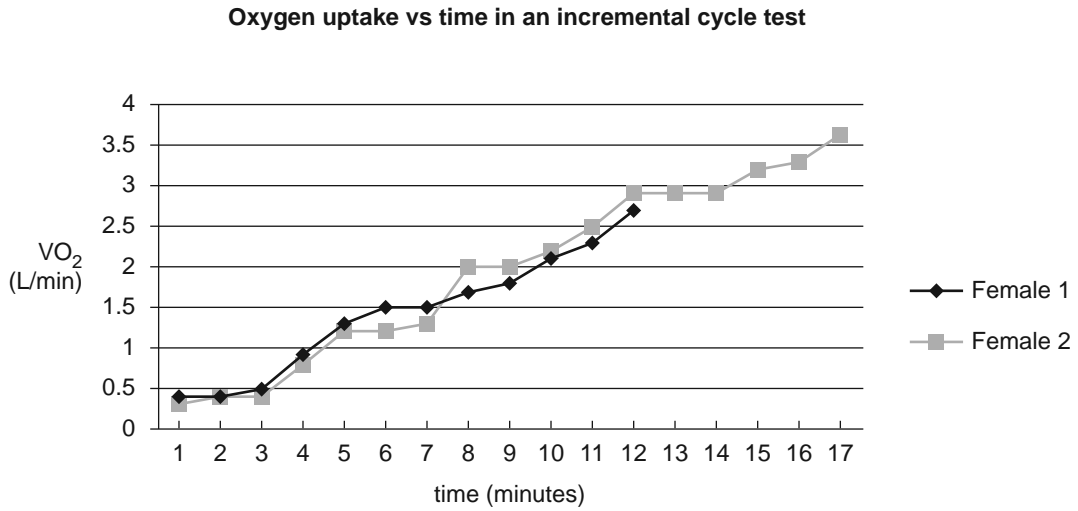
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- c. Suggest a suitable training intensity range for the trained runner and explain why this intensity would be greater than that of the untrained runner. 3 marks

\_\_\_\_\_ % of HR max.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Question 9** (16 marks)

Two female athletes, one a trained runner and the other an untrained runner, performed a  $VO_2$  max. test on a cycle ergometer. The results of the test are shown in the graph below.



	<b>Female 1</b>	<b>Female 2</b>
<b>Weight</b>	75 kg	65 kg
<b>Height</b>	174 cm	176 cm

- a. Use the information in the graph to determine if the values given are absolute or relative measures. Explain which measure (absolute or relative) is more useful when comparing the two runners. 3 marks

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- b. i.** Using the data on page 14, explain which female is the trained runner. 2 marks

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- ii.** Identify one chronic adaptation to the cardiovascular system and explain how it has resulted in the trained runner achieving a greater result. 2 marks

Chronic adaptation \_\_\_\_\_

Explanation \_\_\_\_\_

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- c.** For Female 2, explain what occurs physiologically between 12 and 14 minutes, and then what occurs between 14 and 15 minutes. 4 marks

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The cycle ergometer test is not specific to running.

- d.** Name a recognised **field test** that could be used to determine the runners'  $VO_2$  max. 1 mark

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VO<sub>2</sub> max. values determined on a cycle ergometer are typically 6–11% lower than those obtained on a treadmill for the same individual.

- e. Explain why a cycle ergometer test would produce lower VO<sub>2</sub> max. values than a running test in terms of the fatiguing factor for each test. 2 marks

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- f. Outline one advantage and one disadvantage of conducting a VO<sub>2</sub> max. test in a laboratory rather than in the field. 2 marks

Advantage \_\_\_\_\_

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Disadvantage \_\_\_\_\_

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**Question 10** (5 marks)

Brazilian footballer Ronaldinho uses the strategy of mental imagery in his training. He pictures his teammate alone in front of a rival goalkeeper and imagines how to best deliver a ball to him.

- a. List three different ways in which the use of mental imagery might enhance Ronaldinho's game preparation, strategy and/or performance. 3 marks

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

- b. Name and describe a different psychological strategy that an athlete might use to improve their performance. 2 marks

Strategy \_\_\_\_\_

Description \_\_\_\_\_

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**Question 11** (7 marks)

The men's track cycling team pursuit event is competed over a distance of 4 km by a team of four riders. Riders in a team follow each other closely and, periodically, the lead rider (who works the hardest) moves up the bank of the track and rejoins the team at the rear.

Since the winning team is decided by the third rider across the line, it is common for one rider to take a 'death pull', where he rides so hard that he cannot maintain the group pace afterwards. This allows his teammates to briefly recover behind him before they make a final three-man acceleration towards the finish line. The world record for this event is 3:53.31 minutes.

- a.** Name the energy system that makes the greatest contribution to ATP production in this event. 1 mark

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- b.** Identify the most likely cause of fatigue for the rider who makes the death pull. 1 mark

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- c.** Explain why a rider would be working above their LIP when riding at the front of the team. 2 marks

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- d.** During recovery, the riders' heart rates remain elevated.

Explain, with reference to excess post-exercise oxygen consumption (EPOC), what is occurring physiologically during recovery.

3 marks

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**Question 12** (4 marks)

The table below shows sedentary and non-sedentary time collected by an accelerometer for two Australian adults working in an office environment and having the same total sedentary time across a 12-hour day.

**Activity profile**

	<b>Total activity time</b>	<b>Total sedentary time</b>	<b>Longest sedentary time</b>	<b>Longest activity time</b>
<b>Person 1</b>	3 hours 30 minutes	8 hours 30 minutes	1 hour 40 minutes	28 minutes
<b>Person 2</b>	3 hours 30 minutes	8 hours 30 minutes	15 minutes	1 hour 15 minutes

- a. Provide **one** example of a sedentary behaviour in the workplace. 1 mark

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- b. Explain why Person 2's activity profile is preferable to that of Person 1. In your response, refer to the table above and the National Physical Activity Guidelines (NPAG) for adults. 2 marks

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- c. Why is it important to monitor sedentary behaviour independently of physical activity? 1 mark

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**Question 13** (3 marks)

During team sports, such as hockey and rugby, the consumption of sports drinks can help players continue high-intensity, stop–start activity for longer and enhance endurance capacity.

- a.** Which type of drink is most likely to enhance performance? Circle the correct response. 1 mark

hypertonic      hypotonic      isotonic

- b.** Explain how the consumption of the drink selected in **part a.** may improve endurance capacity in team sports. 2 marks

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**Question 14** (8 marks)

Volleyball is a team sport and a match generally takes between 30 and 60 minutes. Players are involved in high-intensity, short-duration movements, such as serving, passing, setting, spiking and blocking. The game is explosive in nature with rest periods between points.

- a. Using the information provided, describe the interplay of the three energy systems in volleyball.

6 marks

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Plyometric training can improve muscular power and is a suitable training method for volleyball. The senior girls’ volleyball team at a local secondary college has made it to the state finals and the coach wants to prescribe plyometric training for the team.

- b. Outline two guidelines for plyometric training that a coach should follow.

2 marks

- 1. \_\_\_\_\_  
\_\_\_\_\_
- 2. \_\_\_\_\_  
\_\_\_\_\_

**Question 15** (8 marks)

A new community leisure centre with a range of facilities, including an indoor/outdoor swimming pool, children’s pool, hydrotherapy pool, aerobics rooms, basketball courts and weights gymnasium, has just been built.

The managers of the centre want to encourage community participation and use of the facilities.

- a. Identify and provide an example of one physical environmental factor and one policy-level factor that have the potential to encourage community participation and use of the facility. 4 marks

Physical environmental factor \_\_\_\_\_

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Policy-level factor \_\_\_\_\_

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- b. Explain why strategies focusing on the **physical environment** should be put in place before social-level or individual-level strategies. 4 marks

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**Question 16** (3 marks)

Growth hormone (GH) occurs naturally in the body. A synthetic form of GH is also available, but it is a prohibited substance both in competition and out of competition on the World Anti-Doping Agency's (WADA) list of prohibited substances and methods.

With reference to **one** aspect of WADA's rationale, explain why GH is on the list of prohibited substances and methods.

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**Question 17** (6 marks)

The following table shows heart rate, stroke volume and cardiac output responses for two runners, one trained and one untrained, at rest and at maximal exercise intensity.

Subject	Heart rate (bpm)	Stroke volume (mL)	Cardiac output (L/min)
<b>Rest</b>			
trained	50	100	5
untrained	72	70	5
<b>Maximal exercise intensity</b>			
trained	200	170	34
untrained	200	110	22

- a. Explain the impact of training on cardiac output at rest. In your response, you must refer to the formula for cardiac output.

3 marks

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- b. A trained marathon runner ran the 42.2 km in just over 2 hours and an untrained runner ran the marathon in about 4.5 hours.

Using the data from the table, explain why the trained runner was able to complete the marathon in a shorter period of time than the untrained runner.

3 marks

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