



# Victorian Certificate of Education 2010

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

## STUDENT NUMBER

Figures

Words


Letter

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# PHYSICAL EDUCATION

## Written examination

Monday 8 November 2010

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

<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	12	12	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 22 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**

Which statement about accelerometers as a tool for measuring physical activity is true?

- A. Accelerometers are a subjective measure of physical activity.
- B. There is no reactivity associated with the use of accelerometers.
- C. The accelerometer measurement data is provided in beats per minute (bpm).
- D. Accelerometers are an appropriate choice to measure physical activity levels in children.

**Question 2**

Which of the following would you expect to observe immediately after the conclusion of a 1500-metre running race?

- A. decrease in both body temperature and hydrogen ion concentration
- B. decrease in blood lactate concentration and increase in oxygen levels
- C. decrease in muscle glycogen and increase in blood lactate concentration
- D. increase in muscle glycogen and decrease in respiratory carbon dioxide levels

**Question 3**

Our body uses three energy systems to produce ATP – aerobic, lactic acid and ATP-CP. They produce ATP at different rates and have different capacities as shown in the table below.

	<b>Rate (Maximal power output)</b>	<b>Capacity (kcal available)</b>
Energy system X	16 kcal/min	14.5
Energy system Y	36 kcal/min	11.1
Energy system Z	10 kcal/min	>100 000

Which of the following correctly identifies each of the three energy systems?

- A. X = ATP-CP      Y = lactic acid      Z = aerobic
- B. X = lactic acid      Y = ATP-CP      Z = aerobic
- C. X = ATP-CP      Y = aerobic      Z = lactic acid
- D. X = lactic acid      Y = aerobic      Z = ATP-CP

**Question 4**

An increase in an athlete's Lactate Inflection Point (LIP) is thought to be due to an

- A. increased production of lactate.
- B. increased ability to clear lactate.
- C. increased accumulation of lactate.
- D. increased ability to tolerate lactate.

**Question 5**

Data was collected as part of an activity analysis that identified the major muscle groups used to perform the cross-country.

Which muscle groups would be identified as being important in performing the constant flexion and extension of the hip joints in the running gait?

- A. iliopsoas and gluteals
- B. quadriceps and soleus
- C. abdominals and erector spinae
- D. tibialis anterior and gastrocnemius

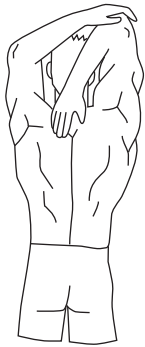
**Question 6**

Diagram 1

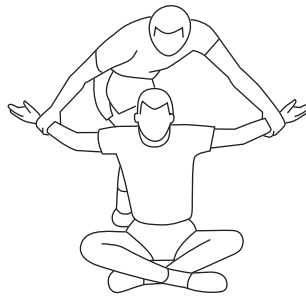


Diagram 2

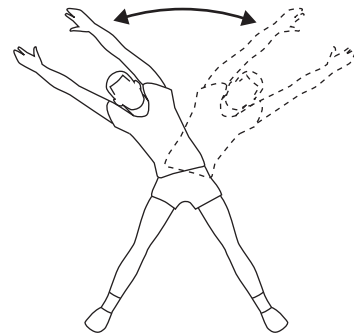


Diagram 3

The diagrams above show three different methods of stretching that can be used as part of a flexibility training program.

The most effective method to the least effective method for developing flexibility is

- A. 2, 1, 3
- B. 1, 2, 3
- C. 3, 2, 1
- D. 2, 3, 1

**Question 7**

Strategies used to promote physical activity in schools can be based in school policy, the physical environment and the social environment.

Which of the following is an example of a policy-based strategy?

- A. mowing the oval regularly
- B. asking house captains to take walking groups at lunchtime
- C. school leadership allocating designated play areas for different year levels
- D. providing opportunities for all years 7 and 8 students to play lunchtime sport

**Question 8**

Which of the following would be most likely to cause fatigue in an 800-metre running race?

- A. depletion of liver glycogen stores
- B. depletion of intramuscular fat stores
- C. accumulation of lactate ions in the blood
- D. accumulation of hydrogen ions in the blood

**Question 9**

The most important electrolyte in a post-exercise rehydration drink used to restore fluid lost in sweat is

- A. sodium ion (Na<sup>+</sup>).
- B. chloride ion (Cl<sup>-</sup>).
- C. potassium ion (K<sup>+</sup>).
- D. magnesium ion (Mg<sup>2+</sup>).

**Question 10**

Which statement best describes the relationship between self-efficacy and a person's stage of motivational readiness?

- A. The relationship is linear; as self-efficacy increases, movement through the stages of change is more likely.
- B. It is an inverse relationship; as self-efficacy increases, movement through the stages of change is less likely.
- C. There is no relationship; they are separate theoretical models explaining participation in physical activity.
- D. The relationship follows the 'inverted-U' hypothesis.

**Question 11**

Which of the following is an example of an approach that could be used to assist an individual in the precontemplation or contemplation stage of the stages of change model of motivational readiness?

- A. set a change date for the individual
- B. enrol the individual in regular exercise classes at the local gym
- C. increase the individual's knowledge of the health benefits of participating in regular physical activity
- D. use counselling strategies such as goal setting, offering support and encouragement, discussing rewards

**Question 12**

The economy of an athlete was measured on a treadmill at 14 km/h before and after engaging in several months of endurance training.

An improvement in economy would be revealed by

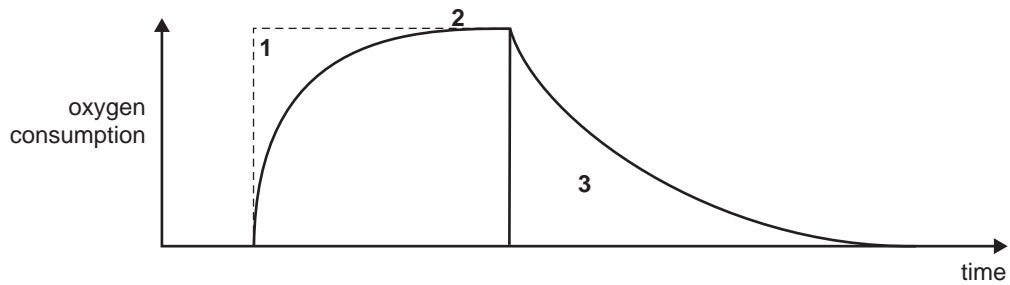
- A. an increase in VO<sub>2</sub> max of the athlete.
- B. an increase in VO<sub>2</sub> recorded at 14 km/h.
- C. a decrease in energy expenditure at 14 km/h.
- D. an increase in energy expenditure at 14 km/h.

**Question 13**

The complete oxidation of carbohydrate results in

- A. bicarbonate, ATP and oxygen.
- B. water, carbon dioxide and ATP.
- C. water, oxygen and carbon dioxide.
- D. water, carbon dioxide and ADP.

*The following graph relates to Questions 14 and 15.*

**Question 14**

In relation to the graph above, which is correct?

- A. 1 = EPOC, 2 = oxygen deficit, 3 = steady state
- B. 1 = EPOC, 2 = steady state, 3 = oxygen deficit
- C. 1 = oxygen deficit, 2 = EPOC, 3 = steady state
- D. 1 = oxygen deficit, 2 = steady state, 3 = EPOC

**Question 15**

The oxygen deficit represents the energy derived from

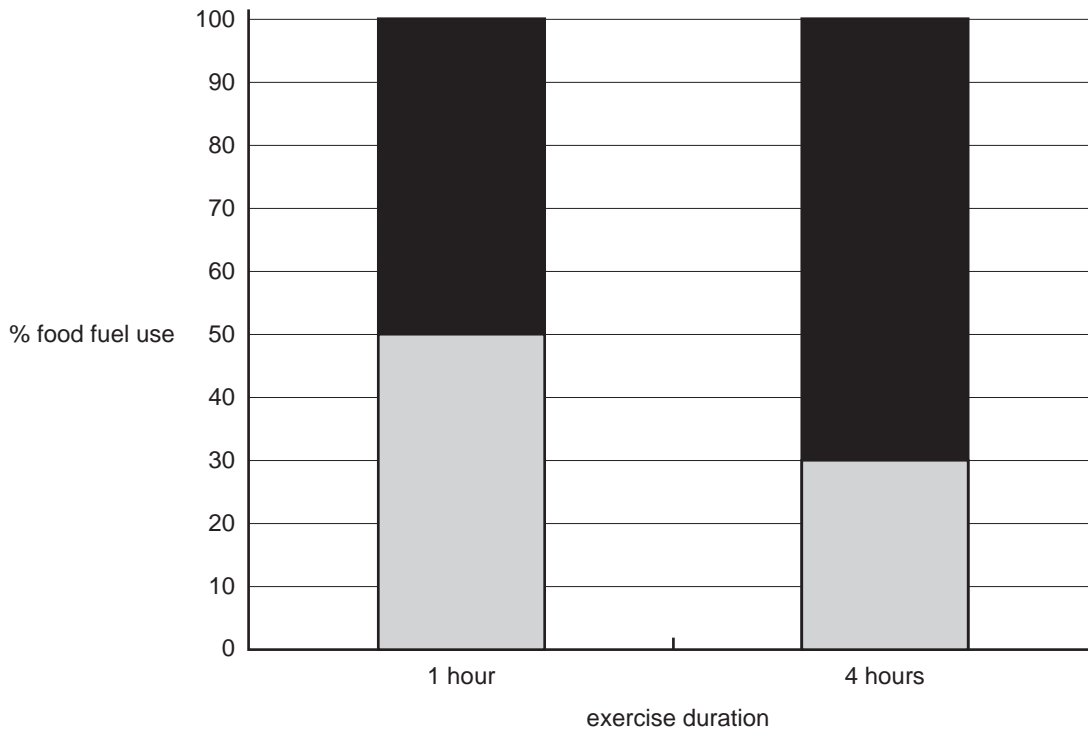
- A. aerobic metabolism.
- B. the phosphate creatine system.
- C. the lactic acid and aerobic energy systems.
- D. the lactic acid and phosphate creatine systems.

**SECTION B – Short answer questions**

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

**Question 1**

The graph below depicts the percentages of food fuel used to energise muscle contraction after 1 hour and 4 hours of continuous cycling.



a. i. Identify the type of food fuel that is represented by the grey component of the graph.

\_\_\_\_\_

ii. Identify the type of food fuel that is represented by the black component of the graph.

\_\_\_\_\_

1 + 1 = 2 marks

b. Explain why it is important to maintain sufficient levels of the food fuel represented by the grey component of the graph.

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

2 marks

Total 4 marks

**Question 2**

Due to copyright restriction,  
this material is not supplied.

Bauman

The cartoon shows one of the most common perceived barriers to being physically active.

Other perceived barriers include

- it is too cold
- I am too tired
- I do not have time
- I cannot afford to go to the gym
- I find it hard to stay motivated.

- a. Select two of the perceived barriers and provide a **practical** behavioural strategy to overcome each of the chosen barriers.

Perceived barrier 1 \_\_\_\_\_

Practical strategy \_\_\_\_\_

\_\_\_\_\_

Perceived barrier 2 \_\_\_\_\_

Practical strategy \_\_\_\_\_

\_\_\_\_\_

2 marks

- b. Explain how an increase in an individual's self-efficacy will allow them to overcome common barriers to physical activity such as those listed above.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 marks

Total 4 marks

**SECTION B – continued**  
**TURN OVER**

**Question 3**

There are a number of methods which can be used to measure physical activity.

Compare and contrast the use of questionnaires (recall), which are a subjective method, with pedometers, which are an objective method.

Comparison	Contrast

4 marks

**Question 4**

The women’s 7.5-kilometre sprint biathlon event combines cross-country skiing with rifle shooting. Competitors race 3 laps of 2.5-kilometre length and have to complete 5 rounds of rifle shooting (6 shots each time) during the event.

Identify two **different** psychological strategies the biathlete could use during each discipline of the race. Explain how each would assist in maximising the biathlete’s performance.

Cross-country skiing \_\_\_\_\_

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Rifle shooting \_\_\_\_\_

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4 marks



**Question 5**

An activity analysis can be useful in helping trainers, coaches or fitness advisors determine the physiological requirements of a sport.

- a. i. Using volleyball as an example, list two types of data that could be collected as part of an activity analysis.

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

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

- ii. Explain how each type of data can then be used to determine the physiological requirements of volleyball.

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2 + 4 = 6 marks

After determining the physiological requirements for the sport, players and athletes often undergo fitness testing to determine their strengths and weaknesses and to establish a baseline from which to monitor training.

An activity analysis of volleyball identified power as an important fitness component in the game; specifically, upper body and leg power.

- b. Identify a recognised test of power for each of the muscle groups listed in the activity analysis and describe or draw a specific exercise that could be used in circuit training to improve the power of each muscle group.

<b>Muscle group</b>	<b>Recognised test of power</b>	<b>Exercise</b>
pectoralis major (upper body)		
quadriceps (leg)		

4 marks

**SECTION B – Question 5 – continued**

**TURN OVER**

- c. Other than circuit training, state another training method that can be used to increase power.

\_\_\_\_\_ 1 mark

- d. Justify the inclusion of a continuous training program in the preseason of a team sport such as volleyball.

\_\_\_\_\_  
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4 marks

Total 15 marks

**Question 6**

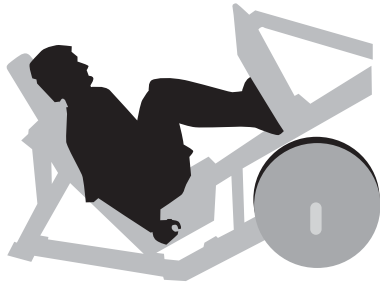
Joshua Ross and Collis Birmingham are among Australia’s best 100-metre sprinters and 10-kilometre runners.

- a. Other than the availability of oxygen, how do the chemical pathways leading to ATP production in the predominant energy system differ for the 100-metre sprint and the 10-kilometre run?

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

4 marks

One of the exercises a 100-metre sprint athlete may include in their training sessions could be the leg press exercise (see below).



- b. How would a 100-metre athlete apply the training principle of frequency to this specific exercise or type of training?

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2 marks

For a given cardiac output, an elite 10-kilometre runner will generally have a lower resting heart rate than an untrained person of the same age, weight and sex.

- c. Explain why this is the case by discussing the relationship between the cardiac parameters associated with this adaptation.

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3 marks

Total 9 marks

**Question 7**

The LZR Racer Suit (shown in the photo below) is a high-performance swimsuit made from an advanced-technology swimwear fabric composed of woven elastane-nylon and polyurethane.



The suit allows for better oxygen flow to the muscles, holds the body in a more hydrodynamic position and repels water. The seams of the suit are designed to further reduce drag. Endorsed for competitive use by FINA, world swimming’s governing body, prior to the Beijing Olympics, the suit reportedly can lower racing times for a competitor by 1.9 to 2.2 per cent.

Following the December 2008 European Short Course Championships in Croatia, where 17 world records fell, it was then decided to modify the rules surrounding swimsuits. As a result FINA announced that performance-enhancing, non-textile swimsuits were banned from 1 January 2010.

Discuss three ethical considerations associated with the LZR Racer Suit that FINA may have addressed in deciding to ban the use of the suit in competition.

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

\_\_\_\_\_

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

\_\_\_\_\_

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

\_\_\_\_\_

6 marks

**Question 8**

The decathlon is an athletic event consisting of a total of ten track and field events. Events are held over two consecutive days and the winners are determined by the combined performance in all events. Performance is judged on a points system in each event. A break of 30 minutes is given to all athletes after the completion of one event before starting the next event.

First day's events	Second day's events
<ul style="list-style-type: none"> <li>• 100-metre sprint</li> <li>• high jump</li> <li>• 400-metre sprint</li> <li>• shot put</li> <li>• long jump</li> </ul>	<ul style="list-style-type: none"> <li>• pole vault</li> <li>• 1500-metre run</li> <li>• 110-metre hurdles</li> <li>• discus throw</li> <li>• javelin throw</li> </ul>

Note: Events have been placed in no specific order.

Consider all the events in a decathlon. Most of the events utilise similar metabolic pathways.

- a. Identify the event which is different and state how it differs from the others.

Event \_\_\_\_\_

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2 marks

- b. i. Which event would you run last on each day of the decathlon?

Last event

Day 1

Day 2

\_\_\_\_\_

- ii. Justify your selection.

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(1 + 1) + 2 = 4 marks

**World records (WR) compared to decathlon bests (DB)**

<b>EVENT</b>	<b>WR &amp; DB</b>	<b>RECORD</b>	<b>SCORE (points)</b>
• <b>100 m</b>	<b>WR – Usain Bolt</b> DB – Chris Huffins	<b>9.58 seconds</b> 10.22 seconds	<b>1203</b> 1042
• <b>high jump</b>	<b>WR – Javier Sotomajor</b> DB – Rolf Beilschmidt	<b>2.45 metres</b> 2.27 metres	<b>1244</b> 1061
• <b>400 m</b>	<b>WR – Michael Johnson</b> DB – Bill Toomey	<b>43.18 seconds</b> 45.68 seconds	<b>1156</b> 1025
• <b>shot put</b>	<b>WR – Randy Barnes</b> DB – Edy Hubacher	<b>23.12 metres</b> 19.17 metres	<b>1295</b> 1098
• <b>long jump</b>	<b>WR – Mike Powell</b> DB – Eriki Nool	<b>8.95 metres</b> 8.22 metres	<b>1312</b> 1117
• <b>pole vault</b>	<b>WR – Sergey Bubka</b> DB – Tim Lobinger	<b>6.14 metres</b> 5.76 metres	<b>1272</b> 1152
• <b>1500 m</b>	<b>WR – Hicham El Guerrouj</b> DB – Robert Baker	<b>3 minutes 26 seconds</b> 3 minutes 58.70 seconds	<b>1218</b> 963
• <b>110 m hurdles</b>	<b>WR – Dayron Robles</b> DB – Frank Busemann	<b>12.87 seconds</b> 13.47 seconds	<b>1126</b> 1044
• <b>discus throw</b>	<b>WR – Jurgen Schult</b> DB – Byran Clay	<b>74.08 metres</b> 55.87 metres	<b>1383</b> 993
• <b>javelin throw</b>	<b>WR – Jan Zenezny</b> DB – Peter Blank	<b>98.48 metres</b> 79.80 metres	<b>1331</b> 1040

**Score when individual world records for each event are combined – 12 540 points**

**Roman Sebrie decathlon world record in 2001 – 9026 points**

The decathlon world record set by Roman Sebrie in 2001 of 9026 points is a much lower score than if the points total for the individual world records for each event were combined (12 540 points).

- c. With reference to training, use specific examples from the data above to explain the difference in these results.

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4 marks



**Question 9**

A workplace decided to implement a lunchtime walking group to increase the physical activity levels of its employees. Staff who chose to join the group would meet at a designated spot each day and walk for 30 minutes.

- a. Outline one expected outcome of a workplace intervention such as this.

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1 mark

The Australian Government has published The National Physical Activity Guidelines for adults.

- b. i. List the four guidelines.

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

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

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

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4. \_\_\_\_\_

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- ii. Select one of the guidelines and outline a practical way that it could be implemented.

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4 + 1 = 5 marks



- c. Describe two changes that an employer could make to the physical environment or to workplace policy to support employees who take part in the walking group. Specify how this change would encourage employees to take part in the program.

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

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

4 marks

- d. Recommend a suitable strategy that could be used after six months to determine the impact of the intervention on the staff in this workplace. Outline how it could be used to critique this intervention.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3 marks

Total 13 marks

**Question 10**

Jeremy is 40 years of age and has an ongoing achilles tendon injury. However, he wants to continue playing veterans hockey. A physiotherapist has recommended some strategies for Jeremy to maintain fitness, limit stress on the injured area and strengthen the injured area.

The recommendations are

- low impact activity training (swimming)
- one leg calf lift using only the eccentric phase (3–4 times/week). Use two legs for the concentric phase – reducing the stress
- ongoing physiotherapy to the injured area
- no running training for 4 months.

**Jeremy’s swimming training program**

**A:** 2 × 200 metres freestyle, 50 metres 85% HR max./50 metres submaximal

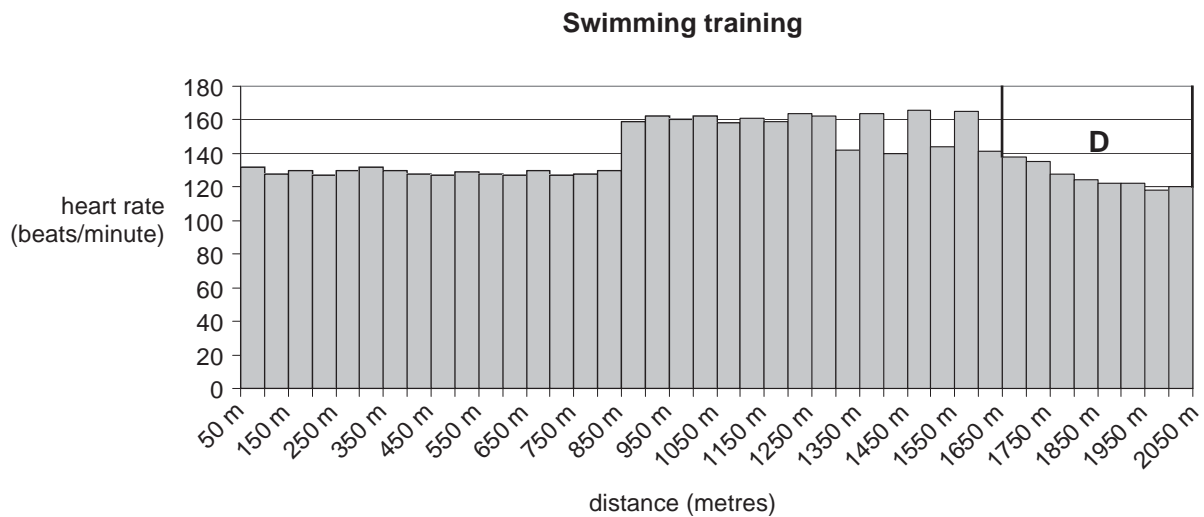
**B:** 4 × 100 metres freestyle at 85% plus HR max., 40 seconds rest between each rep.

**C:** 800 metres alternating between 100 metres of backstroke/100 metres of freestyle at 70% HR max.

**D:** 400 metres; 50 metres kick/50 metres pull at 65% heart rate max.

The following graph shows the heart rate response to the training program above.

- a. Using the corresponding letter (**A, B or C**) identify where each training method can be found on the heart rate graph. The cool down (**D**) has been done for you as an example.



3 marks

At the end of the swimming workout an active cool down was used.

- b. Explain how physiologically an active cool down facilitates a faster recovery compared to a passive cool down.

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3 marks

The aerobic system is used right throughout this training program.

- c. Describe the fuels used by the aerobic energy system and determine why fuel usage by this energy system changes throughout the workout.

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3 marks

Physiotherapists use a variety of techniques to assist their patients to recover from an injury, to reduce soreness of the body or to prevent injury. Massage and strengthening exercises are just two techniques used by physiotherapists.

- d. Outline two **other** techniques that can be used by physiotherapists.

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

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

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2 marks

After four months of swimming and rehabilitation, Jeremy would like to test his achilles and ease into running training prior to the start of the hockey season.

- e. List two preventative measures Jeremy could use while doing running training to reduce the risk of re-injuring his achilles tendon.

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

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

2 marks

Total 13 marks

**Question 11**



- a. From the photograph above, identify two fitness components required to perform this action. Explain why they are important in this manoeuvre.

Fitness component 1 \_\_\_\_\_

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

Fitness component 2 \_\_\_\_\_

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

2 + 2 = 4 marks

Indoor rock-climbing centres around Victoria provide a variety of experiences for school groups introducing the sport of rock climbing. As well as being an excellent physical challenge for school students, it provides the opportunity to develop leadership, teamwork and specific rock-climbing skills.

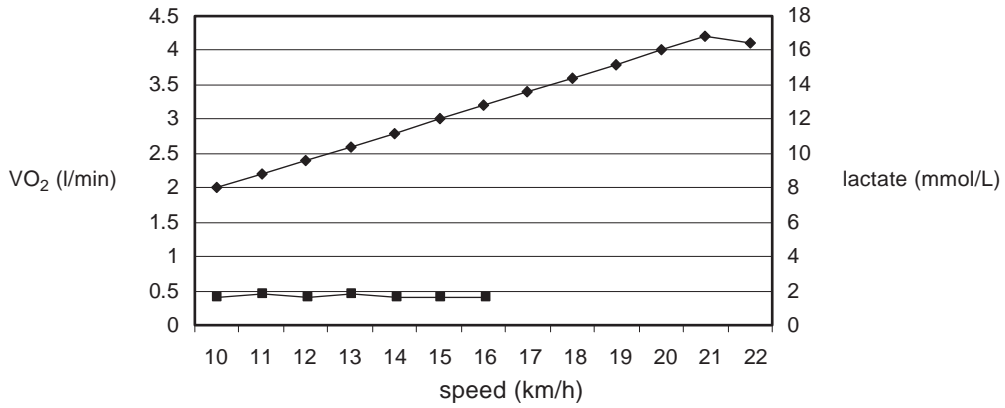
- b. Outline two areas, from an indoor rock-climbing centre’s perspective, that need to be considered in regard to risk management practices. Give specific examples related to teaching rock climbing to a group of school students.

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

2 marks

Total 6 marks

**Question 12**



The athlete whose results are shown in the above graph reaches their Lactate Inflection Point (LIP) at 16 km/h.

- a. Predict the shape of the graph after this point by drawing it on the graph and provide an explanation to support your answer.

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1 + 2 = 3 marks

- b. Discuss the relationship between oxygen uptake and exercise intensity, making specific references to the graph provided.

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3 marks

- c. Explain why training at speeds beyond an athlete's  $VO_2$  max. would be detrimental to improving the athlete's  $VO_2$  max.

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3 marks

Total 9 marks