



Victorian Certificate of Education

2009

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STUDENT NUMBER

Letter

Figures

Words

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PHYSICAL EDUCATION

Written examination

Monday 9 November 2009

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	14	14	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 28 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

Quadriceps muscle biopsies were taken on four athletes to identify whether they are suited to marathon running.

Athlete	Quadriceps fast-twitch fibre concentration	Mitochondria levels	Ability to use fat as an energy source
A	moderate	moderate	low
B	moderate	low	high
C	high	high	low
D	low	high	high

The athlete that most likely possesses the greatest marathon ability is

- A. Athlete A.
- B. Athlete B.
- C. Athlete C.
- D. Athlete D.

Question 2

In which sport is having a high lactate inflection point most likely to provide a competition advantage for the athlete?

- A. tennis
- B. basketball
- C. 400-m race
- D. 5000-m race

Question 3

The National Physical Activity Guidelines (NPAG) for children state that

- A. children should do at least 30 minutes of moderate to vigorous-intensity physical activity on most (preferably all) days and should not use electronic media for entertainment for more than two hours per day.
- B. children should participate in 100 minutes of sport and physical activity each week and should not use electronic media for entertainment for more than two hours per day.
- C. children should do at least 60 minutes of moderate to vigorous-intensity physical activity every day and should not use electronic media for entertainment for more than two hours per day.
- D. children should do at least 60 minutes of vigorous-intensity physical activity five days a week and should not use electronic media for entertainment for more than two hours per day.

Question 4

The Australian Department of Health and Ageing has produced a set of NPAG about the minimum amount of physical activity required to maintain good health. There are four guidelines for better health for Australian adults.

A clear example of the second guideline – ‘Be active every day in as many ways as you can’ would be

- A. enjoying some regular, vigorous activity.
- B. using active transport and doing things yourself instead of using labour-saving machines.
- C. seeing movement of the body as an opportunity for improving health, not as a time-wasting inconvenience.
- D. accumulating 30 minutes (or more) of physical activity throughout the day by combining a few shorter sessions of activity.

Question 5

When completing the phosphate recovery test, the aerobic system is important because it

- A. allows greater replenishment of your ATP-CP stores between sprints.
- B. decreases the dependence on your lactic acid energy system when sprinting.
- C. allows you to work at a higher intensity without accumulating fatiguing by-products.
- D. allows you to use your aerobic energy system all the time without having to work above your LIP.

Question 6

During which macrocycle of a training year would an athlete aim to develop the main physiological requirements of their sport?

- A. preparation phase
- B. competition phase
- C. regeneration phase
- D. overcompensation phase

Question 7

Due to copyright restriction, this material is not supplied.

This poster contained the text, 'This hotel doesn't have a gym, but feel free to run up and down the stairs. Protea Hotels'.

The poster shown is an example of which type of strategy that aims at increasing physical activity levels within the population?

- A. a community-based, mass-media strategy
- B. a workplace-based, policy strategy
- C. an environmental strategy
- D. a social strategy

Question 8

sets	3–6
reps	5–6
load	35% of max
rest	3–4 min (between sets)
speed	quick

The resistance training program above is designed to improve which fitness component?

- A. muscular power
- B. muscular strength
- C. anaerobic capacity
- D. muscular endurance

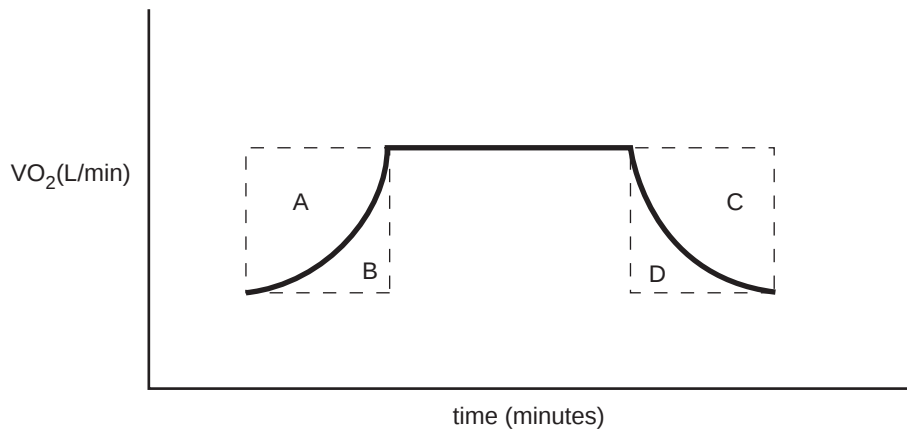
Question 9

Which one of the following statements is **false**?

- A. At the end of a 200-metre race, lactate levels are maximal.
- B. At rest there is approximately 1 ml/mol of lactate in the blood.
- C. Lactate removal after exercise occurs more quickly with an active recovery.
- D. Trained 400-m specialists have more blood lactate accumulation at the end of a race than a non-trained 400-m runner.

Question 10

The graph below shows the VO_2 levels measured during a sub-maximal test. Values were recorded before, during and after exercise.



Which of the labelled sections below indicate oxygen deficit and excess post-exercise oxygen consumption (EPOC)?

	Oxygen deficit	EPOC
A.	A	D
B.	B	D
C.	A	C
D.	D	A

Question 11

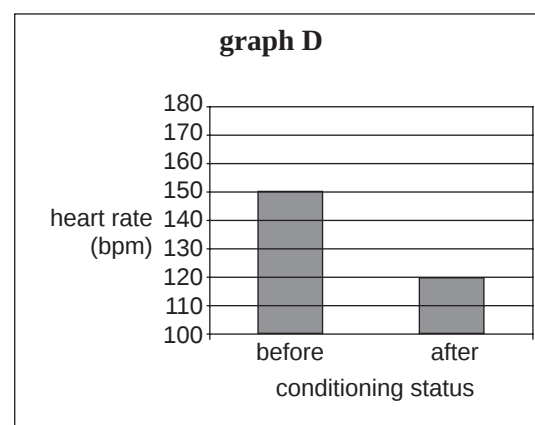
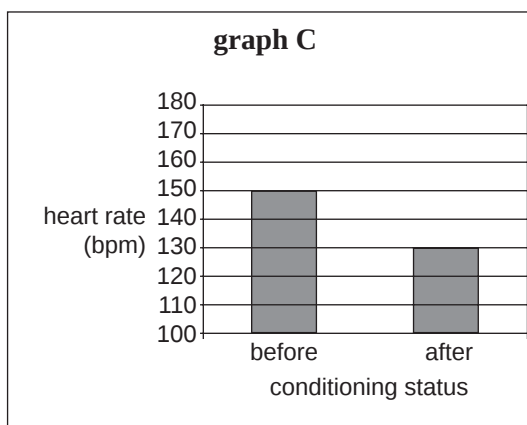
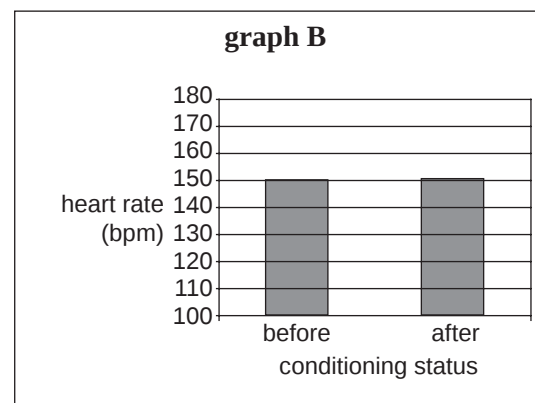
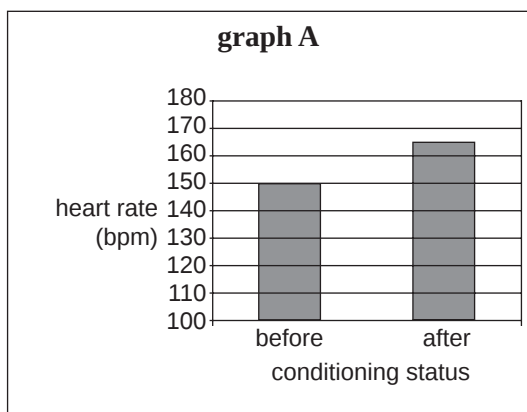
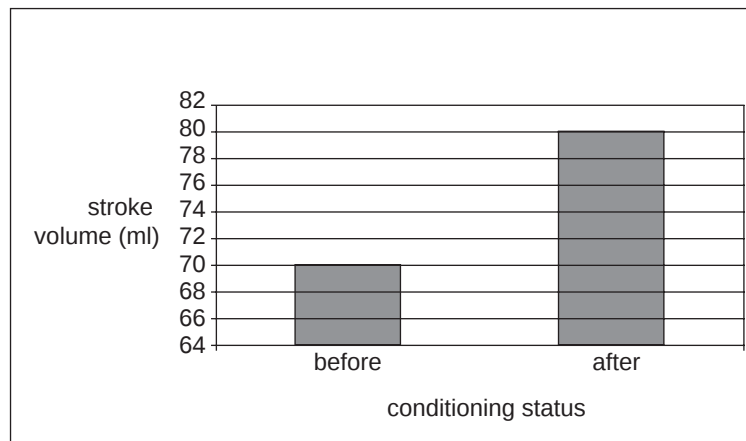
The Premier's Active Families Challenge encouraged Victorians to get more active and be healthier. The challenge was to do 30 minutes of activity a day for 30 days. Teams could include any person in your family.

This initiative is an example of a

- A. community-based, public policy strategy.
- B. community-based, social strategy.
- C. workplace-based, social strategy.
- D. school-based, social strategy.

Question 12

The graph below shows the stroke volume at a sub-maximal treadmill speed before and after a 12-week aerobic conditioning program.



Which of the four graphs above represents the approximate change in heart rate at the same treadmill speed at the same work rate?

- A. graph A
- B. graph B
- C. graph C
- D. graph D

Use the following information to answer Questions 13–15.

Post game recovery – An AFL player’s diary

0–5 minutes post game Jelly babies, snakes (jube lollies) and electrolyte drinks like Gatorade are available to players after they walk down the race and enter the rooms.	30 minutes–1 hour post game Most players will get a massage – avoiding injured sites – which at this stage have been bandaged. Some may use hot/cold contrast therapy during this time.
5–10 minutes post game With lollies and drinks still in hand the players start their warm down. This typically involves players staying active and on the move – walking forwards, backwards and side to side. Typically a stretch down also occurs in this time.	1 hour–24 hours post game Players leave the venue and must continue the ice therapy/recovery. Any new injuries will be iced every 1–2 hours for 20 minutes. These sites should ideally be elevated and compressed/bandaged.
10–30 minutes post game On the way to the coach’s room for a match wrap up, players grab ice packs and ice buckets for ‘tender areas’. The ice is applied for a 10 minute minimum and some players keep it on for up to 20 minutes (the recommended maximum).	24 hours–72 hours post game Some players will do a pool session on the day following a match. Some clubs take the players to the beach for this session.

Question 13

One of the strategies used by the players in the diary above would lead to an increase in oxygen to working muscles, removal of waste products and assist in the prevention of delayed onset muscular soreness (DOMS).

In which time period did this occur?

- A. 0–5 minutes post game
- B. 10–30 minutes post game
- C. 30 minutes–1 hour post game
- D. 1 hour–24 hours post game

Question 14

Another strategy used by the players would benefit them by rapidly replenishing their fuel stores.

In which time period did this occur?

- A. 0–5 minutes post game
- B. 10–30 minutes post game
- C. 30 minutes–1 hour post game
- D. 1 hour–24 hours post game

Question 15

The physiological benefit of using ice as part of their recovery strategy would be

- A. prevention of delayed onset muscular soreness.
- B. vasodilation of the blood vessels which leads to decreased swelling.
- C. vasoconstriction of the blood vessels which leads to decreased swelling.
- D. ‘blood shunting’ or vasodilation and vasoconstriction of the blood vessels.

SECTION B – Short answer questions**Instructions for Section B**

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

Question 1

The local council of Active Valley has decided to provide funding to improve the recreational spaces in the area to try to increase the physical activity levels of the community. They have improved the lighting on all the walking tracks and bike paths, installed information boards on the fitness trail, fixed the drinking fountains and placed shade sails over the children's playgrounds.

- a. What type of strategy has the council implemented?

1 mark

- b. Briefly explain how one of these improvements could lead to an increase in the physical activity levels within the community.

2 marks

Total 3 marks

Question 2

Your 16-year-old friend wants to compete in a 10-km run in six months time. He has no previous running training but is fit and healthy and plays numerous sports such as hockey, basketball and tennis. As you are a VCE Physical Education student, he asks you for some training advice.

- a. State the energy system that you would aim to improve.

1 mark

- b. State two physiological variables measured in a laboratory that distinguish the ability to sustain high running speeds over 10 km.

2 marks

- c. Identify the recommended running intensity, frequency and duration you believe would improve your friend's cardiorespiratory fitness.

3 marks

Total 6 marks

Question 3

The following table lists a fitness test battery that was developed for the US Women's National soccer team. This battery of tests was used by the local U/18 soccer club at the start of their pre-season training and was completed over two days. The test results and the corresponding norms are given for five of the team players. Use this information to answer the following questions.

Player	Vertical jump (cm)	Standing 15-metre sprint (seconds)	Beep test (level)	Illinois agility test (seconds)	Push ups (60 seconds)	Phosphate recovery test (decrement score)
Sam A	36	2.41	9.8	18.4	8	11
	good	good	excellent	good	fair	excellent
Steph C	40	2.36	6.8	17.3	11	23
	excellent	very good	good	excellent	good	average
Katie L	40	2.18	10.1	17.9	7	17
	excellent	excellent	excellent	good	fair	good
Rachel P	35	2.40	8.7	18.0	11	18
	good	good	excellent	good	good	good
Sophie S	41	2.45	9.3	17.9	9	19
	excellent	good	excellent	good	fair	good

- a. Other than determining a player's strengths and weaknesses, identify three reasons for testing the fitness of athletes.

1. _____
2. _____
3. _____

3 marks

- b. Based on the data provided, which player is most likely to be the goalie for the team? Suggest two reasons for your choice.

Player _____

3 marks

- c. i. When looking at the overall team results, state the fitness component that requires the greatest amount of improvement and justify your answer.

- ii. Outline a training method that could be used to improve this fitness component.

2 + 1 = 3 marks

The fitness testing process was carried out on two separate days.

- d. To get the best result for each test, which two fitness tests would you **not** conduct on the same day? Justify your answer.

2 marks

After completing six weeks of pre-season training, all team members were re-tested. The most dramatic improvement was in the Beep test result. All members improved at least half a level.

- e. State a respiratory and cardiac adaptation that may be responsible for this improvement.

Respiratory adaptation _____

Cardiac adaptation _____

2 marks

Total 13 marks

Question 4

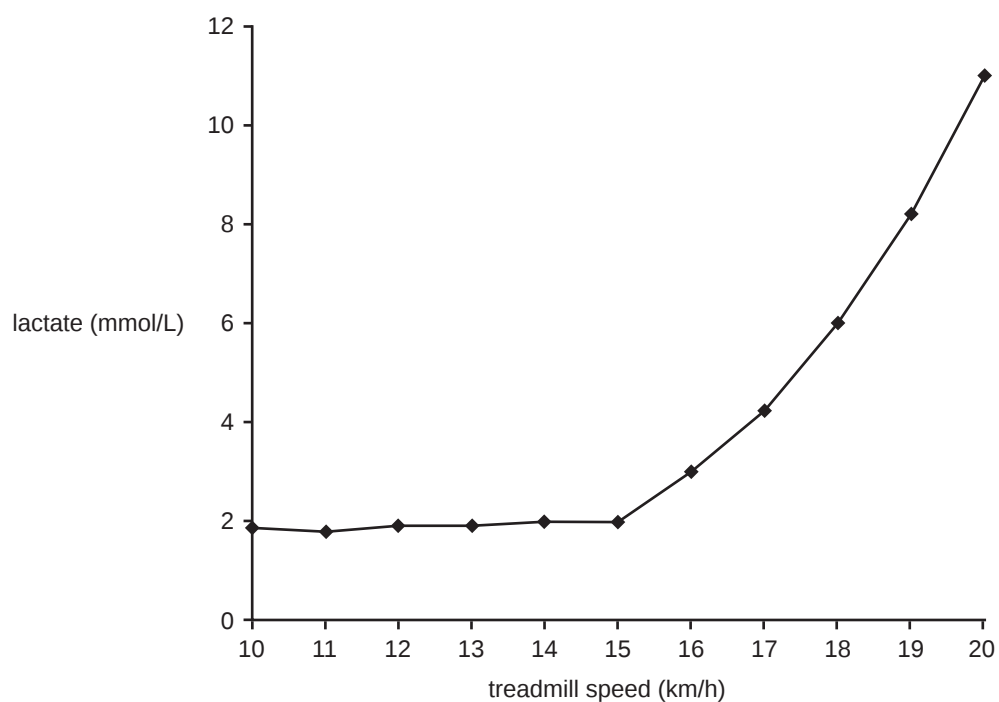
Jamaican sprinter Usain Bolt and Yelena Isinbayeva, the Russian pole vaulter, were both Olympic gold medallists in Beijing. Bolt ran a world-record time of 19.30 seconds to win the 200 m and Isinbayeva vaulted 5.05 metres to win the women's pole vault.

Contrast the energy system requirements for the pole vault and the 200-metre sprint.

4 marks

Question 5

The graph below shows a recreational runner's blood lactate concentration measured during a running treadmill test until exhaustion. The speed was increased every minute and the lactate concentration was measured at the end of each minute.



- a. At what speed does the lactate inflection point occur?

1 mark

b. Why does the lactate inflection point occur?

1 mark

c. Explain the relevance of the lactate inflection point to an endurance athlete.

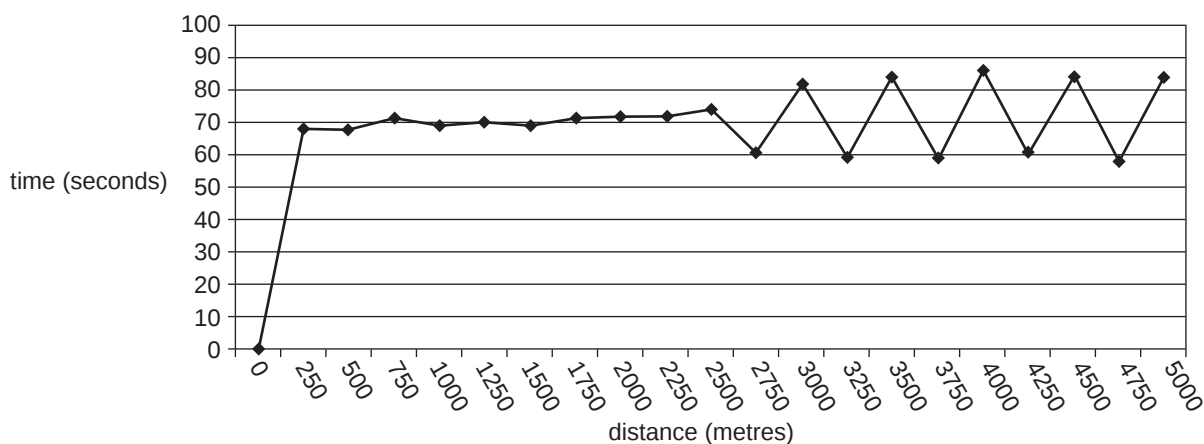
3 marks

Total 5 marks

Question 6

Jeremy is a 39-year-old male who has been exercising regularly three times a week for 12 months. A friend recently asked Jeremy if he would like to play veterans hockey once a week. Jeremy decided that he would. To prepare his body, he undertakes a running session around a lake once a week. This is in addition to his current training load. The lake has a 2.5 km running/walking track around the perimeter. The track has markers that indicate each 250 metres around the circuit.

The following graph represents the time it took Jeremy to run each 250 metres. He has completed two laps of the lake.



Continuous training is evident in the session above.

- a. Identify the second training method which is demonstrated in this session. Justify your answer.

Training method _____

2 marks

- b. Of the two training methods, which is more specific to the type of running used in a game of hockey? Justify your answer by referring to the energy systems used in hockey.

Training method _____

2 marks

During the winter Jeremy found it difficult to maintain his training regime due to working long hours.

c. What are two strategies Jeremy could employ so that motivational levels could be maintained?

1. _____

2. _____

2 marks

Total 6 marks

Question 7

Australia's Stephanie Gilmore is a world champion surfer.

**Due to copyright restriction,
this material is not supplied.**

The picture showed Stephanie Gilmore riding a wave with her arms stretched out straight and her surboard cutting through the wave.

- a. From the photograph above, provide two fitness components Stephanie requires to perform **this** action. Explain why they are important in this manoeuvre.

Fitness component 1 _____

Explanation _____

Fitness component 2 _____

Explanation _____

4 marks

In each heat the surfer has to

- sprint to the water with their surfboard
 - paddle out
 - sit and wait for a good wave
 - pick the better waves and then perform a series of technical manoeuvres and crazy tricks
 - have astounding body control on the water and in the air. The body also has to absorb forces when landing tricks
 - paddle back out after each wave that they ‘ride’ and wait for the next good wave.
- b.** Using the information provided, discuss the interplay of the three energy systems in surfing.

[illegible]

Total 10 marks

Question 8

Many schools include gymnastics in their Years 7 and 8 Physical Education curriculum. There are specific risks involved in participating in gymnastics. PE teachers have the expertise and knowledge to give proper instruction, including demonstration of the techniques used in this activity. Proper instruction is one area for PE teachers to consider in regard to risk management practices.

Discuss three areas, other than proper instruction, that PE teachers would have to consider in regard to risk management practices, giving specific examples related to teaching gymnastics to Years 7 and 8 students in PE.

1. _____

2. _____

3. _____

6 marks

Question 9

A 12-year-old child completed a self-report log and wore an accelerometer to measure physical activity levels for one week.

- a. Which method of assessing the child's physical activity levels would provide more accurate data?

1 mark

- b. Compare the two methods. You must discuss the advantages and disadvantages of each method in your answer.

4 marks

Objective methods of measuring physical activity can be more reactive than subjective methods.

- c. Identify two objective methods of measuring physical activity and explain how you could **reduce** the reactivity of the methods you have chosen.

Method 1 _____

Method 2 _____

4 marks

Total 9 marks

Question 10

In the table below, the VO_2 (L/min) has been recorded at rest, during 5 minutes of sub-maximal treadmill running and 5 minutes after the completion of running. Values were recorded every minute and the data is shown below.

	VO_2 (L/min)
rest	0.5
exercise 1 min	1
exercise 2 min	1.2
exercise 3 min	1.8
exercise 4 min	2.0
exercise 5 min	2.0
recovery 1 min	1.7
recovery 2 min	1.4
recovery 3 min	1.1
recovery 4 min	0.7
recovery 5 min	0.5

- a. i. Identify the time period in which the person is O_2 deficit.

- ii. Identify the steady state value during exercise.

- iii. Identify how long the person is in steady state during exercise.

- iv. Identify when the person experiences excess post-exercise oxygen consumption.

1 + 1 + 1 + 1 = 4 marks

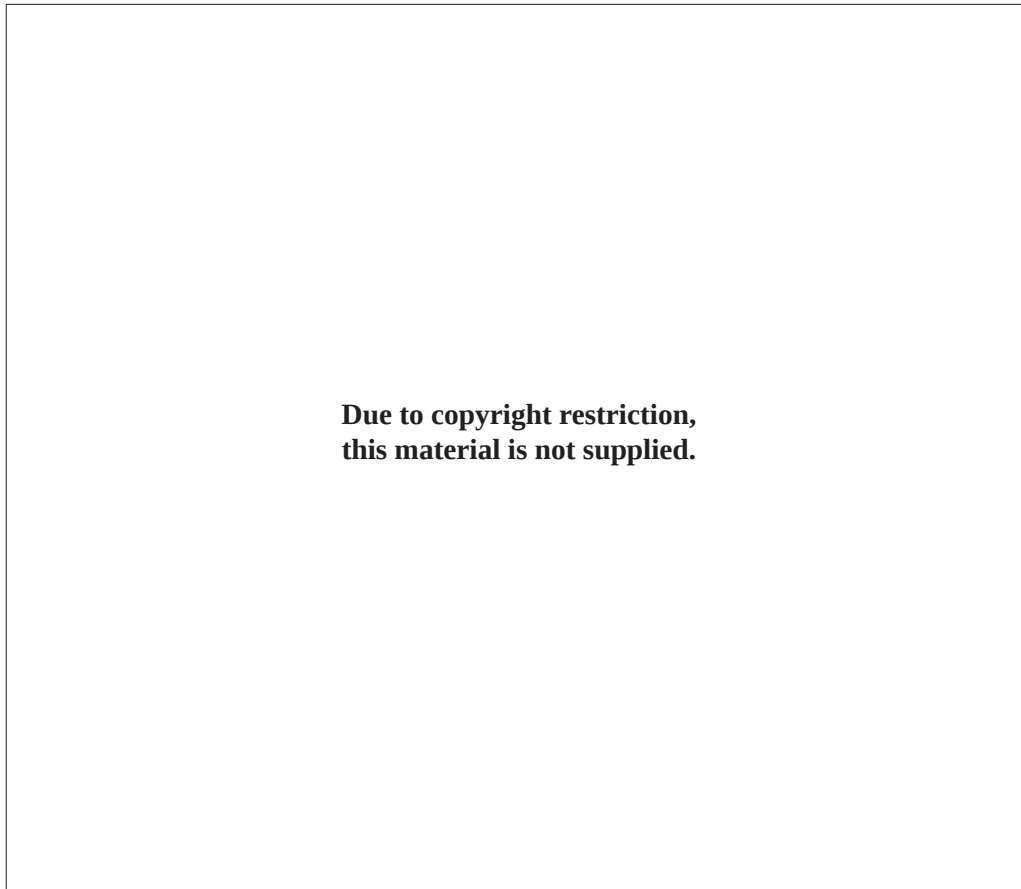
- b. Other than decreasing the intensity of the exercise, name a strategy this person could use to reduce the oxygen deficit incurred during running. Outline how this strategy would reduce the deficit.

2 marks

Total 6 marks

Question 11

The graphs below show the fuel usage of a trained and untrained athlete during aerobic exercise.



- a. From the graphs, indicate which line, A or B, refers to a trained aerobic athlete.

_____ 1 mark

- b. At what exercise duration do we see the greatest difference in fuel usage between the two athletes?

_____ 1 mark

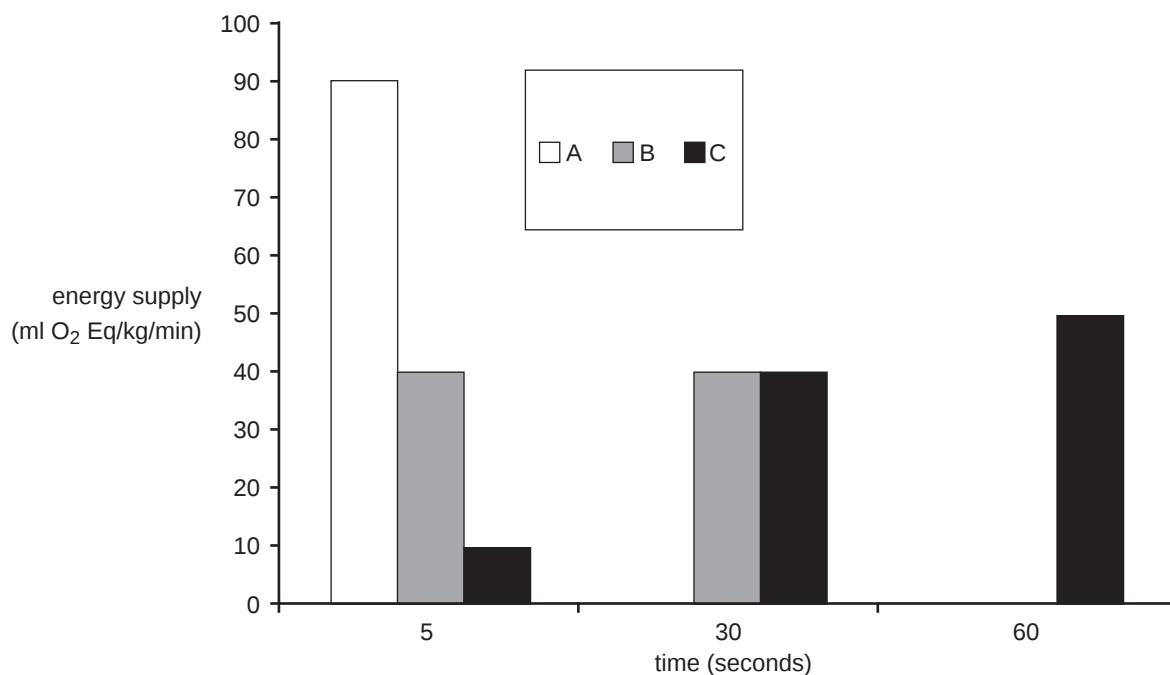
- c. Outline two physiological reasons to explain the difference in fuel usage between the trained and the untrained athlete.

2 marks

Total 4 marks

Question 12

In the diagram below, the energy system contribution to a **maximal** effort cycling test is depicted at the 5 second, 30 second and 60 second time-mark.



a. Which answer shows the correct order of the energy systems represented? Circle the correct answer.

- | | | |
|------------------------|------------------------|------------------------|
| 1. A = aerobic system | 2. A = ATP-CP system | 3. A = ATP-CP system |
| B = lactic acid system | B = lactic acid system | B = aerobic system |
| C = ATP-CP system | C = aerobic system | C = lactic acid system |

1 mark

b. At which time-mark does the aerobic energy supply exceed anaerobic energy supply?

1 mark

c. From the graph, state the time-mark when the overall energy supply is the lowest. Justify your answer.

2 marks

Total 4 marks

Question 13

Professional road cycling races, such as the Tour de France, last 21 days (approximately 1000 hours of competition) during which the cyclists must cover over 3500 kilometres. In some phases of the race, exercise intensity is high, as the cyclists must complete prolonged periods of exercise (e.g. time trials, high mountain ascents) at a high percentage of maximal oxygen uptake.

- a. Identify the two major fitness components required by professional cyclists in the Tour de France and outline why they are important.

1. _____

2. _____

4 marks

- b. Carbohydrates are required at each part of the race; the lead up to the race, cycling each day and during recovery. Outline the different roles that carbohydrates play at each part of the race.

Part of the race	Role of carbohydrates
lead up to race	
cycling each day	
recovery	

3 marks

Australia's Cadel Evans has performed extremely well in the Tour de France over the past couple of years. He has a high maximal oxygen uptake measuring over 85.

- c. i.** What does the number 85 refer to when related to a measure of aerobic capacity?

- ii.** Describe how a high aerobic capacity would assist Cadel Evans while competing in the Tour de France.

1 + 2 = 3 marks

- d.** Describe the most specific laboratory aerobic test that Cadel Evans could do at the Australian Institute of Sport (AIS) to measure his aerobic capacity. (A diagram may be included.)

2 marks

Cadel Evans cycles 30 000 to 35 000 km per year in training and competition. As a result of this aerobic training, chronic changes occur in Cadel's skeletal muscles, such as an increase in the number of mitochondria.

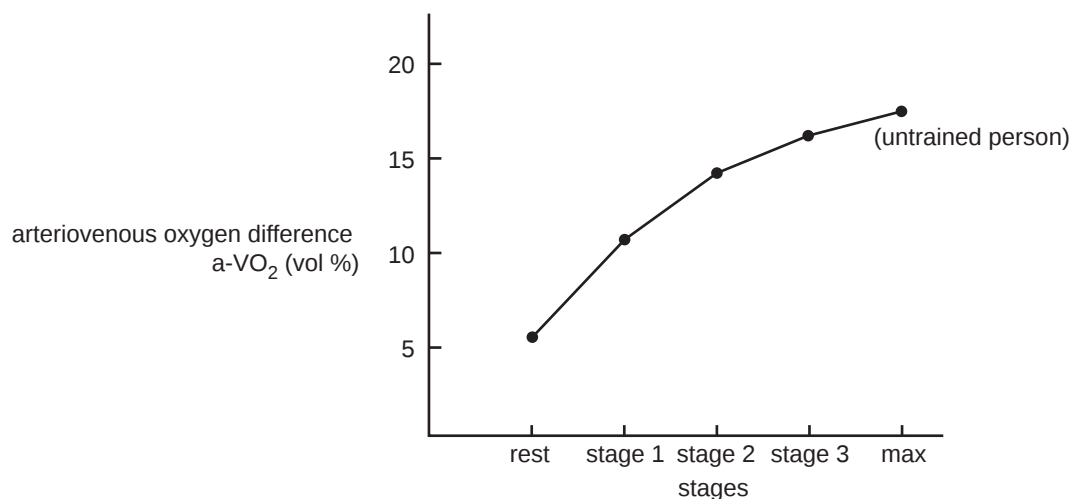
- e. i. How would an increase in the number of mitochondria within the skeletal muscle assist Cadel's performance?

- ii. Identify another chronic effect of aerobic training in Cadel's skeletal muscles and describe how it would assist his performance.

1 + 2 = 3 marks

- f. Aerobic training would also have an effect on Cadel's arteriovenous oxygen difference (a-VO₂ diff.).

- i. On the graph below, draw a line to represent Cadel's a-VO₂ difference compared to an untrained person.



- ii. What is the a-VO₂ difference a direct measure of?

1 + 1 = 2 marks

Total 17 marks

Question 14

Kellie is 37 years old and has decided to start an exercise program. She has bought a new pair of runners and downloaded the 'Couch to 5k' (C25K) program to her iPod.

The C25K is a program that has been designed to get anyone from the couch to running 5 kilometres or running for 30 minutes in just 9 weeks. The program starts by alternating between walking and running small distances, and slowly building up until week 8. In week 9, the participants in the C25K should be able to run 5 km or 30 minutes continuously.

The podcast tells you when to walk and when to run and has music incorporated into it.

- a. In which stage of motivational readiness would Kellie be considered?

1 mark

- b. What are three specific examples of strategies that would be beneficial for someone in this stage of motivational readiness to help them move to the next stage?

1. _____
2. _____
3. _____

3 marks

A copy of weeks 1, 3, 4 and 9 of the program is shown below.

Week	Workout 1	Workout 2	Workout 3
1	Brisk five-minute warm-up walk. Then alternate 60 seconds of jogging and 90 seconds of walking for a total of 20 minutes.	Brisk five-minute warm-up walk. Then alternate 60 seconds of jogging and 90 seconds of walking for a total of 20 minutes.	Brisk five-minute warm-up walk. Then alternate 60 seconds of jogging and 90 seconds of walking for a total of 20 minutes.
3	Brisk five-minute warm-up walk, then do two repetitions of the following: • Jog 200 metres (or 90 seconds) • Walk 200 metres (or 90 seconds) • Jog 400 metres (or 3 minutes) • Walk 400 metres (or 3 minutes)	Brisk five-minute warm-up walk, then do two repetitions of the following: • Jog 200 metres (or 90 seconds) • Walk 200 metres (or 90 seconds) • Jog 400 metres (or 3 minutes) • Walk 400 metres (or 3 minutes)	Brisk five-minute warm-up walk, then do two repetitions of the following: • Jog 200 metres (or 90 seconds) • Walk 200 metres (or 90 seconds) • Jog 400 metres (or 3 minutes) • Walk 400 metres (or 3 minutes)
4	Brisk five-minute warm-up walk, then: • Jog 400 m (or 3 minutes) • Walk 200 m (or 90 seconds) • Jog 800 m (or 5 minutes) • Walk 400 m (or 2 $\frac{1}{2}$ minutes) • Jog 400 m (or 3 minutes) • Walk 200 m (or 90 seconds) • Jog 800 m (or 5 minutes)	Brisk five-minute warm-up walk, then: • Jog 400 m (or 3 minutes) • Walk 200 m (or 90 seconds) • Jog 800 m (or 5 minutes) • Walk 400 m (or 2 $\frac{1}{2}$ minutes) • Jog 400 m (or 3 minutes) • Walk 200 m (or 90 seconds) • Jog 800 m (or 5 minutes)	Brisk five-minute warm-up walk, then: • Jog 400 m (or 3 minutes) • Walk 200 m (or 90 seconds) • Jog 800 m (or 5 minutes) • Walk 400 m (or 2 $\frac{1}{2}$ minutes) • Jog 400 m (or 3 minutes) • Walk 200 m (or 90 seconds) • Jog 800 m (or 5 minutes)
9	Brisk five-minute warm-up walk, then jog 5 km (or 30 minutes).	Brisk five-minute warm-up walk, then jog 5 km (or 30 minutes).	The final workout! Congratulations! Brisk five-minute warm-up walk, then jog 5 km (or 30 minutes).

- c. From the training program, identify two training principles that have been correctly applied to the program. Support your answer using the data provided.

2 marks

- d. Discuss whether or not overload has been correctly applied in this training program. Refer to the data in your answer.

2 marks

On the C25K website there is a link to a training log where participants can keep track of their progress online.

▲▼ Workout 1; Running Log Edit Delete Move				
Activity	Intensity	Distance	Duration (hh:mm:ss)	Pace (hh:mm:ss)
Easy Run	Low		00:20:00	
Total			00:20:00	
Instructions: Workout Emphasis: Endurance Brisk five-minute warm-up walk. Then alternate 60 seconds of jogging and 90 seconds of walking for a total of 20 minutes. Workout Notes:				

- e. What are the advantages of using a training log?

2 marks

- f. After 9 weeks, Kellie is able to run 5 km in 30 minutes.
Describe the likely change in Kellie's self-efficacy and the impact it has on her.

2 marks

Total 12 marks

