



**Victorian Certificate of Education  
2007**

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

**STUDENT NUMBER**

Letter

Figures									
Words									

**PHYSICAL EDUCATION**

**Written examination**

**Monday 12 November 2007**

**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	18	18	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.

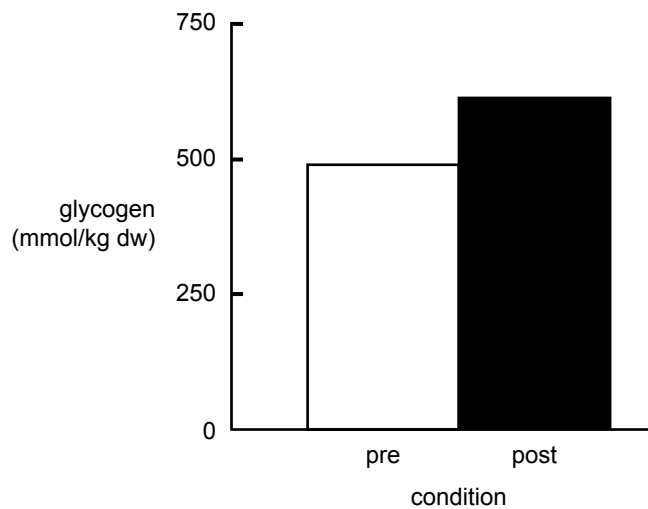
**Question 1**

At the Melbourne Commonwealth Games in 2006, in which running event were athletes most likely to use a relatively even contribution from the aerobic and anaerobic energy sources?

- A. 5000 m
- B. 100 m
- C. 400 m
- D. 1500 m

**Question 2**

**Muscle glycogen concentration measured in resting thigh biopsy samples obtained before and after a two-week sprint training program**



The results shown in the graph reflect that

- A. two weeks of sprint training increases muscle glycogen levels.
- B. muscle glycogen levels remain unchanged after two weeks of sprint training.
- C. two weeks of sprint training is not long enough to produce a chronic training adaptation.
- D. two weeks of sprint training decreases muscle glycogen levels.

**Question 3**

Which method would best assess whether a 7-year-old child is meeting the National Physical Activity Guidelines for children aged 5–12 years?

- A. self report
- B. accelerometry
- C. pedometry
- D. diaries

**Question 4**

Hydrotherapy is best used to

- A. promote recovery through weight-bearing exercise.
- B. decrease blood flow to injured muscles to assist recovery.
- C. reduce stress on the joints and facilitate stretching to assist recovery.
- D. assist in both physiological and psychological recovery of an athlete.

**Question 5**

Complete the formula

carbohydrate → glycogen → \_\_\_\_\_ → CO<sub>2</sub> + H<sub>2</sub>O + heat + energy

- A. lactic acid
- B. pyruvic acid
- C. ATP
- D. ADP

**Question 6**

Which of the following is **not** a principle that would need to be considered in any sporting ethical charter?

- A. harm prevention
- B. refusing to take an unfair advantage
- C. duty of care
- D. use of science to enhance performance

**Question 7**

Lactate Inflection Point (LIP) is

- A. the point where lactate accumulates in the blood.
- B. the exercise intensity where fatigue becomes a limiting factor.
- C. the balance between lactate entry into and removal from the blood.
- D. the point where the body is producing ATP anaerobically.

**Question 8**

Which one of the following physical activity measures would be the **least** practical but **most** accurate measure of physical activity?

- A. physical activity logs
- B. direct observation
- C. accelerometers
- D. pedometers

**Question 9**

The best activity analysis method for long-distance cycling would be

- A. simple observation.
- B. simple observation with statistical records.
- C. skill analysis.
- D. heart rate monitoring.

**Question 10**

Which coaching and training risk management strategy is **least** likely to reduce the risk of **soft tissue** injuries in Australian Rules football?

- A. documentation of training sessions
- B. wearing of ankle braces and taping
- C. specific flexibility and strength training
- D. providing a safe environment

**Question 11**

What are the main functions of nutrition during recovery?

- A. restoring muscle glycogen, replacing lost fluids and electrolytes and manufacturing new muscle and red blood cells in the repair and adaptation process
- B. restoring muscle glycogen, replacing lost fluids and electrolytes and relaxation of muscles through massage
- C. replacing lost fluids and electrolytes, allowing the immune systems to handle any damage caused by the exercise bout and preventing delayed onset muscular soreness
- D. replacing lost fluids and electrolytes, manufacturing new muscle and red blood cells in the repair and adaptation process and preventing delayed onset muscular soreness

**Question 12**

Which of the following characteristics is associated with energy production in the lactic acid system?

- A. energy production is limited by the amount of chemical fuel stored in the muscles
- B. maximum ATP production is 0.7 moles
- C. ATP production occurs in the mitochondria
- D. peak power during maximal efforts occurs in 5–15 seconds

**Question 13**

The **most** appropriate fitness test to assess the anaerobic power of a netball centre player is the

- A. vertical jump test.
- B. phosphate recovery test.
- C. 10-second sprint.
- D. margaria stair climb test.

**Question 14**

When critiquing strategies used to promote physical activity at the population level, which strategy would be considered **least** effective?

- A. introduction and implementation of resources and facilities
- B. removal of barriers and other impediments
- C. adoption of a 'one size fits all' approach
- D. inclusion of educational programs and policies to support environmental change

**Question 15**

Training methods need to be selected to be specific to

- A. body composition, energy systems and muscle actions.
- B. muscle actions, muscles and body composition.
- C. muscles, body composition and energy systems.
- D. energy systems, muscles and muscle actions.

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

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

**Question 1****Wayne Arthurs' painful exit**

*A freakish reaction to a pain-killing injection for a strained hip caused Wayne Arthurs' sad Australian Open farewell yesterday.*

*"I think Wayne was given indications as to the risks and benefits of this procedure. It's an extreme measure to take in sport, such as tennis where these sort of injuries can occur," he said. "Obviously, the circumstances we discussed with Wayne last night, were exceptional. It was potentially his last match in his home country in a grand slam." said Dr Tim Wood, Australian Open Chief Medical Officer.*

[adapted] *Herald Sun*, 20 January 2007

Outline two ethical considerations Wayne may have contemplated prior to making the decision to have the pain-killing injection.

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

\_\_\_\_\_

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

\_\_\_\_\_

2 marks

**Question 2**

Pedometers are a cost-effective way to measure people's physical activity by counting steps per day.

- a. Explain why pedometers are a powerful behaviour change tool and an effective strategy within a community-based physical activity program.

\_\_\_\_\_

\_\_\_\_\_

2 marks

- b. Give two limitations of using pedometry to assess physical activity.

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

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

2 marks

Total 4 marks

**Question 3**

In preparation for the 2007 Cricket One Day World Cup, the New Zealand team found that their opening batsman, Stephen Fleming, had trouble running between wickets. This was especially the case when he was batting for an extended period of time. To address the problem a special sprint training program was initiated.

**Training program**

Work time	Intensity	Repetitions	Sets	Rest period	Work to rest ratio	Frequency per week
5 seconds	95% max heart rate	8	3	25 seconds	1:5	3
	95% max heart rate					3

- a. Fill in the table above to show an appropriate overload for the next training period.

1 mark

- b. Identify the energy system that is dominant during the 1st and 2nd repetitions of the first set of training.

\_\_\_\_\_

1 mark

- c. i. Name the type of recovery which would be used between each repetition.

\_\_\_\_\_

- ii. Justify your answer to **part i.**

\_\_\_\_\_

\_\_\_\_\_

1 + 1 = 2 marks

- d. List two ways this program is specific to batting in the sport of cricket.

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

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

2 marks

Total 6 marks

**Question 4**

Elite cricket teams play on grounds that have been carefully prepared by curators. However, in Victoria, non-elite sports grounds have been severely affected by drought.

Outline two risk management strategies the **administrators** of local sporting clubs could implement to reduce the risk of injuries to their players.

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

\_\_\_\_\_

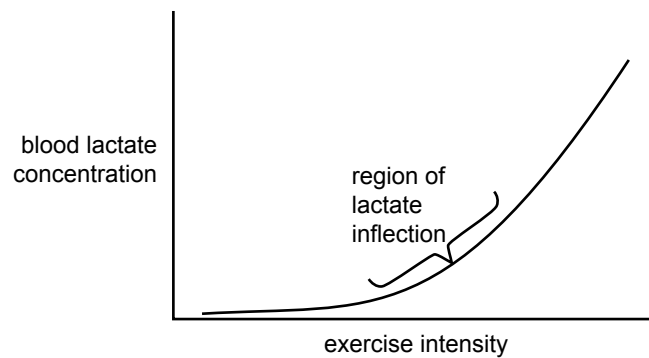
2. \_\_\_\_\_

\_\_\_\_\_

2 marks

**Question 5**

**General representation of the relationship between exercise intensity and blood lactate concentration and lactate inflection**



- a. At exercise intensities beyond LIP, what happens to the blood lactate concentration?

---

1 mark

- b. Explain why fatigue will increase at exercise intensities greater than LIP.

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2 marks

- c. i. Identify which of the following factors is more likely to distinguish between performances of middle and long distance athletes? (Tick the correct answer.)

- $\text{VO}_2$  max  
 lactate inflection point

- ii. Give a reason for your answer.

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1 + 2 = 3 marks

Total 6 marks



**Question 6**

Loris (aged 85 years) has not been regularly active for more than 10 years; however, she has just started to become more active. Loris purchased a pedometer and a new pair of walking shoes. During the last four weeks, she has started to walk for 10 minutes twice a week and she intends to become more active during the next month.

- a. What stage of motivational readiness is Loris considered to be in?

---

1 mark

After five months Loris is consistently meeting the National Physical Activity Guidelines and has reached the action stage.

- b. Outline three strategies that would assist Loris to move from the action stage to the maintenance stage.

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

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

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

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3 marks

- c. i. Give an example of a physical activity measure that would **not** be an appropriate choice to assess Loris’s physical activity behaviour?

\_\_\_\_\_

- ii. Justify your response to **part i.**

\_\_\_\_\_

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1 + 2 = 3 marks

Total 7 marks

**Question 7**

Participants in a six-week endurance training program completed running training 3–5 days per week for 20–30 minutes per session. The subjects completed an identical **sub-maximal** test on a treadmill **before** and **after** the six weeks of training.

a. Give a reason for performing a fitness test in this situation.

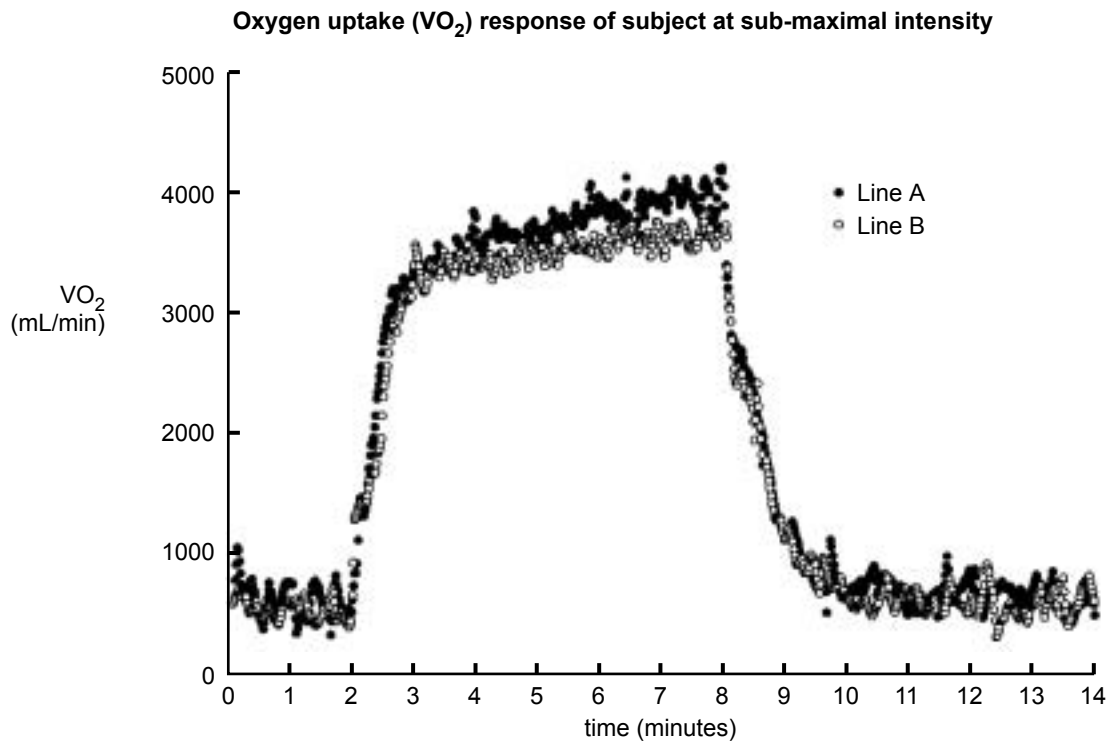
\_\_\_\_\_

1 mark

b. List three elements the test administrators would need to consider to ensure that the tests were administered in a reliable manner.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

3 marks



c. Which line on the graph above represents the results of the treadmill test **post** training?

\_\_\_\_\_

1 mark

- d. Explain the result shown in the graph by comparing the two tests between the third and eighth minutes.

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2 marks

- e. Identify one chronic muscular adaptation that would result from the six-week endurance training program.

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2 marks

Total 9 marks

### Question 8

The study below shows the relative contributions of energy production from the anaerobic and aerobic energy systems. It was found for each duration of maximal work the subject exhausted their anaerobic energy supply.

Fill in the table with the estimated energy release from the aerobic and anaerobic energy systems.

<b>Duration (maximal intensity work) seconds</b>	<b>Total energy release ml/kg</b>	<b>Aerobic ml/kg</b>	<b>Anaerobic ml/kg</b>
60	100	50	50
120	150		
180	200		

4 marks

**Question 9**

Peter is a train driver, which is a sedentary job. His work involves changing shifts which makes it difficult to commit to regular organised team sports. He decided to improve his health so he began a rowing fitness program. Each session consists of a 20-minute workout on a stationary rower. He has been training for the past six weeks.

His week one, five and six program results are listed below.

Week	Day and date	Metres rowed in 20 minutes	Stroke rate per minute	Average heart rate bmp	Total calories	Predicted VO <sub>2</sub> max (ml/kg/min)
one	Monday 14 Jan	4327	22	140	250	38
	Tuesday 15 Jan	4320	23	139	250	
	Thursday 17 Jan	4433	23	139	262	
	Friday 18 Jan	4458	21	140	265	
	Sunday 20 Jan	4603	20	140	281	

five	Monday 11 Feb	4535	21	129	273	40
	Tuesday 12 Feb	4858	21	146	313	
	Wednesday 13 Feb	4719	21	136	295	
	Friday 15 Feb	4871	22	138	315	
	Saturday 16 Feb	4828	20	140	308	
six	Monday 18 Feb	4868	22	140	307	41
	Tuesday 19 Feb	4886	22	141	314	
	Wednesday 20 Feb	4914	22	143	320	
	Friday 22 Feb	4946	22	141	325	
	Saturday 23 Feb	4941	22	140	324	

- a. State the training method being used by Peter.

\_\_\_\_\_

1 mark

- b. i. Identify two fitness components targeted in this program.

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

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

- ii. Justify your response to part i. Support your response using the data in the table.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 + 2 = 4 marks

On Friday 22 February, Peter rowed an extra 32 metres and his average heart rate decreased compared to the previous training session.

- c. What factor may have led to this improvement?

\_\_\_\_\_

1 mark

On 14 January Peter rowed 4327 metres in 20 minutes with an average heart rate of 140 bpm, six weeks later he rowed 4941 metres in 20 minutes with an average heart rate of 140 bpm.

- d. Identify two chronic circulatory adaptations resulting from this training program which would explain this change. Explain how these changes would improve performance.

Chronic adaptation 1 \_\_\_\_\_

How it would improve performance \_\_\_\_\_

\_\_\_\_\_

Chronic adaptation 2 \_\_\_\_\_

How it would improve performance \_\_\_\_\_

\_\_\_\_\_

4 marks

- e. What is another method of training, different from that given in **part a.** on page 12, that Peter could use to develop his anaerobic power and aerobic capacity using the stationary rower?

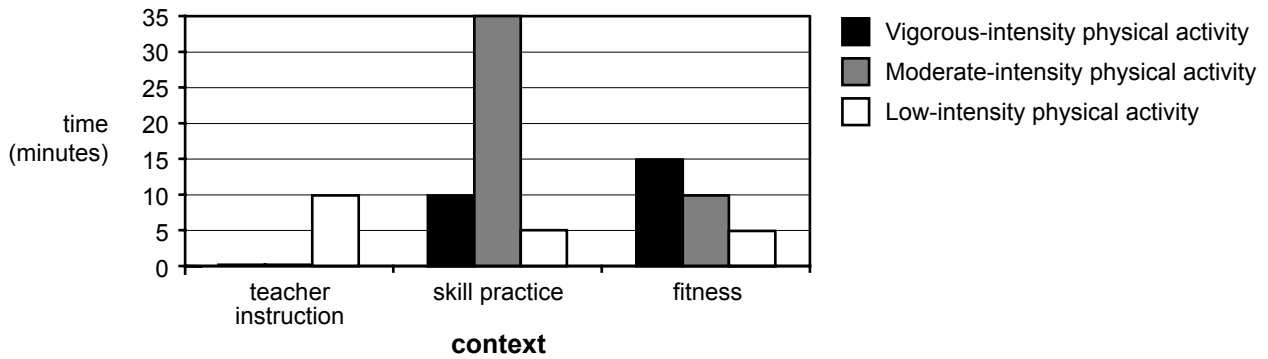
\_\_\_\_\_

1 mark

Total 11 marks

**Question 10**

The following graph represents data collected for a 9-year-old child during a 90-minute grade 4 physical education lesson.



a. Describe the association between the lesson context and physical activity intensity.

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2 marks

The school curriculum includes three hours of physical education and sport per week. This is the only physical activity completed by the grade 4 child.

b. i. Does the child meet the National Physical Activity Guidelines for 5–12 year olds?

Yes  No

ii. Use the information provided to explain your answer.

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1 + 2 = 3 marks

Total 5 marks

**Question 11**

Athlete A	Athlete B	Athlete C
An ultra-marathon runner (24 hours of non-stop running covering 200 kilometres)	Gymnastics floor routine (duration of $3\frac{1}{2}$ minutes)	Soccer goalkeeper (90-minute game)

a. Rank the three athletes for the **total** amount of oxygen consumed during their event.

highest Athlete \_\_\_\_\_  
 ↓ Athlete \_\_\_\_\_  
 lowest Athlete \_\_\_\_\_

3 marks

b. Rank the three athletes for the **average** amount of oxygen consumed per minute during the first five minutes of **recovery**.

highest Athlete \_\_\_\_\_  
 ↓ Athlete \_\_\_\_\_  
 lowest Athlete \_\_\_\_\_

3 marks

c. Discuss the importance of fats as a food fuel in the production of ATP for the highly trained ultra-marathon runner.

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2 marks

At the end of the event, recovery of muscle glycogen stores for the ultra-marathon athlete would be essential. There are various factors that can **slow** the rate of recovery of muscle glycogen stores.

d. Identify three factors that can **slow** the rate of recovery of muscle glycogen.

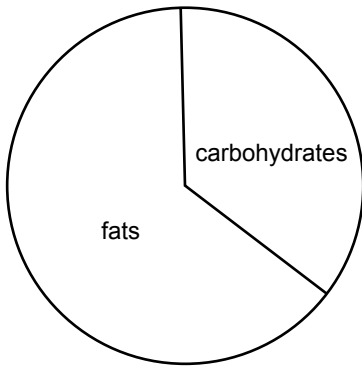
1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

3 marks

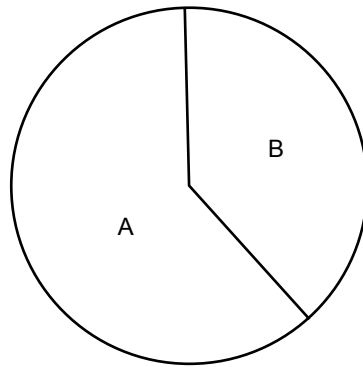
Total 11 marks

**Question 12**

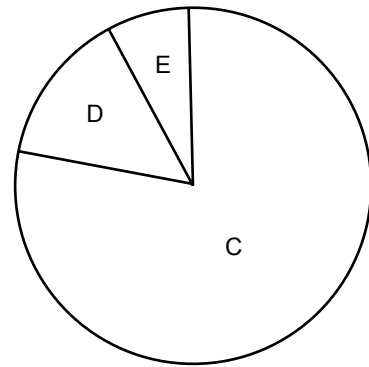
The pie charts below signify various **fuel** sources used under activities of differing intensities and duration.



at rest



100-m sprint  
(running)



ultra-marathon

Name the **fuel** source of ATP production in each situation.

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_

D \_\_\_\_\_

E \_\_\_\_\_

5 marks



**Question 13**

*Captain Ricky Ponting has rejected suggestions Australia’s heavy training during the one-day series left it with an empty petrol tank and led to its collapse in the finals.*

*Australia appeared flat and fatigued in crashing to a 2-0 defeat to England at the weekend, having sweated through rigorous pre-World Cup fitness training during much of January.*

*One of Australia’s top AIS sports scientists, Dr David Pyne, helped Cricket Australia devise the loading-taper training. But he predicted yesterday it would now be looking at freshening up the players.*

*“They would be mindful of (getting flat). Obviously it can be a combination of things: physical fatigue, mental fatigue, where they’re at with strategies for the various competitions,” Dr Pyne said. “The coaches will go through their checklists and ask are the players fatigued, how do we unload them, how we can optimise their recovery? That’s an issue they would be looking at right now, I guess.”*

[adapted] *Herald Sun*, 13 February 2007

- a. List two specific signs of physical or mental fatigue that the coach of the Australian team might have **observed** if the players were suffering from overtraining.

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

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

2 marks

- b. Outline one strategy that could be used to prevent overtraining.

\_\_\_\_\_

1 mark

Athletes sometimes use training logs to monitor their progress.

- c. Give **four** specific examples (**two** relating to an athlete’s physiological response to training and recovery and **two** relating to their psychological response) of information an athlete may record in their training log.

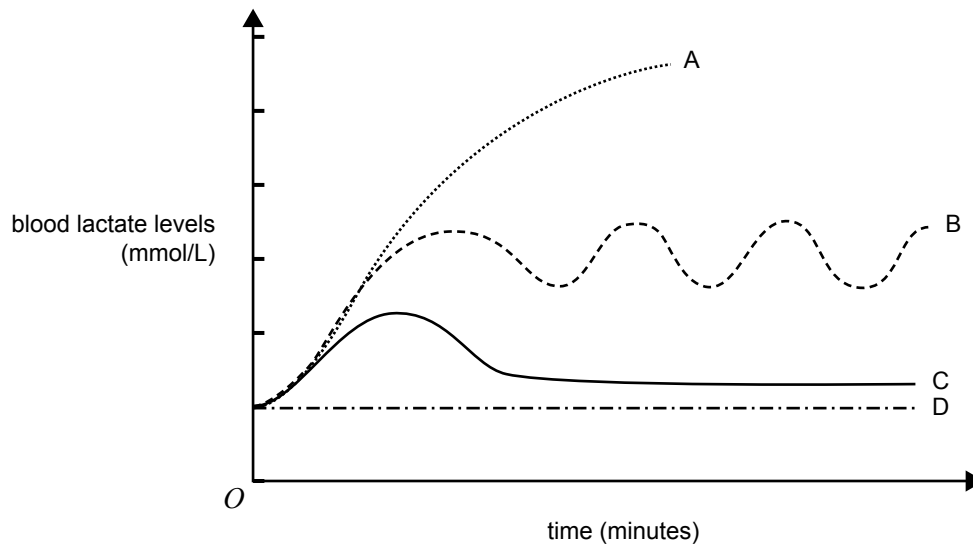
Athlete’s daily training log	
Week A	Date: 06/02/2007
Training notes	
Physiological data	Psychological data
1.	1.
2.	2.

4 marks

Total 7 marks

**Question 14**

**Blood lactate levels with varying exercise intensities**



a. From the list below, select the **four** activities which correspond to the lines on the graph.

**Activity**

- A midfield player in a team sport such as hockey or soccer
- A person walking a dog at a brisk (moderate-intensity) even pace
- A 1500-m competitive swimmer
- A 200-m sprinter (running)
- A person at rest

Line A \_\_\_\_\_

Line B \_\_\_\_\_

Line C \_\_\_\_\_

Line D \_\_\_\_\_

4 marks

After the onset of exercise, there is a change in the blood lactate level as shown by Line C on the graph.

b. Explain why there was an increase and then a decrease in blood lactate levels.

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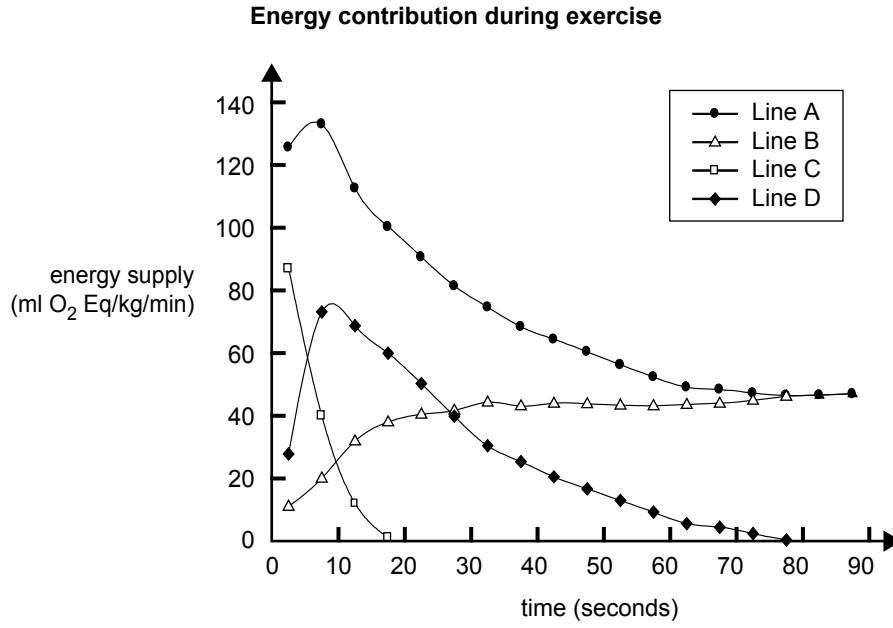


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2 marks

Total 6 marks

**Question 15**



a. What do Line A and Line C represent on the graph above?

Line A \_\_\_\_\_

Line C \_\_\_\_\_

2 marks

b. i. State the dominant energy system at the 10-second point on the graph.

\_\_\_\_\_

ii. Explain why this energy system is dominant at this time.

\_\_\_\_\_

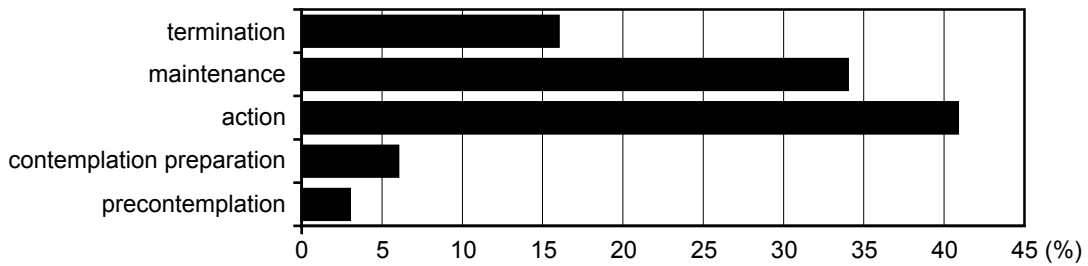
\_\_\_\_\_

1 + 2 = 3 marks

Total 5 marks

**Question 16**

**Distribution of population in physical activity stages (%)**



The data shown is from the 2007 Physical Activity Monitor conducted in ‘Springfield State’.

The graph shows that the majority of the population are in the action stage.

- a. Explain why you would want the highest percentage of the population in the termination stage if you were to maximise the health of Springfield State.

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1 mark

- b. Identify two strategies that would be suitable for an individual in the contemplation stage to change their physical activity behaviour.

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

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

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2 marks

- c. Describe three specific strategies that could be used within the **physical environment** of a community setting to encourage more people to meet the National Physical Activity Guidelines.

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

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

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

3 marks

Total 6 marks

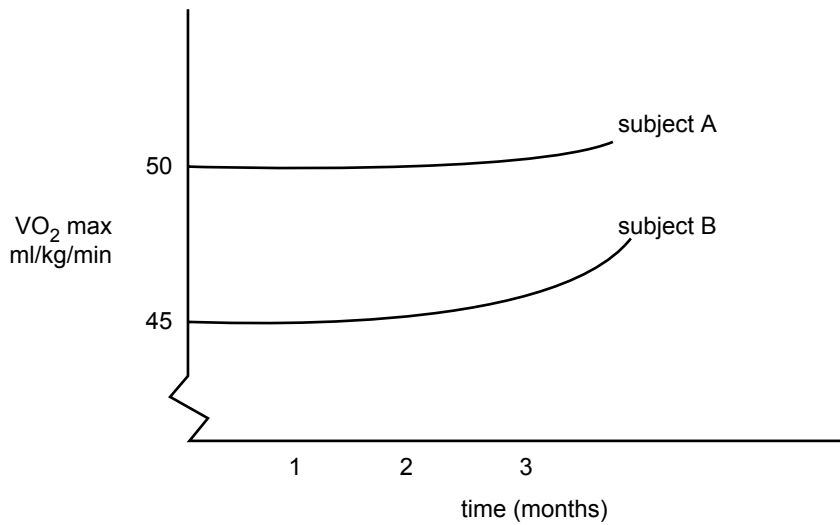
**Question 17**

Jackie and Catherine are identical twins who start a 3-month aerobic training program. Both girls currently represent Victoria in soccer. Catherine plays in the midfield and Jackie is the goalkeeper. The girls have previously undertaken a training program specific to their position in the soccer team.

**Training program**

Duration	Frequency	Intensity
30 min	4 per week	85% max heart rate

**Effect of training on subjects' VO<sub>2</sub> maximum**



a. i. Which subject, A or B, is Jackie? \_\_\_\_\_

ii. Give two reasons to support your answer to **part i.**

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

1 + 2 = 3 marks

Both subjects improved their VO<sub>2</sub> max; however, the training prescription did not change.

b. Explain how this improvement was achieved.

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2 marks

Total 5 marks

**Question 18**

Mr Jacobs is a primary school principal interested in increasing the level of physical activity of his students during recess and lunchtime.

- a. Identify an appropriate measure to assess the context and types of physical activities children engage in during school recess and lunch breaks.

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1 mark

- b. Other than the cost, justify why Mr Jacobs would have selected the measure identified in **part a.** over the use of heart-rate telemetry for use with children.

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2 marks

- c. How can a researcher reduce the reactivity associated with the use of the measure given in **part a.** to assess children's physical activity during lunchtime?

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1 mark

Total 4 marks