VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

Victorian Certificate of Education 2005

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER

									Letter
Figures									
Words									

PHYSICAL EDUCATION

Written examination

Friday 4 November 2005

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

Number of questions	*Number of questions to be answered*	*Number of marks*
23	23	117

- 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 21 pages.

Instructions
- Write your **student number** in the space provided above on this page.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

Question 1

Simone is sixteen and plays soccer on Sunday mornings in a local competition. She severely sprained her ankle when she tripped in a sprinkler hole where a sprinkler cover should have been. Her coach took her to a sports medicine clinic for treatment after the match.

a. Other than covering the sprinkler hole, how could Simone have prevented this injury occurring?

_____

_____

1 mark

After three days, Simone returned to the clinic and the doctor used heat packs on her injured ankle.

b. List **two** specific ways in which the application of heat may improve recovery from soft tissue injuries.

i. _____

ii. _____

2 marks

Total 3 marks

Question 2

Georgie Clark is an elite middle distance runner with a personal best time of 4:09.66 for the 1500 m event.

a. What is the **predominant** energy system used in this event?

_____

1 mark

The energy system you have identified in **part a.** produces ATP.

b. Identify **one by-product** of this system.

_____

1 mark

c. What is the **predominant** food group used to provide the fuel for this event?

_____

1 mark

VO_2 max testing has shown that Georgie has a high level of **cardiovascular endurance** relative to her competitors.

d. What **race strategy** should she use to take advantage of this and **why**?

_____

_____

_____

2 marks

In the first lap of the race Georgie's rate of energy expenditure per minute is greater than her VO_2 max.

e. Briefly explain how this is possible.

1 mark

A biomechanist observed that Georgie's running style was smooth with greater 'economy of movement' compared to other competitors.

f. Explain how this economy of movement improves her performance.

1 mark

In 1998 Nancy Dickman set a world record in the 1500 m for the 55 and over age group. Her time was 7:24.15.

A comparison of this time to Georgie's time demonstrates the decreased aerobic capacity associated with aging.

g. Give one physiological change that may cause this decrease.

1 mark

Total 8 marks

Question 3

'Glycogen sparing' is a chronic training adaptation that alters the amount of muscle glycogen utilised as a fuel for ATP production.

a. Indicate the **type** of event in which glycogen sparing would be beneficial.

1 mark

b. What **fuel** is oxidised in order to reduce the use of muscle glycogen?

1 mark

c. Explain in **physiological** terms the phenomenon known as 'hitting the wall'.

2 marks

Total 4 marks

Question 4

The following questions relate to the health and fitness industry and to programs that encourage participation in physical activity.

a. For a person to lose body weight they must maintain a 'negative energy balance'.

i. State **two** different ways that this can be achieved.

1. _____

_____

2. _____

_____

One advantage of weight loss is the decreased risk of heart disease.

ii. Explain how reduced body fat reduces the risk of heart disease.

_____

_____

_____

2 + 2 = 4 marks

This table shows the 2003 levels of participation in physical activities for Australians over the age of 15 years.

Activity	% of the population participating
walking	37.9
aerobics/fitness	16
swimming	15.3
cycling	9.4
tennis	9.0
golf	8.2
running	7.6
bushwalking	5.6
soccer (outdoor)	4.3
netball	3.4

Source: Participation in Exercise Recreation and Sport 2003, Annual Report p. 6,
Standing Committee on Recreation and Sport, Australian Sports Commission

b. **i.** Suggest **one social** reason and **one physical** reason why walking is the most popular physical activity.

social _____

_____

physical _____

_____

Aerobics/fitness is the second most popular activity. Commercial operators conduct most aerobics/fitness centres. Many also offer a range of facilities and programs that do not **directly** involve sporting or physical activity but are designed to increase patronage.

ii. Give **two examples** of such facilities and programs, explaining how each may increase patronage at the gym or fitness centres.

1. _____

_____

_____

2. _____

_____

_____

2 + 2 = 4 marks

The study that collected the data shown in the table (on page 4) also found that 2.7 million Australians (approximately 18% of the total population) had not participated in any sport or physical activity in the previous year.

c. **Other than weight gain and the risk of cardiovascular disease**, what are **two** potential physical health risks for people who do not participate in any physical activity?

1. _____

2. _____

2 marks

Australians spend $1 million per day on weight loss programs with 42% of women and 29% of men on a diet at any one time. Many weight loss programs can be described as 'fad diets' and are ineffective in reducing body weight and improving an individual's health in the longer term.

d. Explain why diets based on low carbohydrates and high glycaemic index foods may not be the best for losing weight.

_____

_____

2 marks

The government-sponsored 'Go For Your Life' website promotes activities including

- World's greatest pram stroll
- Neighbourhood walk and talk
- Relay for Life
- Race Against the Riverboat
- Dancing on the Docks
- Tai Chi at Federation Square
- Pilates in the Park

e. **i.** Choose **one** program **from the list above** that might be suitable for a **60-year-old female** and give **one** characteristic of the program that makes it appropriate and likely to increase her involvement in physical activity.

program _____

characteristic _____

_____

_____

ii. List **one** characteristic of the programs listed above that might decrease the chance of women developing osteoporosis.

_____

_____

1 + 1 = 2 marks

Total 14 marks

Question 5

Prize money differs greatly between events in different sports. In the Australian Tennis Open the men's singles prize money was $1.2 million while in the US Squash Open the men's singles prize money was $50 000.

a. Give **one** reason, other than sponsorship, why the prize money in professional tennis events is so much greater than in professional squash events.

_____

_____

1 mark

It has been suggested that participation levels may be lower in squash due to the greater risk of injury in squash compared to tennis.

b. List **one** technological development **not** used in tennis that increases safety levels in squash.

_____

_____

1 mark

Total 2 marks

Question 6

In recent years, golf course designers have needed to adjust the positioning of bunkers and water traps because golfers are hitting the ball further. This is due in part to the technological advances in equipment design and construction.

a. List **one specific** technological advancement in golfing **equipment** and explain how it has resulted in the ball being hit further.

advancement _____

explanation _____

_____

_____

1 + 2 = 3 marks

b. Other than technological advances in playing equipment and course design, describe another technological advancement that has assisted in the improved performance of golfers.

_____

_____

_____

1 mark

Many golfers use the psychological technique of **mental rehearsal.**

c. **Describe** how a golfer would perform mental rehearsal in order to improve golf performance.

_____

_____

_____

2 marks

Total 6 marks

Question 7

Many elite sportspersons are making the transition from athlete to coach. Darren Cahill, a retired professional tennis player, has coached a number of highly successful tennis players including Andre Agassi and Lleyton Hewitt.

a. What are **two** characteristics that Darren would need to be a good coach **other than** his extensive knowledge of the game?

_____

_____

2 marks

Darren is asked to run a tennis clinic for a group of primary-school-aged children, who, as beginners, have difficulty processing large amounts of information.

b. What **stage** of learning would these children most likely be in?

_____

1 mark

c. At this stage of learning, what **two** things can a coach do that will benefit the beginner in learning a new skill?

_____

_____

2 marks

When Andre Agassi needed to practise his serve, Darren had him perform it continuously for an extended period of time.

d. What name is given to this type of practice method?

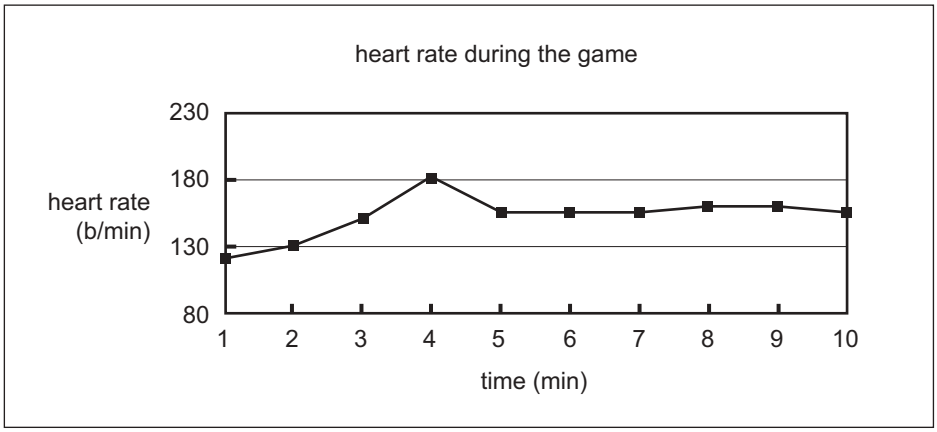
_____

1 mark

Total 6 marks

Question 8

A VCE Physical Education class performed a games analysis on a 20-year-old centre player in a team sport. The player wore a heart rate monitor. The following graph shows the player's heart rate at 1-minute intervals for a ten-minute period of the game.



a. Suggest **one reason** why a coach would use a games analysis.

1 mark

b. Using the information in this graph, explain whether the subject reaches **steady state** during the monitored period.

2 marks

c. Suggest **one other** appropriate method a coach might use to perform a games analysis other than heart rate monitoring.

1 mark

Total 4 marks

Question 9

Haemoglobin, mitochondria and oxidative enzymes are all found within muscles and assist in the generation of aerobic energy. Briefly describe the role of each.

	Role in aerobic energy production
haemoglobin	
mitochondria	
oxidative enzymes	

3 marks

Question 10

a. Describe the **function** of Creatine Phosphate in the ATP-PC energy system.

1 mark

Creatine Monohydrate is a legal performance-enhancing supplement sometimes taken by athletes.

b. Which of the following athletes would be **most likely** to benefit from taking Creatine Monohydrate supplements? (Tick one box.)

☐ 800 m runner ☐ shot putter ☐ rhythmic gymnast ☐ marathon runner ☐ 1500 m swimmer

1 mark

c. Explain how taking Creatine Monohydrate powder may enhance performance.

2 marks

Total 4 marks

Question 11

Adam is a promising 14-year-old tennis player who plays three times per week. His father, who is strict and highly motivated, trains him six times per week. Adam currently feels he has lost enthusiasm for tennis and would rather spend more time with his friends.

Before afternoon training Adam had steak and hot chips for lunch as his father said it would help build his strength. It was a hot afternoon and Adam started suffering from stomach cramps during training. His father advised him to not drink any more water and to keep training. He gave him two salt tablets to stop the cramps.

When Adam stopped training and complained about feeling unwell a short time later his father yelled 'No pain, no gain!'.

a. Suggest **one** advantage and **one** disadvantage of this coaching style.

advantage _____

_____

disadvantage _____

_____

2 marks

Adam's performance has been adversely affected by eating steak and hot chips prior to activity.

b. Explain **in terms of blood flow** how performance is affected.

_____

_____

_____

2 marks

c. Explain the **mechanism** whereby salt tablets may produce a decline in performance.

_____

_____

_____

2 marks

Total 6 marks

Question 12

Joel is a ten year old who is taking part in his school swimming sports at an outdoor pool. It is cold (17 degrees Celsius) and windy. Joel swam in an event at 10.00 am and does not swim again until 1.00 pm. He becomes extremely cold and develops hypothermia.

a. List **two recognised symptoms** that would indicate that Joel is suffering from hypothermia.

_____

_____

2 marks

b. Explain how decreased muscle temperature will decrease the ability of Joel's muscles to perform.

_____

_____

_____

2 marks

Total 4 marks

Question 13

The Tour de France cycling race is an extremely demanding sporting event. Competing cyclists race most days for three weeks and require high levels in a range of fitness components.

It is essential that all competitors recover quickly at the end of each day, and they use a variety of techniques to assist them to do this.

a. Provide details of what dietary strategy (**relating to food**) that a cyclist may employ at different intervals following the end of each race day to speed up recovery

i. within the first hour **after** the race

_____

_____

ii. more than four hours **after** the race.

_____

_____

2 marks

The illegal drug, EPO, has been detected in a number of Tour de France cyclists in recent years.

b. What is the **physiological** reason that cyclists may take EPO?

_____

_____

1 mark

Total 3 marks

Question 14

List **three physiological** reasons why an AFL footballer may ride an exercise bike while on the interchange bench during a match.

1. _____

_____

2. _____

_____

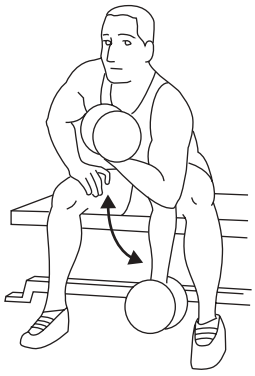
3. _____

_____

3 marks

Question 15

The diagram below shows an athlete performing a bicep curl using a dumbbell.



The athlete uses both the biceps and triceps muscles in performing this movement.

a. What term is used to describe the **action** of the elbow joint when the **biceps** contracts **eccentrically**?

_____

1 mark

In performing a bicep curl the athlete's muscles use the process called reciprocal inhibition.

b. Describe the process of **reciprocal inhibition** referring to the bicep curl as an example.

_____

_____

_____

2 marks

The diagram below represents what is occurring in the bicep muscle at a microscopic level during a bicep curl.

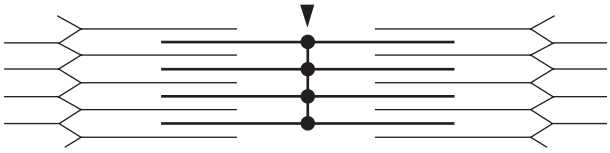


diagram A

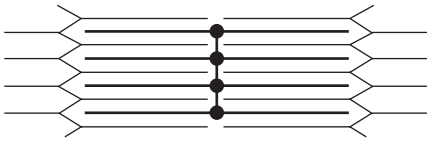


diagram B

c. Which diagram, A or B, most accurately represents the bicep muscle **at the end of** a **concentric** contraction?

_____

1 mark

d. Name the **substance** released into the myofibril from the sarcoplasmic reticulum to assist the actin and myosin to interact.

_____

1 mark

e. List the **two** structures that make up a motor unit.

1. _____

2. _____

2 marks

When a muscle develops tension its fibres respond according to the **all or none law**. This law states that in response to a stimulus a muscle fibre will either fully contract or will not contract at all.

f. If the all or none law holds true, describe **two ways** in which the amount of tension developed in the muscle can be altered.

1. _____

_____

2. _____

_____

2 marks

Total 9 marks

Question 16

Archery is an Olympic sport where Australia has been successful. The diagram below shows an archer competing in an archery contest.

Archery involves a type of skill where the external factors are generally predictable and change little throughout performance.

a. What is the name given to this type of skill?

_____

1 mark

b. In the diagram above, what type of muscle contraction is being performed in the shoulder muscles **at the moment before** the arrow is released?

_____

1 mark

Beta-blockers are an illegal ergogenic aid that lower heart rate.

c. Explain **one** way in which beta-blockers may have a beneficial effect on performance in archery.

_____

_____

1 mark

d. Name **one** legal ergogenic aid that an archer may use that would have a similar effect to a beta-blocker.

_____

_____

1 mark

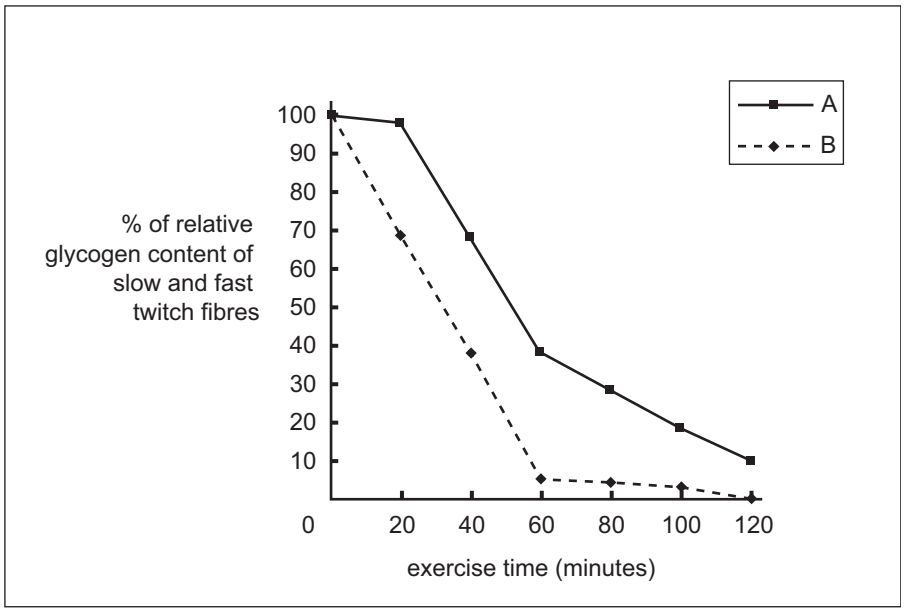
Total 4 marks

Question 17

The graph below shows the glycogen levels of fast and slow twitch muscle fibres during prolonged submaximal exercise.

Use the information provided on the graph to answer the following questions.

Muscle fibre glycogen content during prolonged submaximal exercise



a. Which line, A or B, is most likely to represent the glycogen content of the slow twitch fibres?

_____

1 mark

b. What does **the graph suggest** about preferential recruitment of muscle fibres?

_____

_____

_____

2 marks

c. List **one** factor **other than lactate accumulation** that may lead to fatigue of fast twitch fibres.

_____

_____

1 mark

Total 4 marks

Question 18

A female 3000 m runner undergoes a test to determine her VO_2 max. She is very pleased to find out that her score is 62 ml/kg/min, which is greater than that of her male training partner who is the same age. She is puzzled, however, to find that the sport scientist also mentioned that another score was calculated which showed that her VO_2 max was 3.6 l/min, which was less than that of her male training partner (4.3 l/min).

a. What physical characteristic causes this discrepancy?

1 mark

b. Which of the two scores (ml/kg/min or l/min) is more important as a measure of aerobic capacity for this female runner?

1 mark

c. Explain your answer to **part b**.

2 marks

Total 4 marks

Question 19

A swimmer returns to training after a 6-week lay off due to injury. She finds that she needs a much greater period of time to recover between her repeat 100 m efforts that each last approximately 70 seconds and are completed at approximately 85% of maximum heart rate.

a. State **one** physiological change that has occurred during this period of detraining.

1 mark

b. Discuss how the change listed in **part a.** has caused the need for an increased recovery period between 100 m efforts.

2 marks

Total 3 marks

Question 20

A male athlete who has been successful in school sports in the shot put event wishes to be successful in advanced club level competition. Following a range of fitness tests prior to the club athletics season, he has been prescribed a weight-training program that focuses upon the development of **leg power**.

Unfortunately, the coach designing the training program made **three** errors.

Exercise	Sets	Repetitions	Weight		Recovery period (mins) between sets
			Kg	% 1RM	
barbell power cleans	1	3–5	70	60	3
barbell squats	3	3–5	100	70	4
hip extension on a pin-loaded machine	6	3–5	50	70	1

a. Identify the **three** pieces of information from the table that are **incorrect**.

1. _____

2. _____

3. _____

3 marks

b. **i.** Explain why **one** of the pieces of information indicated in **part a.** is incorrect.

_____

_____

_____

1 mark

ii. For the error you have identified in **part b. i.**, suggest an appropriate alternative figure or range.

_____

1 mark

Total 5 marks

Question 21

When a coach plans a training program for an athlete they usually focus on one primary method of training depending on the component of fitness they wish to target for improvement.

Athlete	**Specific aim of training**	**Training method employed**	**Detail of training method**	**Explanation of how overload could be applied to this method of training**
long jumper	increase leg power		jump over a low hurdle landing on take-off leg and lowering to a crouch position	increase number of repetitions
1500 m swimmer	increase aerobic power	continuous	swim for 10 min intervals maintaining HR at 175 bpm	
soccer goalkeeper	increase agility	flexibility	perform a range of stretches taking them to max range of motion and hold each for 10 seconds	increase the range of motion and continue to hold for 10 seconds
male gymnast	increase upper body strength	resistance training	perform lat pull downs 4 sets of 6 at 60% of 1 RM	
800 m track runner	increase anaerobic threshold		constant pace running at an intensity that can be maintained for 30 mins	increase working intensity

a. What training method is being employed by the long jumper?

_____

1 mark

b. By referring to the 'detail of training method' column in the table

i. describe how the 1500 m swimmer would overload their program

_____

_____

ii. provide details of how the male gymnast would overload his program.

_____

_____

2 marks

c. What type of training is being undertaken by the 800 m track runner?

_____

2 marks

Total 5 marks

Question 22

A recent survey has revealed that surfing is the fastest growing sport in Australia and has become one of the biggest sports in the nation with 2.6 million participants annually, particularly in children under the age of 15 years. This figure is more than the combined number of participants in the three major football codes in the country: Australian rules, soccer and rugby.

A major factor in people participating in surfing is whether they live or holiday close to the beach.

a. **Other than geographic location**, identify **one** major factor influencing people to initially participate in surfing.

_____

1 mark

b. Explain how this factor leads to an increase in participation levels in surfing.

_____

_____

_____

2 marks

As age increases participation levels in surfing decreases.

c. Suggest **one** major recognised social or cultural factor responsible for this decrease.

_____

1 mark

d. Explain how this factor produces this effect.

_____

_____

_____

2 marks

Total 6 marks

Question 23

Exercise can induce both **chronic** and **acute** training effects on the cardiovascular, respiratory and muscular systems. The following questions look at different examples of training and the effects they produce.

Sally, aged 25 years, started a training program 12 weeks ago. She has been running twice a week and going to the gym to do an aerobics class twice a week. Sally wears a heart rate monitor each time she trains to ensure she is working in her aerobic training zone.

Sally noticed that her heart rate during exercise was lower after 12 weeks of training than it was at the start of the program.

a. What is the name given to this type of training effect?

_____

1 mark

When an athlete begins to exercise, the body's need for oxygen increases and a number of immediate changes occur to help increase the supply of oxygen to the working muscles. One of these cardiovascular responses to exercise is an increase in arteriovenous oxygen difference (a-VO_2 diff.).

b. What is meant by the term a-VO_2 diff.?

_____

_____

1 mark

c. Outline why a-VO_2 diff. increases during exercise.

_____

_____

1 mark

A healthy, untrained 21-year-old male commenced a six-month weight-training program targeting muscle strength and hypertrophy.

d. List **two** microscopic changes within the muscles that result in muscle hypertrophy.

1. _____

2. _____

2 marks

e. **Other than** the responses in **part d.** and strength, list **two chronic** adaptations to skeletal muscles that occur as a result of long-term weight training.

_____

_____

2 marks

Total 7 marks

END OF QUESTION AND ANSWER BOOK