



Victorian Certificate of Education 2003

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER

Figures

Words

Letter

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PHYSICAL EDUCATION

Written examination

Friday 7 November 2003

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>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
25	25	123

- 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 27 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 electronic communication devices into the examination room.

Question 1

In the last two decades aerobics classes have increased in popularity. In aerobics classes participants exercise to music. These classes are usually conducted in a gym and have led to more people attending gyms.

- a. Explain **one** characteristic of **aerobics** that may have led to the increase in people attending gyms.

1 mark

More recently, water aerobics has been developed. This activity involves exercise to music in a swimming pool.

- b. i. Explain **one** characteristic of **water aerobics** that may have encouraged people to participate in this activity.

- ii. Name **one** group likely to be attracted to water aerobics because of this characteristic.

1 + 1 = 2 marks

Question 2

The Australian Football League (AFL) *Report on Player Injuries* for the year 2000 provides information about all injuries to players throughout the year.

- a. Provide **two** reasons **in relation to player management** by the coach or the trainer that would contribute to each of the results listed below.

- i. The incidence (rate) of injury has dropped.

Reason 1 _____

Reason 2 _____

- ii. The average number of games missed with each injury has dropped.

Reason 1 _____

Reason 2 _____

2 + 2 = 4 marks

The report shows that the incidence of hamstring strains has **not** decreased and that hamstring strain is the injury most likely to recur.

It has been suggested that players should do an intensive program of both stretching and strengthening of the hamstring muscle group as a strategy to prevent the recurrence of hamstring injuries.

- b. Name or describe or sketch **one** specific exercise that a football club fitness coach might give as part of a **rehabilitation weight-training program** to

- i. strengthen the hamstring muscle group.

- ii. stretch the hamstring muscle group.

1 + 1 = 2 marks

The hamstring muscle group is involved in producing flexion at the knee joint.

- c. What type of muscle contraction is occurring in the hamstring during flexion of the knee?

1 mark

- d. Using Figure 1 below, **describe** the process occurring **in the sarcomere** as the contraction identified in part c. (above) occurs.

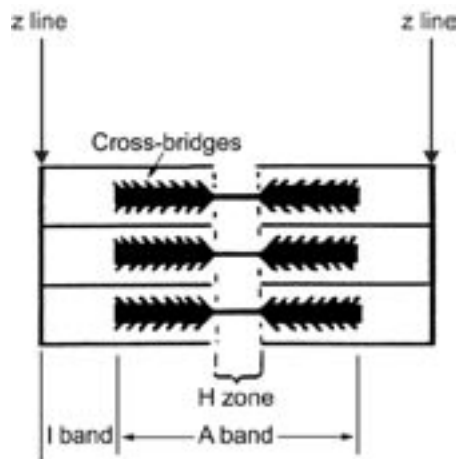


Figure 1

2 marks

Question 3

Figure 2 below is a representation of the ratio of red to white muscle fibres in the quadriceps of three subjects.

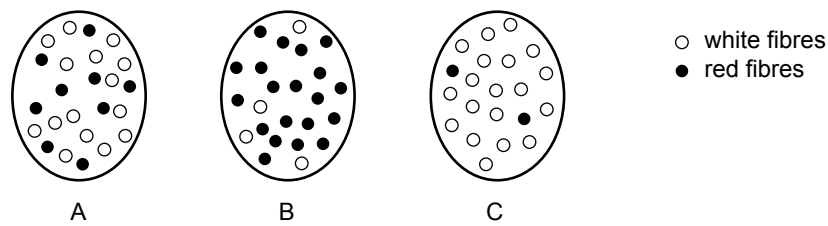


Figure 2

- a. Which diagram, A, B or C, best represents the fibre ratio of an elite 100 m sprinter?

1 mark

One characteristic of **slow twitch** muscle fibres is relatively slow speed of contraction.

- b. State **two** other characteristics of slow twitch muscle fibres.

i. _____

ii. _____

2 marks

One characteristic of **fast twitch** muscle fibres is fast speed of contraction.

- c. State **two** other characteristics of fast twitch muscle fibres. (These characteristics must be different to the ones listed in part b.)

i. _____

ii. _____

2 marks

TURN OVER

Question 4

The Murray River Canoe Marathon is an event held in January which lasts five days. The participants usually paddle for many hours each day. The event is usually conducted in extremely hot conditions. In past events some paddlers have suffered heat exhaustion.

You are the coach of an athlete who wishes to compete in the Murray River Canoe Marathon.

You design a training program that lasts for six months to develop your athlete's **aerobic capacity** and **anaerobic threshold**.

One result of this program is that the athlete will alter their reliance upon carbohydrate and fat at a given submaximal work output (absolute).

- a.** Outline **one** change in the use of fat relative to carbohydrate use.

1 mark

It is important for the paddler to start the race with the highest possible muscle glycogen levels. To achieve this you decide to use the 'taper' method of carbohydrate loading. Part of the taper method involves increasing the proportion of carbohydrate in the paddler's diet before the event.

- b. i.** State the time span over which you would increase the paddler's carbohydrate intake.

- ii.** In addition to increasing carbohydrate intake, what else would you do as part of this tapering method?

1 + 1 = 2 marks

The following table shows two meals suggested for the paddler. One is designed as a pre-race meal and the other as a post-race meal.

Meal A	Meal B
Low-fat strawberry milkshake/smoothie	Sports or soft drink
Banana	Honey sandwich
Wholemeal bread roll	Dried fruit
Water	Sweets (lollies)
	Watermelon

- c. i.** Which of these meals is better eaten 1–2 hours prior to the start of a day of paddling?

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

1 + 1 = 2 marks

Question 4 – continued

The paddler should drink fluid during each day's paddling to help avoid heat exhaustion.

d. State two other actions that would help prevent heat exhaustion.

i. _____

ii. _____

1 + 1 = 2 marks

Mitchell and Haydn are two paddlers. Mitchell has paddled at a comfortable pace ($60\% \text{VO}_2 \text{ max}$) for the day. Haydn has paddled at 75% of his $\text{VO}_2 \text{ max}$ for the day and has sprinted the last five minutes of the day's paddling at maximal intensity.

Active and passive recovery are both legitimate recovery regimes.

- An example of active recovery is a period of 15 minutes of low intensity exercise—approximately $60\% \text{HR}_{\text{max}}$.
 - An example of passive recovery is sitting or lying down for 15 minutes.
- e.** Explain which of these recovery regimes is most appropriate for Haydn to use after this day's paddling.

2 marks

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TURN OVER

Question 5

William is a 13-year-old swimmer who has consistently performed well in freestyle and butterfly events. His coach believes that he is capable of winning state and national titles and that William has the potential to be a successful world-class swimmer.

Each week William is currently completing ten sessions in the pool and four weight-training sessions.

In the last few weeks he has competed at a number of carnivals and his times, in all events, have been much slower than his personal best times.

- a.** Suggest **one** specific change that the coach could make to William's training schedule to remedy this decrease in performance.

1 mark

William's current coach uses an authoritarian style of coaching.

- b. i.** Outline **one** advantage of this style of coaching.

- ii.** Outline **one** disadvantage of this style of coaching.

1 + 1 = 2 marks

Question 6

Figure 3 is a graph that shows the distribution of blood flow to body parts during exercise.

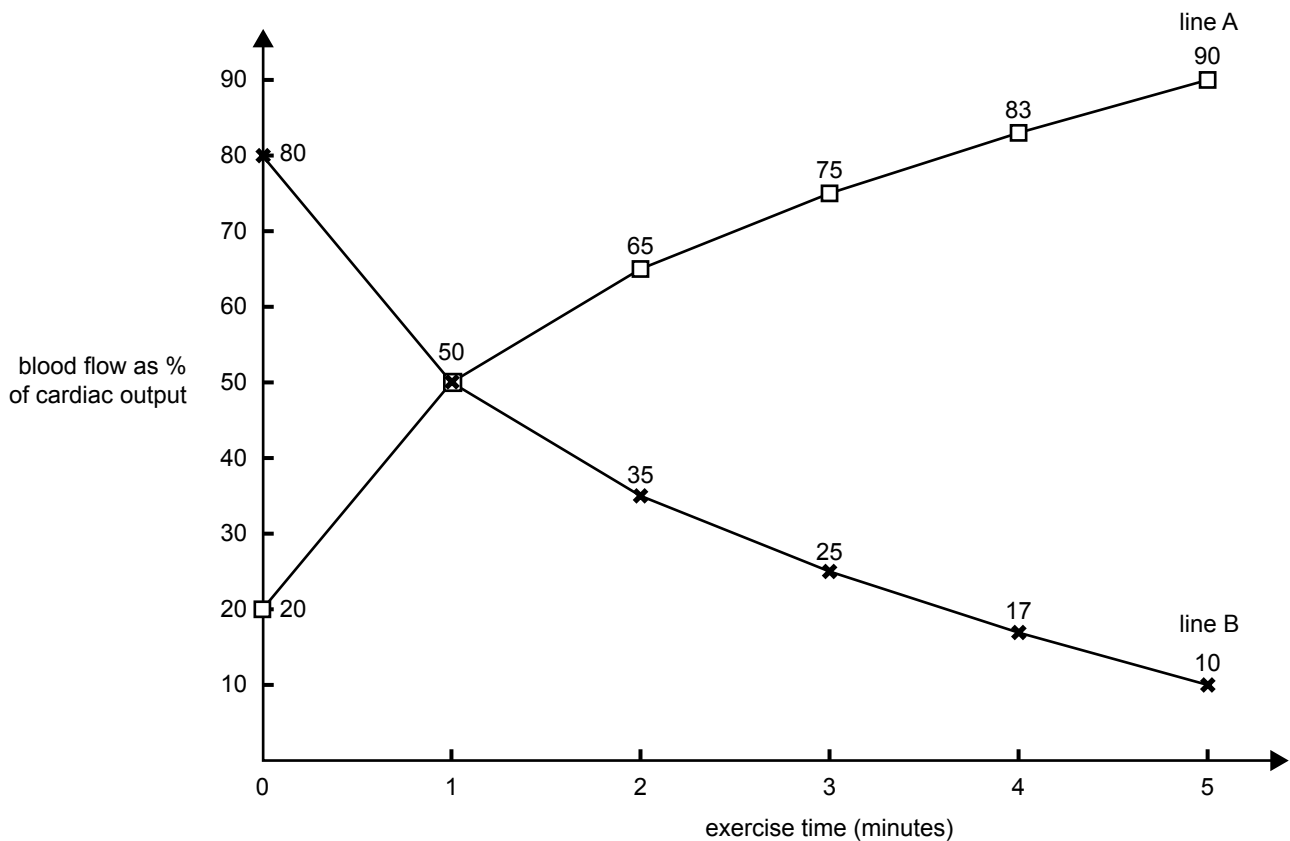


Figure 3

- a. Which line (A or B) represents blood flow to skeletal muscles?

1 mark

- b. List **two** acute (immediate) responses to exercise which enable the **redistribution** of blood as shown by the graph.

i. _____

ii. _____

1 + 1 = 2 marks

TURN OVER

Question 7

Individuals are motivated to commence and continue participation in physical activity by a variety of factors.

- a. i.** Identify two social and/or cultural factors that might influence an individual's decision to **commence** the sport of **sailing**.

Factor 1 _____

Factor 2 _____

- ii.** Explain in detail how **one** of these factors might result in a person commencing sailing.

2 + 2 = 4 marks

Having commenced sailing an individual may continue to participate because they enjoy the sport.

- b.** Identify two other factors **different to those identified in part a.** that might contribute to the individual **continuing** to participate in the sport of **sailing**.

i. Factor 1 _____

Factor 2 _____

- ii.** Explain in detail how **one** of these factors would increase levels of **continued** participation in sailing.

2 + 2 = 4 marks

Question 8

Many sports have developed modified versions of the sport to encourage young children to participate.

- a. Select **one** sport and identify **two** modifications that make the sport more accessible for younger participants.

Sport _____

Modification 1

Modification 2

2 marks

- b. Explain how **one** of these modifications would increase a younger child's ability to perform the skills needed in this sport.

1 mark

Question 9

The following questions relate to a group of **sub-elite** athletes.

Athlete A relies heavily upon fitness components such as power and strength to perform in her sport.

- a. Which **energy system** predominates during power and strength activities?

1 mark

In activities lasting 25 seconds Athlete B has lower local muscular endurance than other sub-elite performers in her sport.

- b. Which two **energy systems** would Athlete B most need to improve to increase her levels of local muscular endurance?

i. _____

ii. _____

1 + 1 = 2 marks

Athlete C has scored in the highest category on the 1.6 km running test.

- c. Which **component of fitness** is likely to be most developed for the athlete to achieve this result?

1 mark

TURN OVER

Question 10

A track coach sets a program that requires an athlete to run **maximally** for 30 seconds.

a. Which two **fuels** are predominantly used at the muscular level to provide energy for this 30-second run?

i. _____

ii. _____

2 marks

The coach had the athlete repeat this 30-second run six times with rest intervals consisting of 5 minutes of passive recovery.

b. Which specific physiological capacity is the coach primarily trying to develop with this program?

1 mark

Question 11

Figure 4 shows running speed in metres per second (m/s) for males and females in events ranging from the 100 m to the 10 000 m.

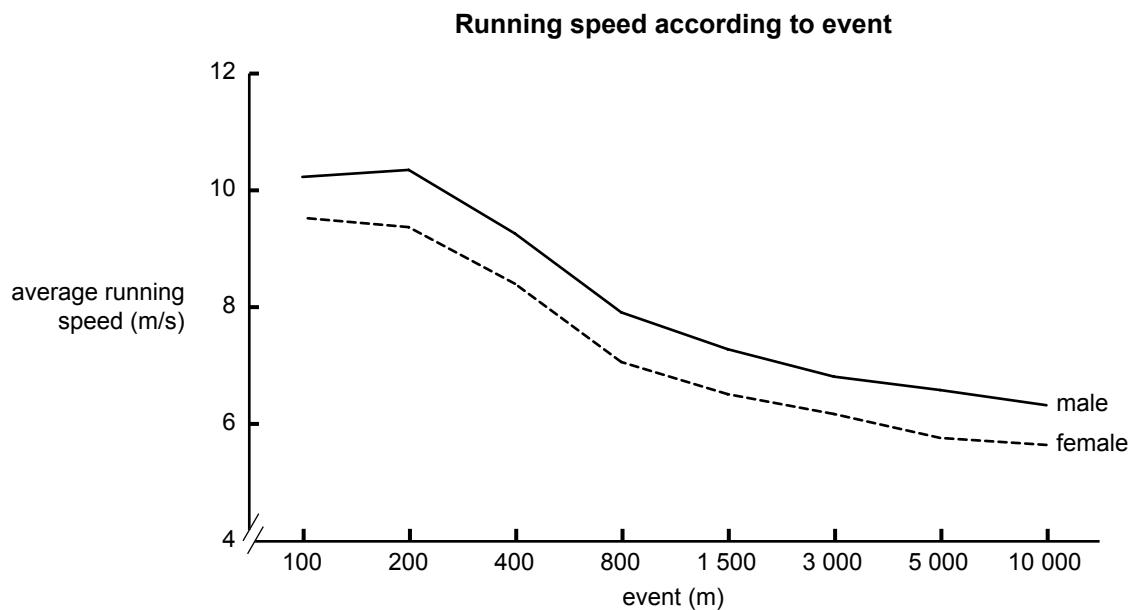


Figure 4

a. Give two physiological factors to explain why the average running speed for both male and female athletes is slower in the 800 m event than in the 200 m event.

i. _____

ii. _____

1 + 1 = 2 marks

Question 11 – continued

The graph shows that trained elite female performance is approximately 10% lower than performance by comparably trained elite male athletes.

After taking body weight and body fat levels into account, trained elite female athletes have a VO_2 max that is approximately 10% less than the VO_2 max for equally trained male athletes.

- b.** List two **cardiovascular** factors that may account for this higher **aerobic** capacity in males.

2 marks

VO_2 max cannot explain the 10% difference between males and females in the shorter events.

- c.** Give one factor that may account for this difference.

1 mark

In the last few decades world records for women's endurance events have decreased at a much faster rate than the same records for males.

- d.** Suggest **two** reasons why this may have occurred.

i.

ii.

1 + 1 = 2 marks

TURN OVER

Question 12

Increased participation in physical activity has benefits for individuals and the community. For each age group listed below

- i. list one government or private sector campaign or program aimed at increasing participation in that age group
- ii. explain how one characteristic of the campaign or program will lead to this increase.

You must use a **different campaign or program** for each age group.

a. 8–15 years old

i. Campaign/program _____

ii. Characteristic _____

b. 30–40 years old

i. Campaign/program _____

ii. Characteristic _____

c. Over 60 years old

i. Campaign/program _____

ii. Characteristic _____

2 + 2 + 2 = 6 marks

Question 13

A talented under 17 volleyball player was set a weight-training program designed to focus primarily on **leg power**.

Table 1

Exercise	1 Repetition Maximum	Sets	Repetitions	Weight
Squats	90 kg	6	4	87.5 kg
Hamstring curls	27 kg	12	5	18 kg
Calf raises	57.5 kg	5	6	37.5 kg
Leg press	85 kg	4	7	50 kg

There are **two errors** in this program. Each error is outside recommended guidelines for developing muscular power.

a. Identify each error and state a more appropriate value.

i. Error number 1 _____

Suggested value _____

ii. Error number 2 _____

Suggested value _____

1 + 1 = 2 marks

The volleyball player followed the initial program shown in Table 1 above. After five weeks, progressive overload was commenced. The proposed figures for the leg press to be used in week five are shown in Table 2 below.

Table 2

Exercise	Sets	Repetitions	Weight
Leg press	5	10	55

b. Discuss whether the principle of progressive overload has been applied correctly.

2 marks

A likely result of this training program is an increase in muscle hypertrophy.

- c. Outline what takes place at a muscular level to
- i. make the muscle larger **at the end of** a single training session.

- ii. make the muscle larger at the end of a six month program.

1 + 1 = 2 marks

A fellow player has given the volleyballer the following **incorrect** advice.

- i. 'Be careful with a weight program as your muscle will turn to fat when you stop training.'
- ii. 'You need to increase the proportion of protein in your diet to greater than 40 % to make sure the program is effective in increasing your power and muscle bulk.'
- d. Explain why these are **incorrect**.

Statement i. _____

Statement ii. _____

2 + 2 = 4 marks

Question 14

Figure 5 below shows the oxygen uptake and oxygen deficit of an athlete during an 800 metre track running event lasting approximately 2 minutes.

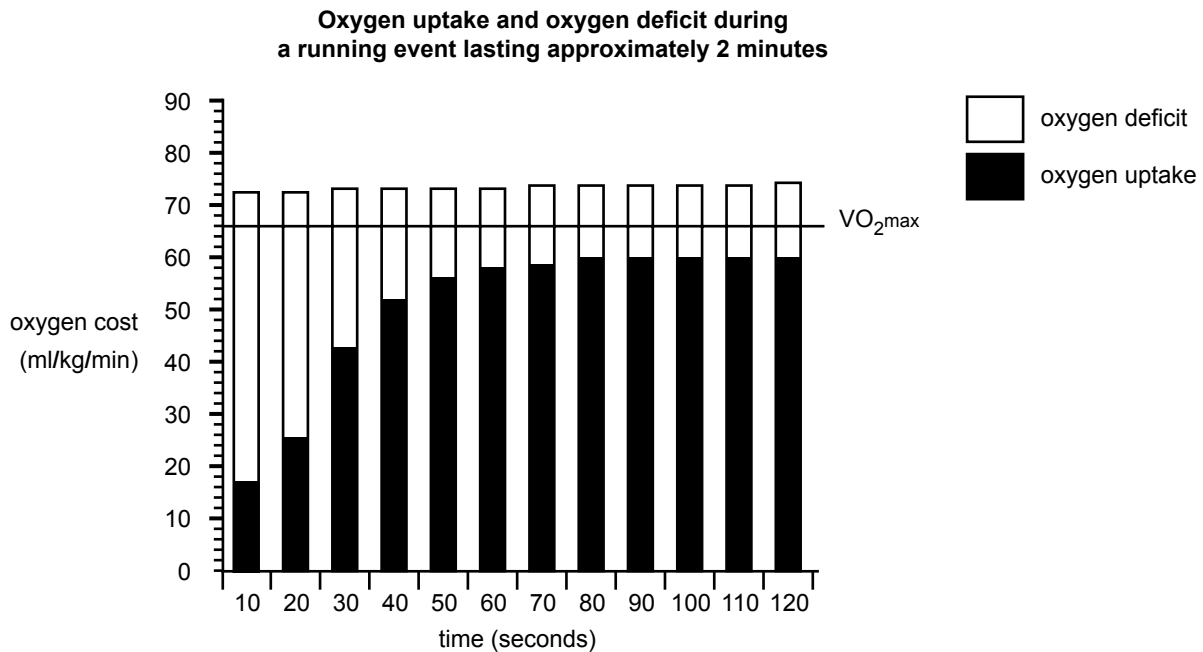


Figure 5

This graph indicates that during an 800 m run, it is possible that the athlete may have an oxygen cost of greater than 100% of their VO_2 max.

- a. Explain how this can occur.

1 mark

- b. Explain the term 'oxygen deficit'.

2 marks

At the end of the 800 m event the subject stopped running. However, the subject's heart rate and breathing rate remained elevated for some time.

- c. Explain why these rates remained elevated.

2 marks

TURN OVER

Question 15

Figure 6 shows the concentration of lactic acid in an elite athlete's venous blood at the end of each 3-minute incremental workload during a step test. The two results shown were taken before and after a 6-month training period.

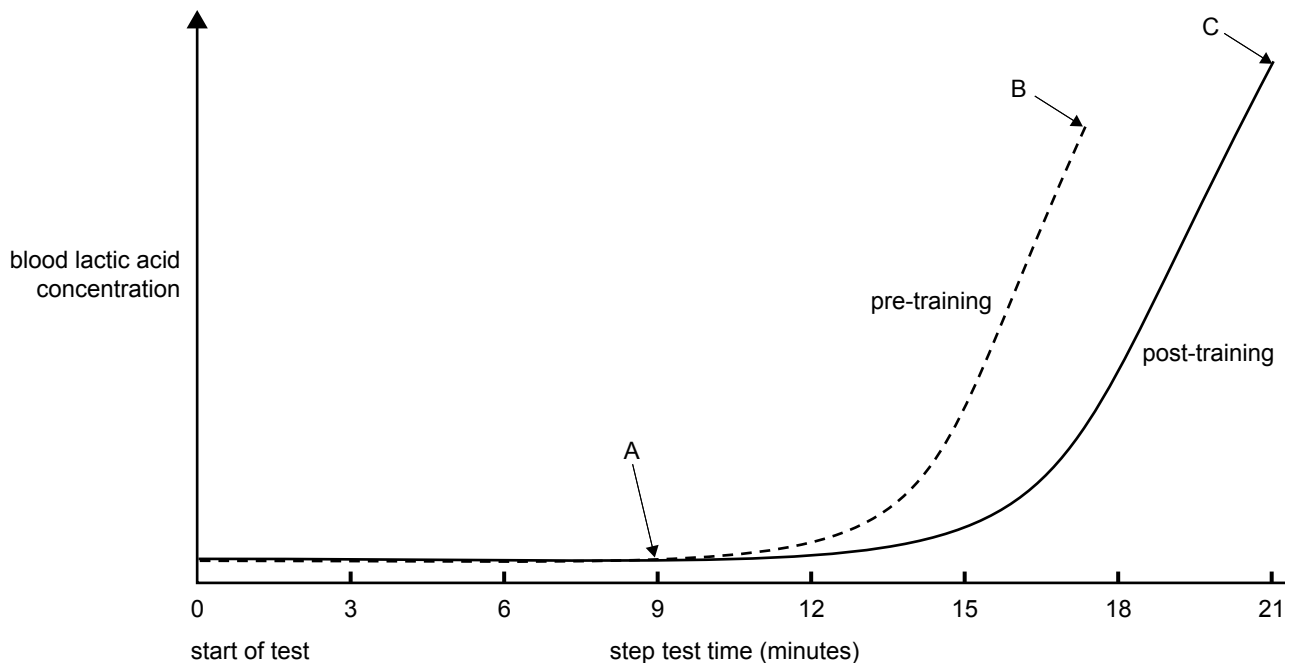


Figure 6

At point A in the graph the athlete's venous blood shows a low but steady concentration of lactic acid. This is lower than would be expected, given the rate of lactic acid production in the skeletal muscle.

- a. Explain why this is the case.

1 mark

The peak blood lactic acid concentration has increased from point B to point C as a result of the training program.

- b. What physiological change has occurred to cause this increase?

1 mark

- c. State the type of training most likely to have resulted in the increase in peak blood lactic acid concentration from point B to point C.

1 mark

- d. State the intensity of training as a % of maximum heart rate that the athlete would have worked at during the program to bring about this change.

1 mark

Question 16

Active Australia Day is a Federal Government initiative funded by the Australian Sports Commission. It is a national event designed to promote the benefits of regular sport and physical activity. The purpose of the day is to **encourage people to join a sporting club**.

As a senior student at school, you have been asked to form a committee to organise activities **at your school** as part of Active Australia Day celebrations.

Use the following table to detail **one activity** that you might organise at your school to achieve the desired outcome of Active Australia Day.

Brief description of activity	Resources needed	How this will lead to an increase in students joining clubs
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

3 marks

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Question 17

The ageing process has been clearly shown to reduce physiological function and athletic performance.

Figure 7 shows the predicted VO_2 maximum of two male subjects, one subject is inactive and the other highly trained.

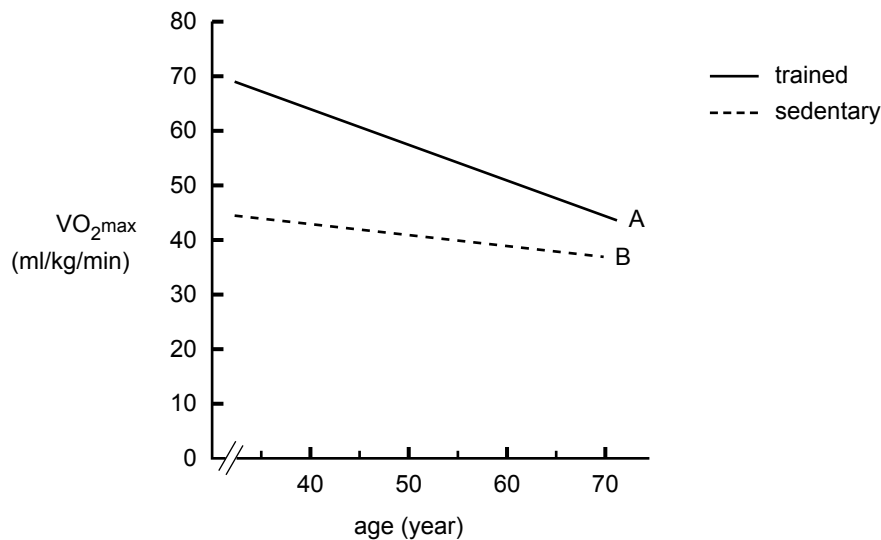


Figure 7

- a. State two **musculo-skeletal** reasons to explain why both lines A and B decrease.

2 marks

The greater aerobic capacity of the trained individual (as shown in Figure 7) can be explained by the chronic adaptations of the **cardiovascular system** caused by training.

- b. List two of these adaptations and explain how each leads to an increase in VO_2 maximum.

Adaptation 1 _____

Explanation

Adaptation 2 _____

Explanation

2 + 2 = 4 marks

Question 18

Administrators of a sport use sponsorship money to market the sport to make it more attractive so that media coverage and participation increases.

Outline one **marketing strategy**, which has been used by administrators in a **major sport** in Australia, and give the desired outcome of this strategy.

Marketing strategy	Desired outcome
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>

2 marks

Question 19

The following is adapted from a newspaper report on sponsorship in sport.

Historically, many large corporations have sponsored sports and sporting teams. A new report from the Commercial Economic Advisory Service of Australia (CEASA) is predicting that sports sponsorship is set to drop in 2002, due largely to the collapse of some corporations.

Already these corporate collapses have contributed to a small decline in Australian sports sponsorship in 2001, according to CEASA's latest statistics.

Just under \$1.25 billion was spent on sports sponsorship last year—a drop of more than \$4 million or 0.3% from the previous year. This is the first decline since CEASA began its surveys in 1996.

a. Identify three possible effects of reduced sports sponsorship on an elite sports team or the sport itself.

i.

ii.

iii.

1 + 1 + 1 = 3 marks

b. Outline **one** example of how a sponsor might **not** benefit from its association with an elite sports team.

1 mark

TURN OVER

Question 20

A games analysis was undertaken of an **elite** level tennis match and the following information was obtained.

Average time for each point played	5.3 seconds
Average rest time between points	17.5 seconds
Total time taken to play the match	180 minutes
Total work time (total length of points played)	20 minutes
Average number of shots played in a point	4
Longest point	15.4 seconds
Average power output during each point played	95–100%

- a. Provide **one** explanation why a coach would require a game analysis such as this before developing a fitness program for elite players.

1 mark

- b. Use data from the table to answer the following questions.

- i. What is the main energy system used during each point played?

- ii. What training method is best suited to improving the main energy system used during each point played?

1 + 1 = 2 marks

As a coach you need to construct a training program.

- c. What other information do you need to collect during the match to help you do this?

2 marks

Question 21

A subject was tested twice at 24-hour intervals on a fitness test. The only difference in the conditions under which each test was conducted was the amount of rest allowed between sprints. No other strenuous activities were undertaken on either day.

In each test the subject was required to sprint at maximum speed for 7 seconds. This was repeated eight times with a rest in between each sprint.

For each sprint the subject was given a score according to how many witches hats they had run past in the 7 seconds allowed. At the end of each sprint a tester recorded the decrease in the number of witches hats run past from the first sprint. These figures were added together at the end of each test.

Results of both tests are shown in the tables below.

Test A

In test A the subject was allowed **30 seconds recovery** between each sprint.

Results									Best possible score	Total score	Decrease
Sprint number	1	2	3	4	5	6	7	8	56		
Score on each sprint (number of witches hats run past)	7	5	4	3	3	2	2	2		28	
Decrease	–	2	3	4	4	5	5	5			28 (50%)

Test B

In test B the subject was allowed **50 seconds recovery** between each sprint.

Results									Best possible score	Total score	Decrease
Sprint number	1	2	3	4	5	6	7	8	56		
Score on each sprint (number of witches hats run past)	7	6	5	5	5	4	4	4		40	
Decrease	–	1	2	2	2	3	3	3			16 (29%)

- a. Which **energy system** is used predominately during the first **three** sprints of each test?

1 mark

- b. Which **component of fitness** is being measured by these fitness tests?

1 mark

- c. Explain the underlying **physiological reasons** for the greater percentage decrease in performance during fitness test A compared to fitness test B.

2 marks

After a 3-month aerobic training program the student was retested on test A under the same conditions (30 seconds recovery).

- d. Explain whether you would expect greater relative improvement in performance on sprint 1 or sprint 8 of the retest.

2 marks

Question 22

Exercise physiologists suggest skeletal muscle is a likely site of fatigue during any exercise session.

Name three causes of fatigue at the **muscular level**.

- i.

- ii.

- iii.

1 + 1 + 1 = 3 marks

Question 23

Approximately 4000 people swam in the annual swimming event, the Lorne Pier to Pub, on 11 January this year. This event involves an ocean swim of 1.2 kilometres. Elite swimmers usually win the event. Entrants include novice, experienced, male and female swimmers across all age groups from junior to veteran. People have different motivational reasons for participating in the event.

a. State two **intrinsic** motivational reasons for participating in this event.

i. _____

ii. _____

1 + 1 = 2 marks

b. State two **extrinsic** motivational reasons for participating in this event.

i. _____

ii. _____

1 + 1 = 2 marks

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Question 24

Figure 8 shows systolic and diastolic blood pressure readings taken from a 20-year-old male during a maximal graded exercise test completed to exhaustion.

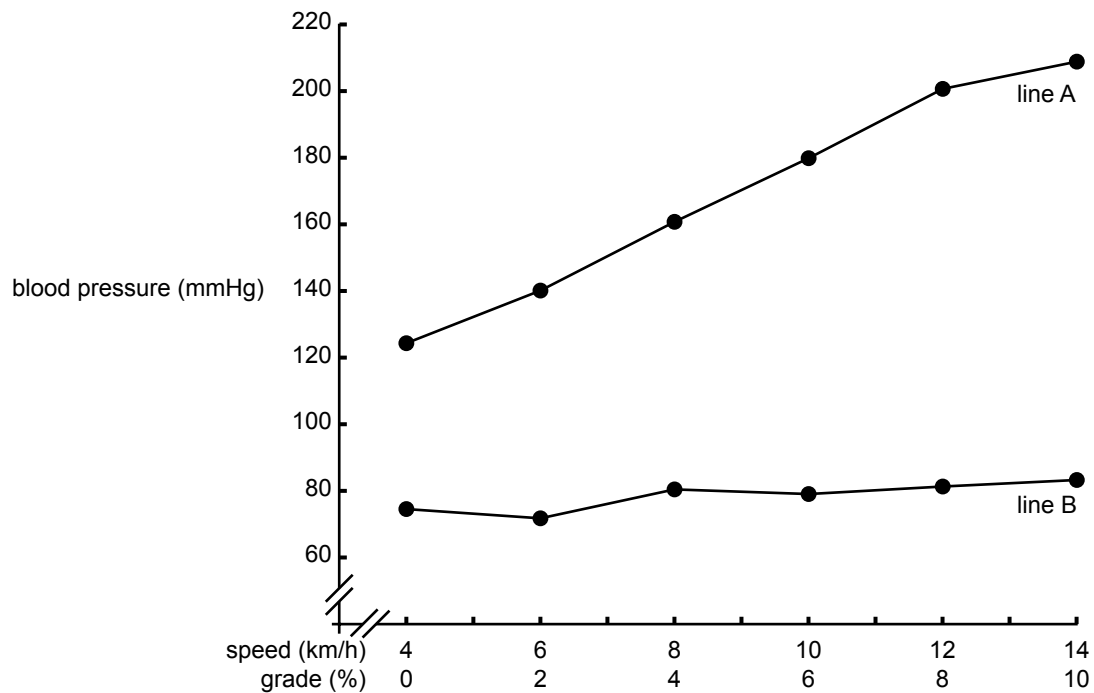


Figure 8

- a. Which line, A or B, represents diastolic blood pressure?

1 mark

- b. Explain what is meant by the term systolic blood pressure.

2 marks

- c. At the end of the test the subject will have reached his maximum heart rate. What is this likely to be?

1 mark

Question 25

A coach wishes to design a training program to improve her elite 3000 metre runner's **anaerobic threshold**. One of the training sessions requires the athlete to complete **10 repetitions** of **3-minute runs** with **30 seconds rest** between each repetition.

Each repetition is completed with a **heart rate of between 60% and 65% of maximum**.

Blood lactate checks during the session indicate that the athlete's exercise blood lactate concentration remains below 2 mMol/l during the training period.

- a.** Is this training session likely to contribute towards an improvement in the athlete's anaerobic threshold? Give a clear explanation for your answer.

2 marks

A trained aerobic athlete will generally have a lower **resting** heart rate than an untrained person of the same age, body weight and sex.

- b.** Explain why this is the case.

2 marks