



Victorian Certificate of Education 2002

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER

Letter

Figures

Words

PHYSICAL EDUCATION

Written examination

Friday 8 November 2002

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>
23	23	127

- 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 23 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**Figure 1**

The subject has been instructed to hold the position in Figure 1 for 10 seconds.

- a. Name the component of fitness that is being demonstrated.

_____ 1 mark

- b. Name the agonist muscle group which is mainly responsible for lifting the athlete up from the ground to the position shown.

_____ 1 mark

- c. Name the type of muscle contraction required to hold this position.

_____ 1 mark

- d. What type of muscle contraction occurs in the agonist muscle group to lower the upper body back down to the floor?

_____ 1 mark

- e. Name the movement which takes place at the hip joint during the upward phase of the sit-up.

_____ 1 mark

Total 5 marks

Question 2

Figure 2 shows the percentage of fast twitch muscle fibres in four individual elite athletes.

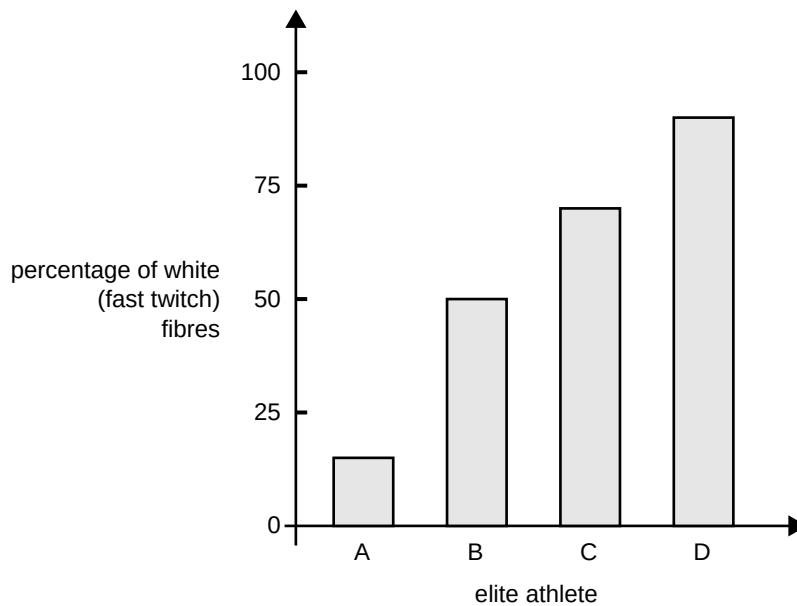


Figure 2

a. Which athlete shown on the graph is most likely to be

i. a marathon runner?

ii. a field events athlete (thrower or jumper)?

2 marks

Fast twitch and slow twitch muscle fibres have many different characteristics. One difference is in the amount of triglycerides stored in the muscle fibre.

b. Discuss and suggest a reason for this difference.

2 marks

Total 4 marks

TURN OVER

Question 3

Midfield players in sports such as **soccer** and **netball** are often required to perform repeated high-intensity efforts with little time for a walk/jog recovery. Typically a midfield player in soccer or netball would perform high-intensity efforts for 2–3 seconds with a recovery period of 5–10 seconds.

- a. Give three changes, at a muscular level, evident in a soccer or netball centre/midfield player **immediately** following an intense 15-minute period of play.

- i. _____
- ii. _____
- iii. _____

3 marks

Figure 3 shows the rate of glycogen depletion of two players. One is a midfield soccer player and the other is a soccer goalie.

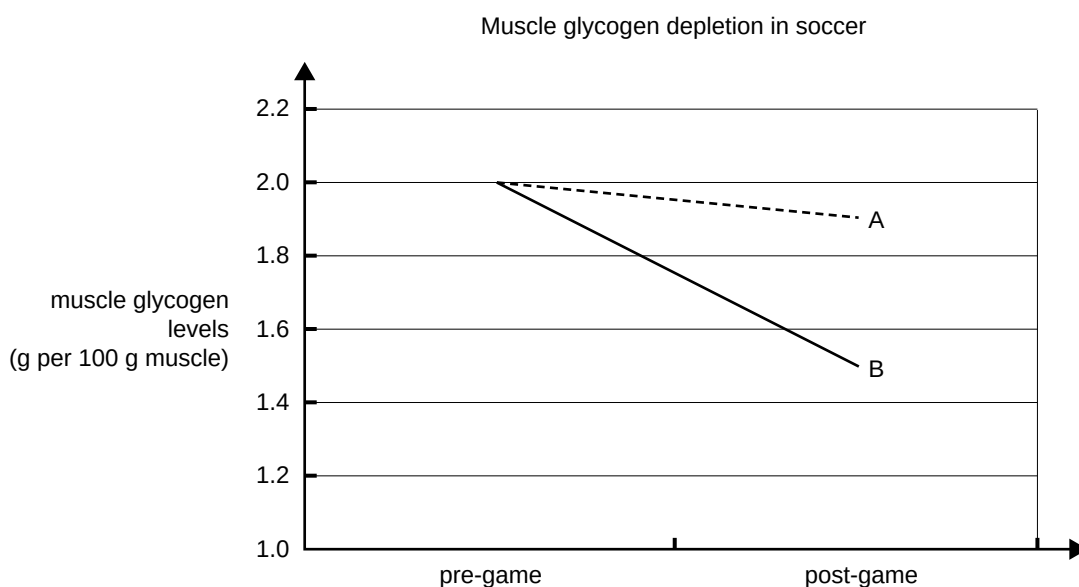


Figure 3

- b. Which line (A or B) in Figure 3 represents a midfield player?

1 mark

- c. Explain your choice in part b.

2 marks

A school netball team decided to start a ten-week training program. They sought the help of a coach to design a program and conduct training sessions. In the first session the coach explained that much of the training would be done with similar work and rest periods to those used in a netball game.

- d. What principle of training is the coach applying in this example?

1 mark

The training sessions conducted by the coach produced both chronic (long-term) and acute (immediate) training effects on the cardiovascular, respiratory and muscular systems.

- e. Using your knowledge of these, complete the unshaded boxes in the table below.

Type of effect			
Training effect	Cardiovascular	Respiratory	Muscular
ACUTE			
CHRONIC			

4 marks

At the end of each training session the players were fatigued. The coach conducted a warm-down activity.

- f. Outline two specific actions, **other than warm-down**, the players could take to ensure they recover as rapidly as possible after each session.

2 marks

Total 13 marks

TURN OVER

Question 4

As part of Physical Education Week in a school, a number of students and teachers attempted a range of fitness tests. Results of these tests are shown in the table below.

Subject	Age	Sex	Current sport	Current activity levels	RESULTS					
					beep test (stage)	bicep curl (kg)	vertical jump (cm)	sit and reach (cm)	40 m sprint (s)	Illinois agility run (s)
A	28	F	netball	social competition 2 times per week	7	10	35	+9	8.5	22.1
B	17	F	tennis	training 3 times per week 1 pennant match	9	15	47	+16	6.8	17.8
C	44	F	triathlon	training daily	11	15	30	+5	7.0	20.4
D	17	M	nil	minimal	4	25	44	-15	7.5	25.7
E	44	M	golf	18 holes per week	6	20	26	-20	8.5	23.0
F	13	F	gymnastics	training 5 times per week	6	10	58	+28	6.7	17.1
G	28	M	body building	gym workout most days	7	60	52	0	6.0	20.5
H	13	M	skating	moderate every few days	7	15	38	+5	7.1	18.4

- a. What is the likely maximum heart rate of subject A?

1 mark

- b. Name the component of fitness being tested in the 'sit and reach' test.

1 mark

- c. State one likely reason for the result of subject F in the sit and reach test.

1 mark

- d. Muscle fibre type percentage is one possible explanation for the result of subject C in the 'vertical jump' test. Give another possible explanation for this result.

1 mark

Subject D sustained an ankle injury during the running of the 'beep test' and was unable to continue. The injury has been assessed as a soft tissue injury and subject D is resting in a safe and comfortable position.

- e. List two first-aid procedures that the teacher in charge should implement immediately for subject D.

i. _____

ii. _____

2 marks

- f. What advice should be given to subject D regarding management of the injury in the following two days?

2 marks

- g. What advice should be given to subject D regarding management of the injury after two days have passed?

2 marks

Total 10 marks

Question 5

Ric Charlesworth is a coach of elite athletes.

He coached the Australian women's hockey team for a number of years and is currently assistant coach at the Fremantle Dockers AFL Club.

- a. Identify two specific characteristics that would make Ric a successful and respected coach in these sports.

i. _____

ii. _____

2 marks

- b. Discuss how **one** of these characteristics may lead to improved player performance.

2 marks

Total 4 marks

TURN OVER

Question 6

Swimming performances have improved over the last 100 years. An example of this is the decrease in winning times for the Women’s 100 m freestyle at the Olympic Games.

In 1912 Fanny Durack won the gold medal in a time of 1.22.2 seconds.

In 2000 Inge De Bruin won the gold medal in a time of 53.77 seconds.

Identify two specific technological changes, **other than training methods or diet**, that have contributed to this improvement in performance and **describe** how each change has brought about this improvement.

	Technological change	How it has contributed to improved performance
i.		
ii.		

4 marks

Question 7

A friend has come to you for advice about starting a fitness program to improve their general fitness.

They are unsure whether to join a commercial gym, hire a personal trainer or just do it themselves.

Summarise your advice in the table below, stating **one** advantage and **one** disadvantage of each of these three methods from a **sociocultural** or **motivational** perspective.

(Do not use the same answer more than once in the table.)

Choice	Commercial gym	Personal trainer	Do it yourself
Advantage			
Disadvantage			

6 marks

TURN OVER

Question 8

Figure 4 shows the results of a survey of participation of children aged 8 to 14 in organised sport outside of school hours.

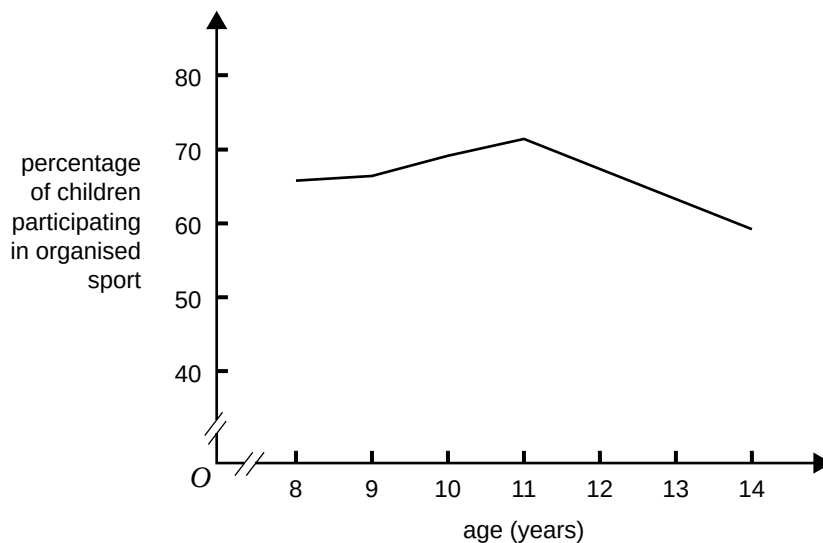


Figure 4

- a. Identify one trend evident in this graph.

_____ 1 mark

- b. Suggest a likely reason for the trend identified in part a.

 _____ 1 mark

‘Active Australia’ promotes ‘Streetactive’, a program providing opportunities for young Australians to participate in street sports such as skateboarding, inline skating and freestyle BMX in a fun, organised and safe environment. Market trends indicate that street sports are increasing in popularity and are moving from being ‘fringe sports’ to the sport of choice for many young people.

- c. Identify two characteristics of this program that may make it attractive to young people.

i. _____

 ii. _____

2 marks

d. Identify two likely benefits to the local community from this program.

i.

ii.

2 marks

Total 6 marks

Question 9

Traditionally Australia does not perform well in Winter Olympic competition.

It has been suggested that reasons for this include

- i. Climate – short snow season and few ski resorts.
- ii. Geographical location – long distances to ski resorts for most Australians.

a. Identify one **other** factor that may limit Australians from **initial** participation in snow sports.

1 mark

b. Explain how this factor may limit **initial** participation.

2 marks

c. Identify one factor that may encourage the individual to continue with snow sports once they are involved.

1 mark

d. Explain how the factor identified in c. will lead to increased participation in snow sports.

2 marks

Total 6 marks

Question 10

A group of young athletes (aged 10–12 years) is about to start match practice as part of a training session in a **contact sport**.

- a. List **two** characteristics of the players that the coach must consider in the setting up and running of a practice match in a contact sport.

i. _____

ii. _____

2 marks

- b. Outline **two specific** modifications the coach might make to a practice match in a contact sport to ensure safe and equitable participation.

i. _____

ii. _____

2 marks

Total 4 marks

Question 11

An elite 400 m runner performed a cycle ergometer test. In the test the athlete was required to accelerate to an exercise intensity of 110% of his VO_2 max as quickly as possible and maintain this level for the duration of the test. The relative contribution of the energy systems and total energy supply for this test is shown in Figure 5.

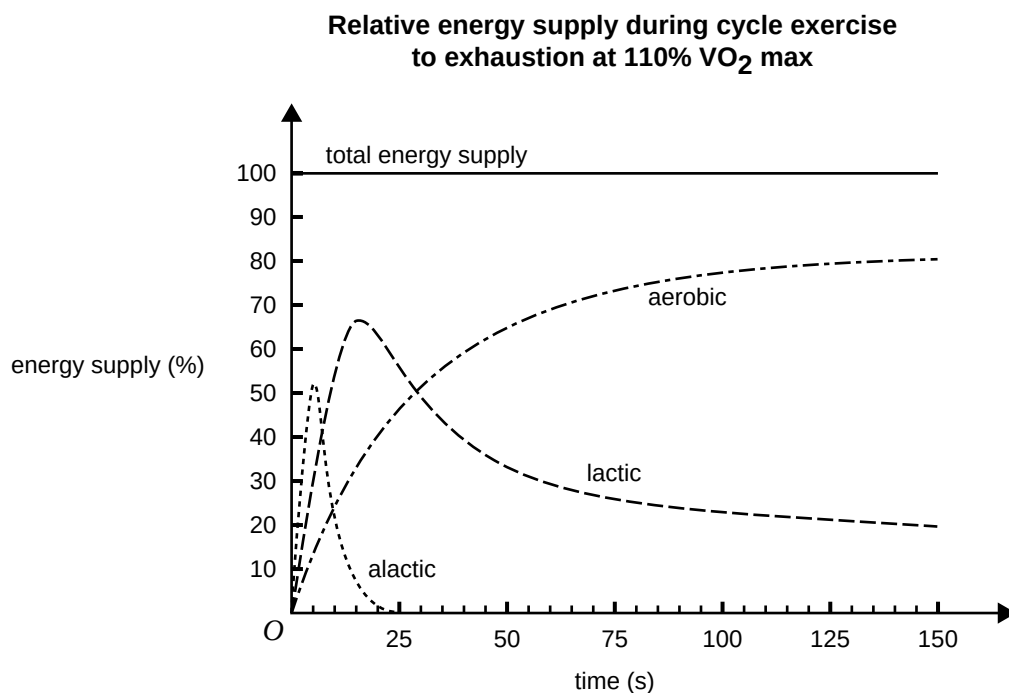


Figure 5

- a. i. Name the dominant energy system during the **first 5 seconds** of this test.

- ii. What is the main **component of fitness** being used during the first 5 seconds of the test?

2 marks

- b. What percentage of total energy supply is contributed by the lactic acid energy system at the **50-second mark** of this test?

1 mark

- c. Outline how it is possible for an athlete to work at an intensity of greater than 100% of their VO_2 max.

1 mark

A 400 metre event completed in approximately 50 seconds uses approximately 40% aerobic and 60% anaerobic energy.

- d. Outline why this proportion is different to that shown in Figure 5.

1 mark

- e. What proportion of this athlete's yearly training program should be devoted to aerobic training?

1 mark

Total 6 marks

TURN OVER

Question 12

The Masters Games attracts mature competitors from many countries. The Masters Games movement aims to promote lifelong participation in physical activity.

Involvement in physical activity can lead to significant health benefits.

- a. Explain one way in which involvement in physical activity may lead to reduced risk of cardiovascular disease.

2 marks

- b. State two sociocultural benefits to the individual who is involved in the Masters Games.

i.

ii.

2 marks

The table below shows 100 m and 10 000 m records for the Olympics and Masters 60–65 year age group for males and females.

	100 m track sprint		10 000 m race	
	Male	Female	Male	Female
Masters 60–65 record	13.07 s	16.20 s	39 min 13.00 s	48 min 19.00 s
Olympic record	9.79 s	10.49 s	26 min 22.75 s	29 min 31.78 s

- c. State two factors, **other than reduced maximum heart rate**, associated with the ageing process that may contribute to the lower performance level achieved by competitors in the 60–65 year age group compared to the younger competitors who compete at the Olympics.

i.

ii.

2 marks

- d. Explain how **one of these factors** will lead to a decreased performance in either of the events above.

2 marks

Figure 6 illustrates some of the changes that occur as a result of ageing.

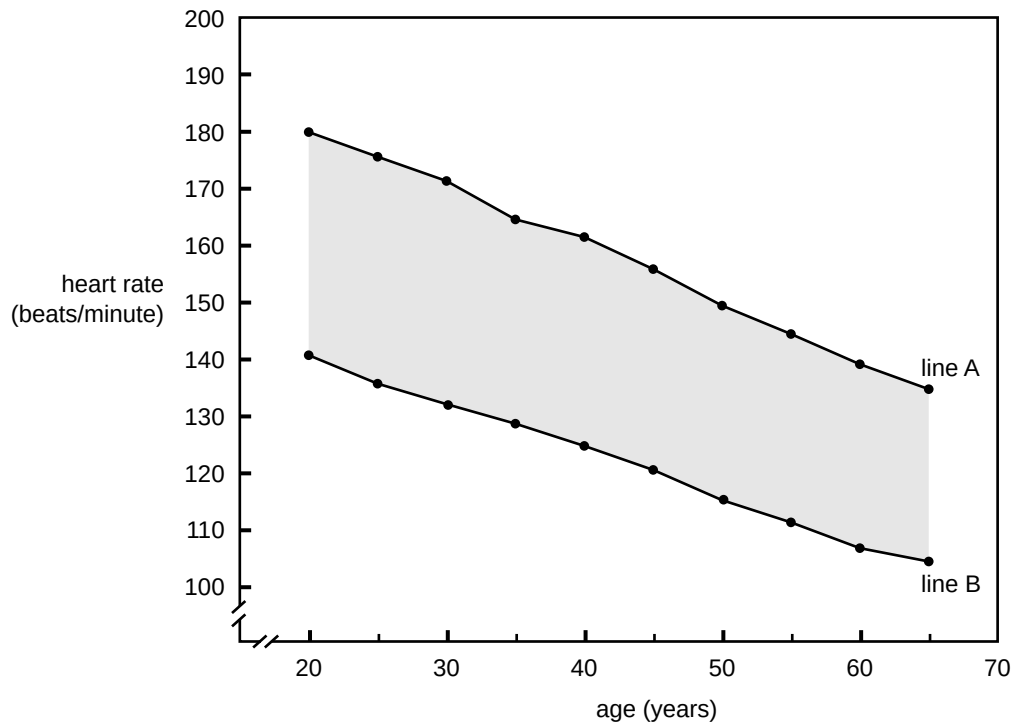


Figure 6

- e. What is represented by line A?

1 mark

- f. What does the shaded area between lines A and B represent in terms of training for aerobic fitness?

1 mark

Total 10 marks

TURN OVER

Question 13

The following two programs are samples of programs set by a coach for two elite swimmers. One of the swimmers is a 50 m specialist.

Program A	Program B
20 × 25 m sprints each completed in 15 s with 15 s rest	20 × 25 m sprints each completed in 15 s with 60 s rest

- a. Explain why program B is better suited to improve the performance of the 50 m specialist.

2 marks

- b. Discuss which physiological capacity is being targeted by program B.

2 marks

Total 4 marks

Question 14

Blood lactate concentration is often measured during an incremental work test (step test) in order to assess the impact of training on physiological capacity.

Figure 7 shows the blood lactate levels of an elite rower taken during a step test conducted at the start (pre-season) and end (post-season) of the rowing season.

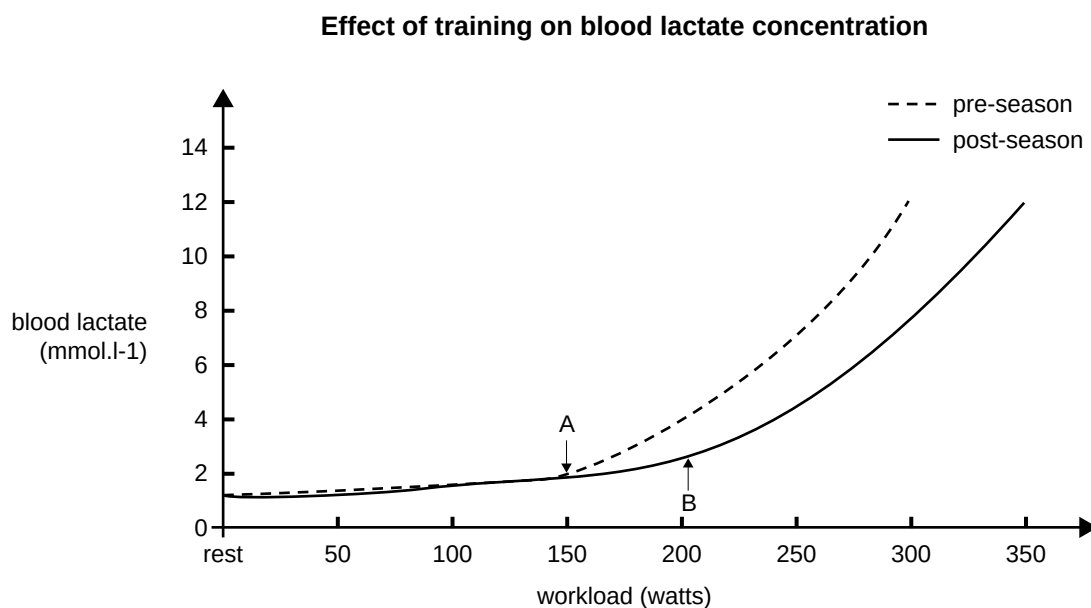


Figure 7

Question 14 – continued

- a. In Figure 7 the point at which lactic acid begins to accumulate in the athlete's blood has moved from point A to point B.

i. Outline the physiological change that has occurred to produce this result.

_____ 1 mark

ii. What is the ideal training intensity for the athlete to train at to produce this result? Express your answer as a percentage of maximum heart rate.

_____ 1 mark

- b. The lines on the graph accurately show the athlete's blood lactate levels. This is not an accurate reflection of the rate of anaerobic glycolysis taking place in the athlete's muscles. Explain why this is the case.

_____ 2 marks

Total 4 marks

Question 15

A Physical Education teacher returned to the staffroom from lunchtime yard duty and remarked to his colleagues; 'When I started teaching in the 1970s all the students in the schoolyard were playing cricket and they were all bowling fast balls. Today, they are playing soccer, volleyball, basketball, netball and all sorts of other games, and those students playing cricket are bowling spin'.

- a. Provide two factors that may explain the change in bowling styles popular in the schoolyard from the 1970s to 2002.

i. _____

ii. _____

2 marks

- b. Provide **two** factors **different** from those given in part a. to explain the change in the type of activities being played in the schoolyard from the 1970s to 2002.

i. _____

ii. _____

2 marks

Total 4 marks

TURN OVER

Question 16

An athlete completes the running fitness test described below as part of a fitness-testing regime. Each 60 m sprint is done at maximum effort following the rest times indicated in the table below.

Activity	Running time	Rest time
sprint 60 m	7.5 s	4 min
sprint 60 m	7.3 s	3 min
sprint 60 m	8.0 s	1 min
sprint 60 m	9.2 s	10 s
sprint 60 m	12.0 s	End of test

- a. Which **method** of training would be most **specifically** suited to improving the athlete's performance on this test?

1 mark

- b. State how each of the following **principles** of training would be best applied to the **method** of training you identified in part **a.** for this activity.

i. Frequency _____

ii. Intensity _____

iii. Specificity _____

3 marks

- c. State three ways that the athlete can progressively overload the method of training you identified in part **a.**

i. _____

ii. _____

iii. _____

3 marks

Total 7 marks

Question 17

Figure 8 shows the microscopic structure of a section of muscle fibre with a number of key components labelled.

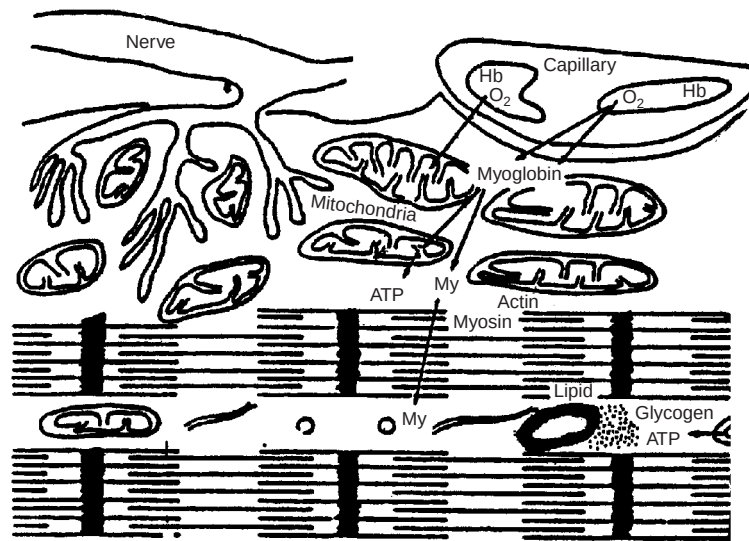


Figure 8

Describe the role of each of the following components in the production of energy for physical activity.

i. Mitochondria

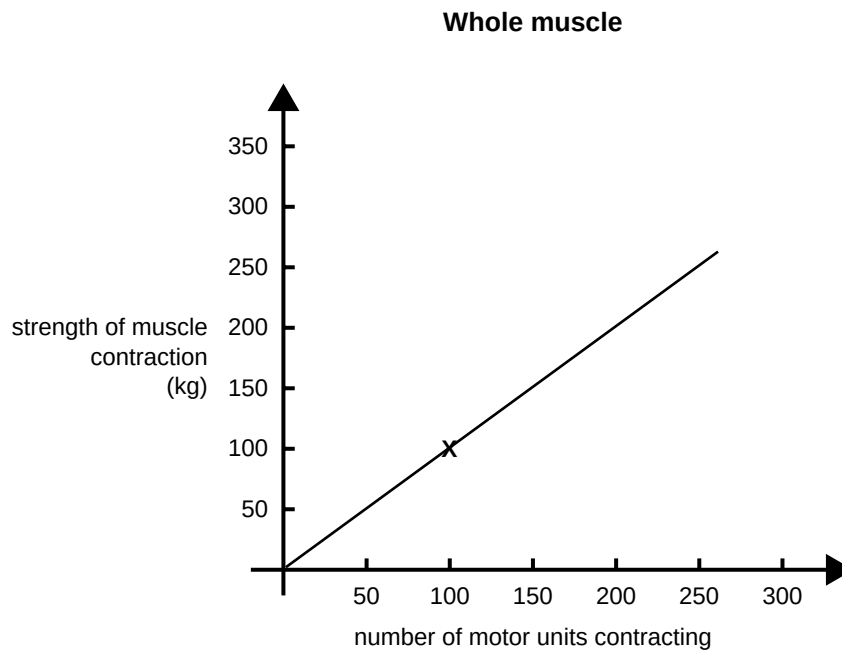
ii. Myoglobin

iii. Glycogen

3 marks

TURN OVER

Question 18

**Figure 9**

- a. How many motor units have contracted at the point marked **X** on Figure 9?

1 mark

- b. Explain what is meant by the term **motor unit**.

2 marks

- c. Explain the principle of muscle contraction known as the 'All or None' law.

2 marks

Total 5 marks

Question 19

Blood samples taken from athletes help physiologists to determine arterio-venous oxygen difference ($a - VO_2$).

A number of athletes had their $a - VO_2$ differences tested under a variety of exercise conditions. Their results are shown in the table below.

- a. For each of the pairs below, indicate in the table which athlete (A or B) would have the **higher** $a - VO_2$ difference under the test conditions indicated. If you believe that the results would be the same write 'same'.

	Test conditions	Athlete A	Athlete B	Answer (A / B / same)
pair 1	at rest	sedentary 70 kg female	70 kg female aerobic athlete	
pair 2	8 km/h jogging on a treadmill	sedentary 70 kg female	70 kg female aerobic athlete	
pair 3	20 km/h running on a treadmill	sedentary 70 kg female	70 kg female aerobic athlete	

3 marks

- b. Explain your answer to pair 2.

2 marks

Total 5 marks

Question 20

At the Salt Lake City Winter Olympic Games in February 2001 a number of athletes were disqualified for having returned positive doping test results for the banned drug, EPO.

EPO is believed to enhance endurance performance in elite athletes.

- a. State how EPO is thought to achieve this enhancement.

1 mark

- b. What are two medical dangers associated with the use of EPO by elite athletes?

i.

ii.

2 marks

- c. Name two alternative legal methods that may produce a similar improvement in endurance performance.

i.

ii.

2 marks

Total 5 marks

TURN OVER

Question 21

Peter Robertson is an elite triathlete and was world champion over the Olympic distance in 2001. His average event time was approximately 2 hours.

A friend suggested that Peter should eat some lollies (sweets) in the hour before an event to provide him with extra energy during the race.

- a.** Discuss the likely effect of eating lollies (sweets) at this time and how it may affect Peter's performance.

3 marks

Peter's endurance training will alter the way his skeletal muscle uses carbohydrates and fats throughout the event compared to a less trained person.

- b.** State one of the changes in fuel use during the event occurring as a result of endurance training.

1 mark

- c.** Explain how this change improves performance as the event is nearing the end.

2 marks

Total 6 marks

Question 22

You are the coach of a junior basketball team that has been entered in a three-day tournament. You anticipate that your team will be required to play at least two games of 40 minutes duration per day over the three days.

- a. Name one dietary **or** one training strategy you could employ to ensure that the team members start the tournament with the highest possible muscle glycogen stores.

_____ 1 mark

- b. Briefly explain how you would apply this strategy.

_____ 2 marks

A player plays the entire first 10 minutes of a game early in the tournament at a high intensity.

- c. What fuel is likely to be used most for the production of ATP during this time?

_____ 1 mark
Total 4 marks

Question 23

The coach of an elite 10 000 m runner suggested that 1000 m intervals (approximately 3 minutes) should be used for developing aerobic fitness.

- a. What intensity, as a % of maximum heart rate, should the athlete train at over the 1000 m intervals to improve their aerobic fitness?

_____ 1 mark

- b. Given the information above, what would be an appropriate recovery period to use for this training?

_____ 1 mark
Total 2 marks