



Victorian Certificate of Education 2008

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER

Letter

Figures

Words

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PHYSICAL EDUCATION

Written examination

Monday 10 November 2008

Reading time: 3.00 pm to 3.15 pm (15 minutes)

Writing time: 3.15 pm to 5.15 pm (2 hours)

QUESTION AND ANSWER BOOK

Structure of book

Section	Number of questions	Number of questions to be answered	Number of marks
A	15	15	15
B	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 25 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

What is an appropriate overload for a Year 12 Physical Education student whose weight training program consists of 8 repetitions and 3 sets?

- A. 8 repetitions, 4 sets
- B. 10 repetitions, 3 sets
- C. 9 repetitions, 4 sets
- D. 9 repetitions, 3 sets

Question 2

Which of the following methods can be used to assess physical activity levels within a given population?

- A. heart rate telemetry, accelerometry, pedometry
- B. accelerometry, maximum bench press, beep test
- C. heart rate telemetry, beep test, pedometry
- D. pedometry, phosphate recovery, heart rate telemetry

Question 3

During exercise, blood flow is diverted from some organs.

Which organs are likely to receive less blood flow during exercise?

- A. the skeletal muscles and the brain
- B. the small intestine and the kidneys
- C. the skin and the skeletal muscle
- D. the heart and the brain

Question 4

The energy substrate stored in the body which can produce the most amount of ATP is

- A. lipids.
- B. phosphate creatine.
- C. proteins.
- D. carbohydrates.

Question 5

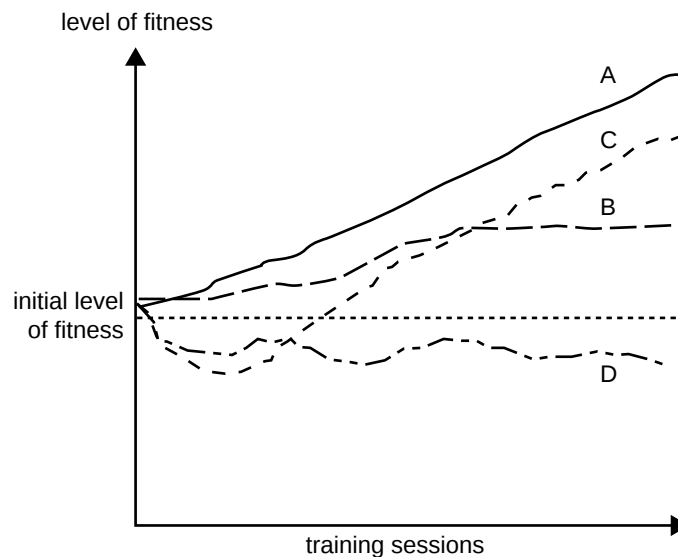
An individual in the pre-contemplation stage of motivational readiness would benefit from which of the following strategies?

- A. set goals to be active
- B. use reminder systems to be active
- C. be aware of the risks of remaining inactive
- D. assess motivational readiness

Question 6

Which statement is **true** about low GI foods?

- A. Low GI foods are digested rapidly and cause a rapid release of glucose to muscles.
- B. Low GI foods should be eaten 1–4 hours pre-competition.
- C. Low GI foods are more beneficial for sprinters than endurance athletes.
- D. Examples of low GI foods include: potatoes, corn, bananas and porridge.

Question 7

Which of the following statements best describes line D on the graph?

- A. The initial work rate was correct and progressive overload was added correctly to achieve the best possible results.
- B. The initial work rate was too difficult, but over time the body adapted, and then progressive overload was added correctly to improve fitness.
- C. The initial work rate was difficult, then the body did adapt, which saw fitness gains, but from that time onwards no overload was applied.
- D. The initial work rate was too difficult and when the body started to adapt, further overload was applied resulting in an overall decrease in fitness.

Question 8

The National Physical Activity Guidelines are the minimum recommendations by health authorities to

- A. achieve health benefits for the population.
- B. increase physical activity levels within the population across all domains.
- C. gain high levels of fitness within the general population.
- D. reduce weight and levels of obesity within the population.

Question 9

Jimmy is 15 years old and plays junior football for his local club. To improve his aerobic fitness, Jimmy's coach designs a basic fartlek training program to be completed two nights a week, on top of his normal training twice a week.

The program consists of the following.

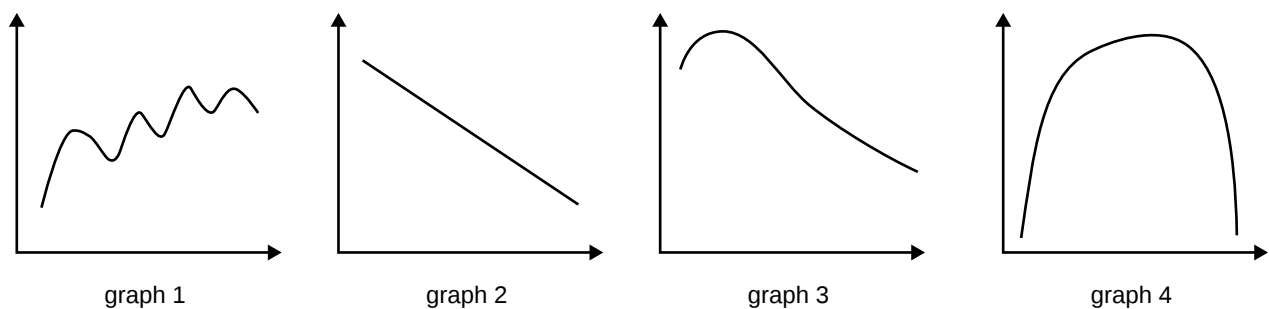
Warm up	Body	Cool down
10-minute run at 70% HR max	30 seconds at 60% HR max, then 30 seconds at 85%+ HR max continuous for 10 minutes	5-minute run at 70% HR max

The training program above demonstrates which of the following training principles?

- A. duration, intensity, frequency
- B. specificity, diminishing returns, variety
- C. specificity, variety, progressive overload
- D. duration, intensity, maintenance

Question 10

The shape of the graphs below illustrate blood lactate concentration changes during recovery.



Which graph best shows the changes in lactate concentration for a 400-m sprinter who has completed an active recovery?

- A. graph 1
- B. graph 2
- C. graph 3
- D. graph 4

Question 11

Which variable **decreases** as a result of aerobic training?

- A. blood plasma
- B. myoglobin
- C. sub-maximal heart rate
- D. stroke volume

Question 12

Which of the substrates below **cannot** be used by the lactic acid system to produce ATP?

- A. blood glucose
- B. muscle glycogen
- C. liver glycogen
- D. intramuscular triglycerides

Question 13

The Australian Institute of Sport runs regular talent identification programs to enable individuals to enter the sport that their individual physiology is best suited to.

The tests performed and data gathered on four people during a talent identification program is included in the table below.

Test	Person A	Person B	Person C	Person D
1. VO₂ max (mL/kg/min) (on a treadmill)	50	60	45	55
2. 10-m sprint (seconds)	3.2	3.6	2.9	3.1
3. Repeated sprint (metres) (Ten 5-second sprints with 20 seconds recovery between sprints. The accumulated distance covered for each 5-second sprint was assessed.)	400	320	300	350

From the results of the tests, which person (A, B, C or D) would be most suited to the following sports: Australian Rules football, long-distance running and the 100-m sprint?

- A. A = Australian Rules footballer, B = long-distance runner, C = 100-m sprinter
- B. A = long-distance runner, C = 100-m sprinter, D = Australian Rules footballer
- C. A = long-distance runner, B = Australian Rules footballer, D = 100-m sprinter
- D. A = Australian Rules footballer, B = long-distance runner, D = 100-m sprinter

Question 14

Researchers have recently demonstrated that lactic acid accumulation is unlikely to inhibit muscle contraction force.

Which option is more likely to cause a decline in muscle force production in a climber attempting to sustain a near maximal muscle contraction?

- A. an increase in muscle calcium concentration
- B. an increase in muscle phosphate ion concentration
- C. a decrease in muscle hydrogen ion concentration
- D. an increase in muscle lactate ion concentration

Question 15

Which of the following statements is **incorrect** in relation to the role of fats in the body?

- A. Fat soluble vitamins A, D, E and K are necessary for general health and wellbeing.
- B. Fats provide approximately 50% of the body's energy for everyday activities.
- C. The breakdown of Free Fatty Acids (FFA) in muscle fibres requires less oxygen than glycogen to breakdown.
- D. Fat is transported in the blood in the form of FFA.

**END OF SECTION A
TURN OVER**

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

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

Question 1

Anthea and Cathy, both 60 years old, have been walking together for 30 minutes a day, 5 days a week for over 10 years.

- a. i. What stage of motivational readiness would Anthea and Cathy be considered to be in?

- ii. Give two reasons to justify your answer.

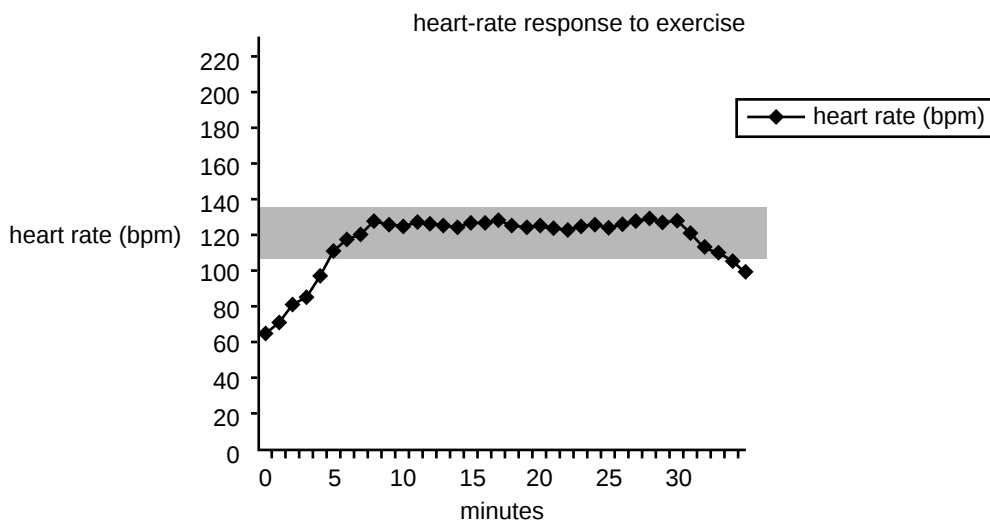
1. _____

2. _____

1 + 2 = 3 marks

Anthea recently purchased a heart-rate monitor to wear during her walks.

The graph below shows the heart-rate data recorded from one 30-minute walk.



- b. What zone is shown by the shaded area on the graph?

1 mark

Anthea reaches a 'steady state' 8 minutes into her walk.

- c. Explain why this steady state is not reached until this point of her walk.

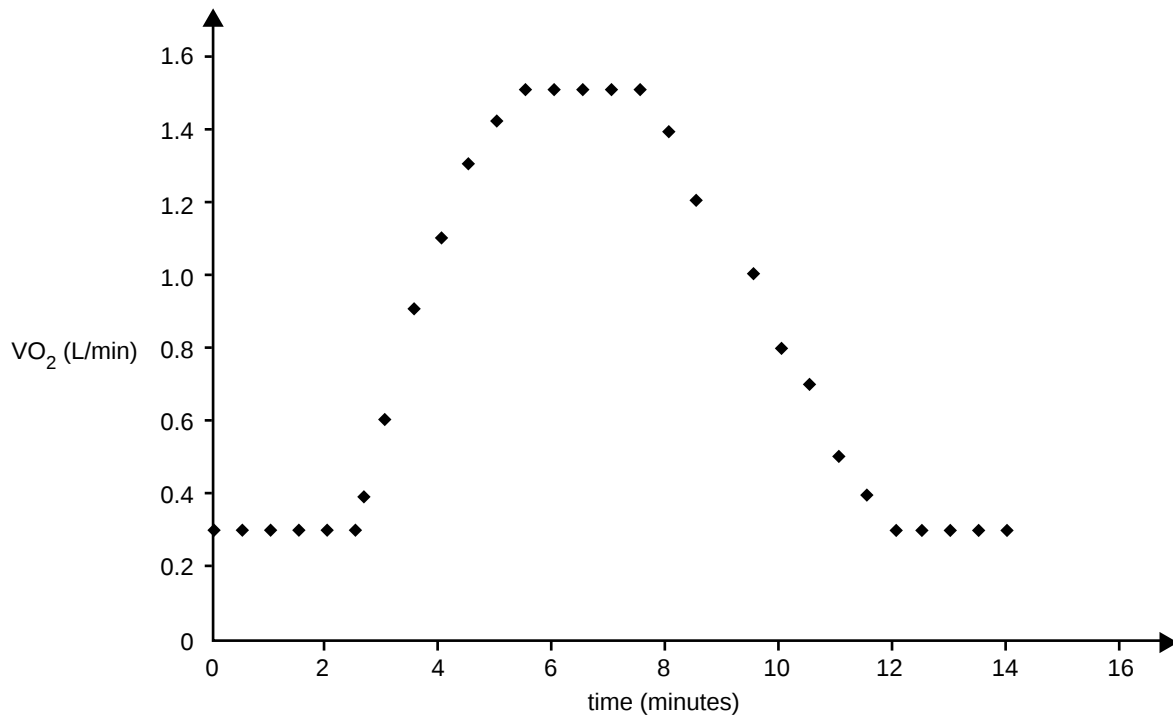
3 marks

Total 7 marks

SECTION B – continued

Question 2

The diagram below is a representation of an individual's oxygen uptake prior to, during, and after exercise in an outside temperature of 20°C.



- a. On the graph provided above, shade the region of excess post oxygen consumption (EPOC).

1 mark

- b. i. Identify what would happen to EPOC after 30 minutes of running at the same pace in an outside temperature of 35°C compared to 20°C.

- ii. Outline why this occurs.

1 + 1 = 2 marks

- c. What strategy could an athlete use to reduce EPOC? Give a practical example of how this could be achieved.

Strategy _____

Practical example _____

1 + 1 = 2 marks

Total 5 marks

Question 3

A marathon covers a distance of 42 km. Typically, a marathon runner's speed declines at the 35-km point during a race.

- a. Identify the most likely cause of fatigue for the runner at the 35-km point and briefly outline how it causes fatigue.

2 marks

A 400-m sprinter's speed declines throughout the race.

- b. Other than lactic acid accumulation, explain **two** possible causes of speed decline.

1.

2.

4 marks

Total 6 marks

Question 4

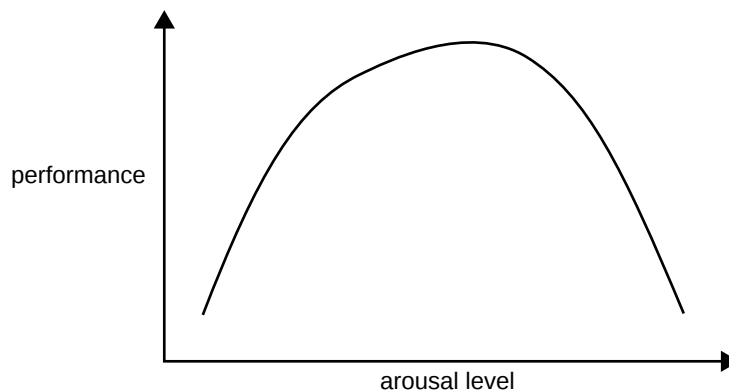
Use the following scenario to answer the question.

Australia's Lleyton Hewitt is a professional tennis player who has been ranked number one in the world.

In a best of five set match, Hewitt was down two sets to love. He hits a winner down the line and calls out 'Come on!' with the accompanying gesture (see photograph).

Due to copyright restriction,
this material is not supplied.

Indicate on the graph with an 'X' where Hewitt's arousal level would probably be for him to **need** to perform this action. Justify your answer.



Justification _____

2 marks

Question 5

Many athletes, such as divers and long jumpers, use **imagery** to obtain optimum arousal and concentration levels.

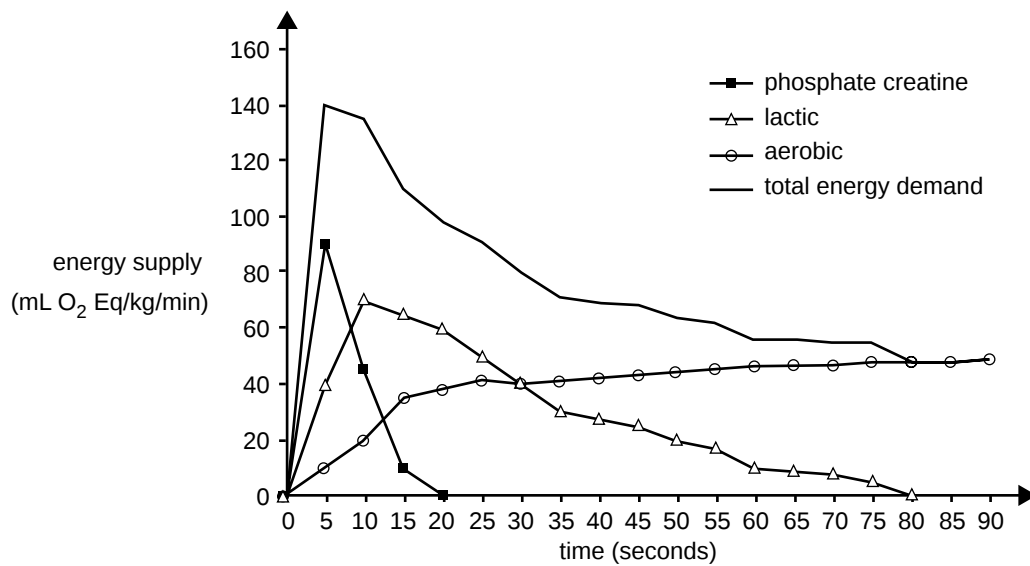
Give a specific example of how a diver or long jumper could use imagery and how this could bring about improved performance.

2 marks

SECTION B – continued
TURN OVER

Question 6

The graph below illustrates the energy system contribution over time.



- a. i. Which energy system produces energy at the greatest rate?
- _____
- ii. Which energy system can sustain energy supply for the longest duration?
- _____
- iii. At what time does aerobic energy supply exceed anaerobic energy supply?
- _____

1 + 1 + 1 = 3 marks

- b. Using the information provided on the graph, why is the energy supply at 10 seconds greater than the energy supply at 90 seconds?
- _____
- _____
- _____
- _____

2 marks

Total 5 marks

Question 7

In the paragraph below, options to complete each sentence are given within the brackets. Circle the correct option in each case.

The advantage of measuring physical activity by [**direct observation** / **proxy report**] is that accurate and detailed information is gained about an individual or group within a specific setting. This type of measure is said to be [**subjective** / **objective**] as it does not rely on the individual's perception of the activity. There are [**lower** / **higher**] levels of reactivity associated with this type of measurement.

3 marks

Question 8

The table below presents blood lactate concentration data obtained from a 21-year-old soccer player during an incremental treadmill test to exhaustion. The speed was increased by 1 km/h every minute.

Speed (km/h)	Blood lactate (mmol/L)	Heart rate (bpm)
10	2	110
11	2	122
12	2	130
13	2	141
14	3.5	152
15	4.0	163
16	4.5	171
17	5	180
18	5.5	192
19	6	199

- a. i. At what speed does the lactate inflection point (LIP) occur?

_____ km/h

- ii. State the range of speeds where lactate clearance is equivalent to lactate production.

_____ km/h

- iii. State the range of speeds where lactate production exceeds lactate clearance.

_____ km/h

1 + 1 + 1 = 3 marks

- b. Based on the information in the table above, at what heart-rate range would you advise the athlete to train to improve their LIP?

_____ bpm

1 mark

- c. What happens to the athlete's ability to sustain exercise effort when LIP is exceeded?

2 marks

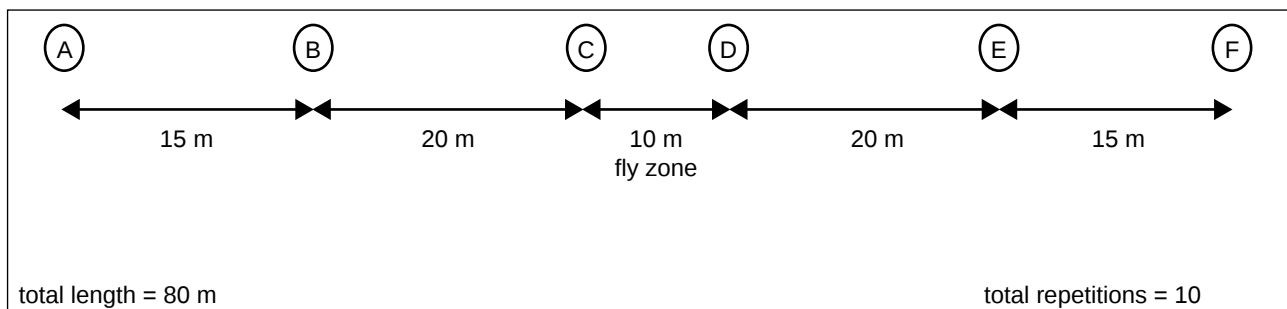
Total 6 marks

SECTION B – continued
TURN OVER

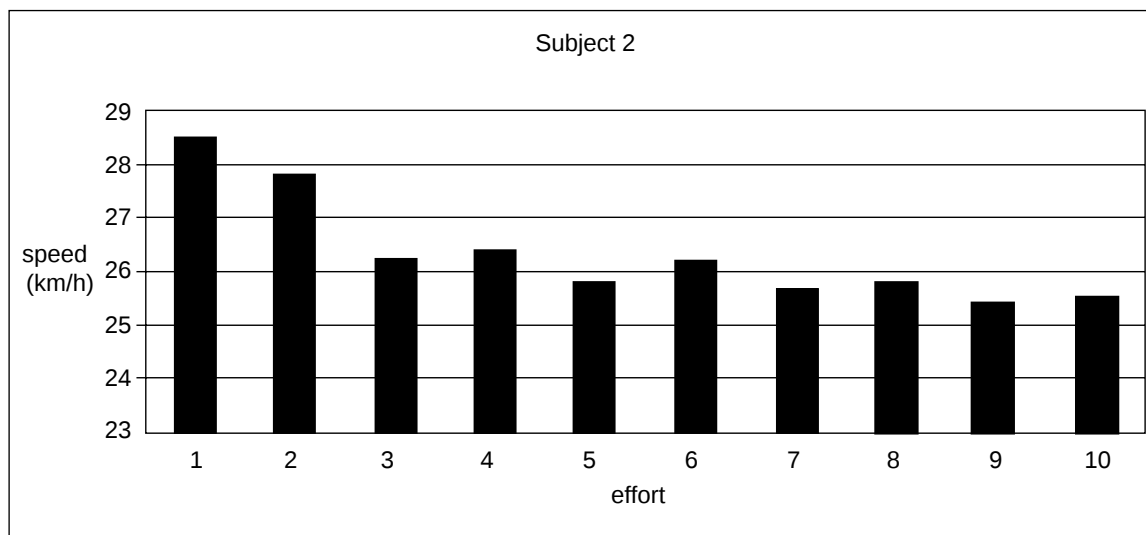
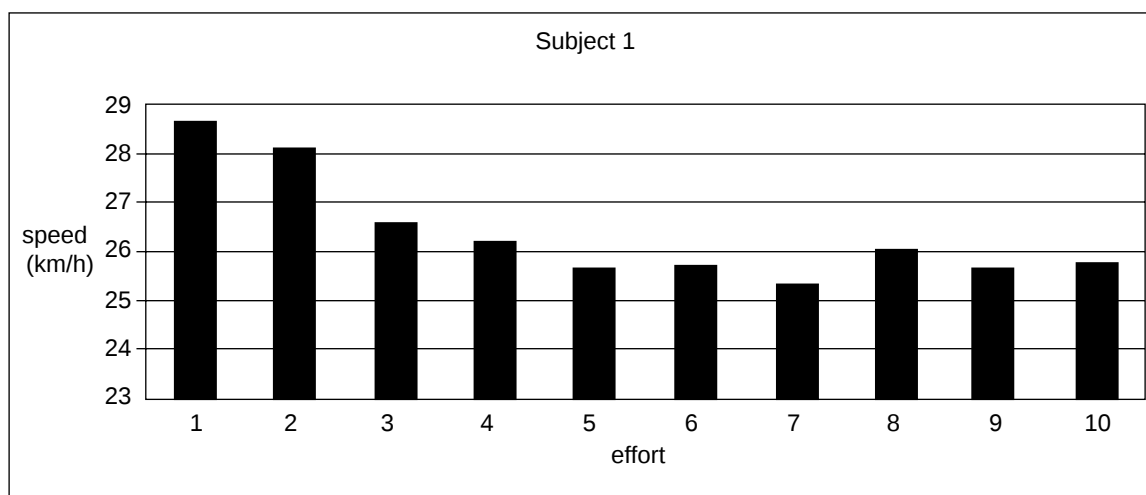
Question 9

The following data refers to the scores obtained from two subjects in a repeated sprint test. The subjects were elite level AFL footballers. Below is a summary of how the test was conducted.

- Subjects jog from point A to point B.
- At point B subjects accelerate so that when they get to point C they are at maximum speed.
- Maximum speed is maintained over 10 m from point C to point D (fly zone). The time taken to cover the 10 m in the fly zone is recorded and the speed is calculated.
- From point D to point E the subject decelerates (slows down).
- Subjects jog from point E to point F.
- Subjects rest for 25 seconds between sprints.
- Subjects perform 10 repetitions.



The graphs show the maximum speed reached in the fly zone by the two subjects.



- a. What component of fitness does the repeated sprint test measure?

1 mark

As the test progresses, the ability of the athlete to run at the same speed during the **fly zone** diminishes.

- b. With reference to the recovery rate of the dominant energy system, explain why this occurs.

4 marks

Having a well-developed cardiorespiratory system is beneficial to a successful performance in this test.

- c. Outline two reasons why having a good maximum oxygen uptake is important in this test.

1. _____

2. _____

2 marks

- d. Select a method of training that could be used to improve an individual's result in this test and justify your answer.

2 marks

Total 9 marks

Question 10



The advertisement above gives a recommendation to be used in conjunction with the National Physical Activity Guidelines for children aged 5–12 years.

- a. State the National Physical Activity Guidelines for children aged 5–12 years.

1 mark

The above advertisement is an example of a population-based approach to physical activity promotion.

- b. i. Identify the specific type of strategy (intervention) used.

- ii. Outline one purpose of this strategy.

1 + 1 = 2 marks

Total 3 marks

SECTION B – continued

Question 11**Jones pleads guilty, admits lying about steroids****Olympic track star says she took banned drugs from 2000 to 2001**

Marion Jones was the owner of three Olympic gold and two bronze medals which she won at the 2000 Sydney Games. Suspicions and doping allegations had dogged Jones for years. She had angrily and defiantly denied all doping allegations, even in court before a grand jury.

In October last year, Jones was forced to come clean and admit that she had used steroids. She pleaded guilty to lying to federal investigators when she denied using performance-enhancing drugs, then announced her retirement in a tearful apology outside a US District Court.

She has had a stunning fall from grace because she was once the symbol for everything that was right about women in sports. She was powerful and had the grace and poise of a supermodel.

Seven years later, she is broke, she has been stripped of her five Olympic medals and her reputation is ruined. She has also served time in prison.

Source: Adapted from <http://nbcsports.msnbc.com>. Accessed July 2008

- a.** Other than physiological benefits, state two reasons why some athletes may choose to take performance-enhancing drugs.

1. _____

2. _____

2 marks

- b.** Outline two detrimental effects to sport that may result from an athlete's decision to use a banned performance-enhancing substance.

1. _____

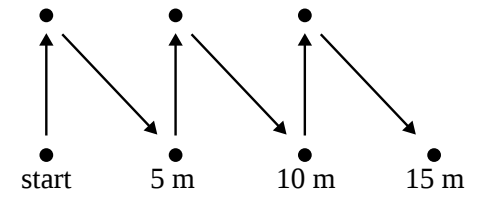
2. _____

2 marks

Total 4 marks

Question 12

The following fitness tests are used by AFL football players.

Description of test	Component of fitness measured	Alternative recognised test specific to AFL
The player stands with his toes just before the start line. On the whistle, the player races 20 m as fast as possible past the end line.	Speed	50-metre sprint
Seven × 35-metre sprints separated by 25 seconds for recovery between each sprint. The times for each sprint are recorded.	1.	2.
Players are timed over a 3-km course.	Aerobic fitness	3.
Player stands behind a line and jumps as far forward as possible. Distance is measured from where the back of the heels land.	4.	Vertical jump
 Player places feet on the start line and, on the whistle, sprints around the outside of the six cones.	5.	6.

- a. Complete the table above (6 answers in total) to indicate the fitness component measured and an alternative, but recognised, fitness test.

6 marks

The 3-km time trial can be used to **predict** the VO_2 max of an athlete. An alternate test is the PWC 170. This relies on an assumed relationship between heart rate and oxygen uptake.

- b. What is this assumed relationship and how is it used in testing?

2 marks

The player undertakes a six-month training program to improve his aerobic fitness. The player then repeats the 3-km time trial at the **same speed** as previously.

- c. Circle the correct answer.

During the second 3-km time trial

- | | | | |
|--|--------|-------|-----------|
| i. the stroke volume will be | higher | lower | no change |
| ii. the heart rate will be | higher | lower | no change |
| iii. the blood lactate concentration will be | higher | lower | no change |

3 marks

Total 11 marks

Question 13

Many athletes include the use of ‘hot-and-cold contrast therapy’ during recovery sessions. This may involve the athlete having a hot shower for a couple of minutes, followed by getting into an ice bath for a minute or so, as shown in the photograph below.

Due to copyright
restriction, this material
is not supplied.

- a. Describe the physiological changes that occur when the athlete uses hot-and-cold contrast therapy.

2 marks

- b. Explain how these changes can enhance recovery when compared to a passive recovery.

3 marks

Total 5 marks

Question 14

Lee Troop is an international level marathon runner (leading in photograph).

Due to copyright restriction,
this material is not supplied.

- a. Estimate the VO_2 max of an international level male marathon runner such as Lee Troop.

_____ mL/kg/min

1 mark

- b. Discuss how marathon runners incorporate peaking and tapering into their training program.

2 marks

Assume that Lee Troop and the other marathon runner in the photograph have a very similar VO_2 max.

- c. Suggest a reason why Lee might perform consistently better and finish ahead of the other runner.

2 marks

Total 5 marks

Question 15

The Global Corporate Challenge (GCC) is a corporate health and wellbeing initiative developed specifically for the workplace. With a daily target of 10 000 steps, participants record their daily walking activity levels from the GCC pedometer and every step moves them further along a virtual walk around the world.

The GCC is a program that aims to increase staff fitness, promote teamwork, foster positive competitive spirit and support the workforce to be active, healthy and more productive.

- a. Other than those stated above, outline one measurable outcome that an employer could use to see if the Global Corporate Challenge was a successful intervention.

1 mark

In a workplace setting, changes can be made to policy, social environment and physical environment to promote physical activity.

- b. Complete the table below by giving **one** example of each of the strategies that could be implemented in a workplace setting to increase physical activity.

Strategy		
Policy	Social environment	Physical environment

3 marks

An employee undertakes the GCC and the results for a two-week period are shown below.

	Number of steps
Week 1	72 854
Week 2	84 073
Total steps	156 927

- c. i. From the data, is it possible to state if the employee has met the National Physical Activity Guidelines for adults?

Yes ☐

No ☐

- ii. Give two reasons to justify your answer.

1. _____

2. _____

1 + 2 = 3 marks

Total 7 marks

Question 16

The Aussie cricketers are more muscular and fitter than ever with the help of sports science, including GPS satellite tracking systems and accelerometers to measure players' physical activity. Team strength and conditioning coach Justin Cordy has drawn up fitness programs for each player. They have returned in better shape than ever from a four-month winter break.

Due to copyright restriction,
this material is not supplied.

(‘Cricketers Harden Bodies’ by Ben Dorries
14 October 2006 *Herald Sun*)

- a. Give two specific examples of information or data that can be obtained from GPS satellite tracking of the cricketers.

1. _____
2. _____

2 marks

- b. How can this data be used by fitness coaches?

2 marks

Cricket is a summer sport and matches are often played in hot and humid conditions. Test matches often go for five days and cricketers can be out in the field for up to six hours a day. Hydration is a top priority for the players. Most players will drink sports drinks to avoid dehydration.

- c. Outline two advantages for the cricketers of drinking sports drinks compared to water.

1. _____
2. _____

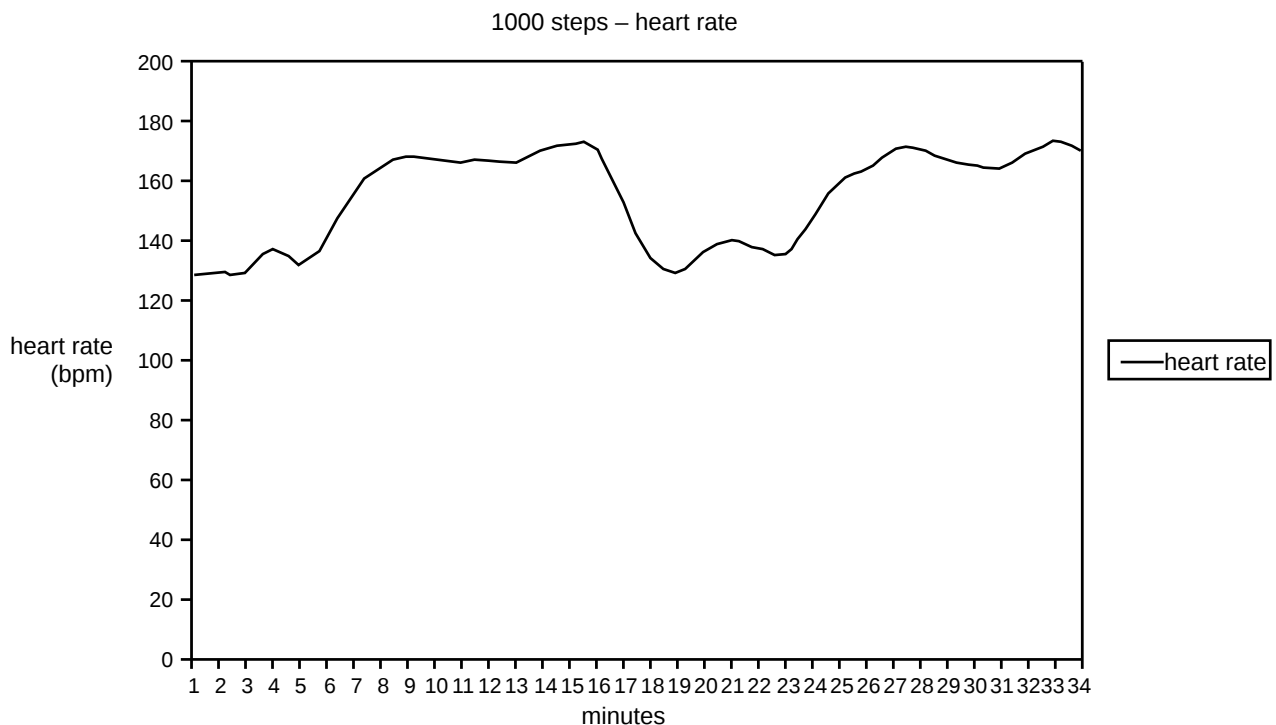
2 marks

Total 6 marks

Question 17

Jeremy is a 38-year-old male who likes to keep fit. His training program consists of a 30-minute swim once a week, a 30-minute walk twice a week and every Saturday morning he walk/jogs the Kokoda Trail. This is a 1000 step trail in the Dandenong Ranges. Jeremy lightly jogs 400 m to the steps as a warm up, and then he jogs down the steps at a steady pace. On the way back up Jeremy works at an intensity of 85% max heart rate. He does this twice and then walks 400 m home for his cool down.

The following data was taken using a heart-rate monitor while Jeremy was completing his activity **on the steps**.



- a. Using the graph provided, indicate a period of time where Jeremy is likely to be in oxygen deficit.

1 mark

After three months of completing this program, Jeremy is able to complete the activity 50 seconds quicker. One chronic adaptation that occurred due to training was an improved arteriovenous oxygen difference ($a\text{-VO}_2$ diff).

- b. List and explain one muscular and one vascular adaptation that has led to the improved $a\text{-VO}_2$ difference.

Muscular _____

Vascular _____

4 marks

- c. Other than intensity, list three training principles evident in Jeremy's training program. Use an example from the information provided to support your answer.

1. _____

2. _____

3. _____

3 marks

Heart-rate monitors provide an indirect measure of physical activity and are widely used in monitoring fitness levels.

- d. Other than cost, provide one advantage and one disadvantage associated with the use of heart-rate monitors.

Advantage	Disadvantage

2 marks

Total 10 marks

Question 18

Touch rugby is a fast-paced game played by men and women. Teams are made up of six players on the field and up to six interchange players. Games consist of two 20-minute halves, with a 5-minute break at half time.



The following data was obtained during an activity analysis of a touch rugby game.

Rest periods (% of game time)	
standing (includes interchange)	26%
walk forwards	16%
jog backwards	7%
walk sideways	5%
slow jog	15%
jog sideways	6%
Total	75%

Work periods (% of game time)	
sprint forwards	9%
sprint backwards	5%
sideways intense shuffle	3%
passing	2%
fast jog	4%
guarding/defending	2%
Total	25%

Average sprint distance

	1–3 metres	3–6 metres	6–10 metres	10–15 metres	15 metres plus
Number of sprints	35	21	10	4	7

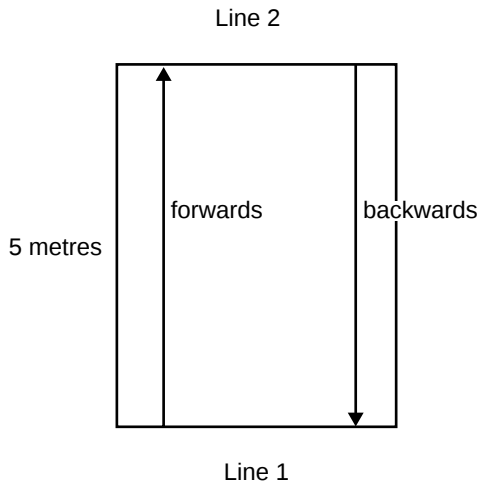
- a. Calculate the work to rest ratio for this game of touch rugby using the data provided.

1 mark

- b. Which energy system is predominately used during the work periods?

1 mark

To improve the player's anaerobic power, the following short interval program was designed.



- Divide the touch rugby team into groups of 4 players.
- One at a time, each player sprints 5 metres forwards and then 5 metres backwards at maximum intensity.
- Each player completes 6 repetitions.
- After 6 repetitions, the group rests for 2 minutes.
- The group completes 5 sets of the 6 repetitions.

- c. Identify one way in which progressive overload can be applied to this program.

1 mark

- d. Outline two ways, other than type of movement used, in which this interval program is specific to touch rugby. In your answer, refer specifically to the data provided.

1.

2.

2 marks

Plyometric training is used with both anaerobic and aerobic athletes. For example, a touch rugby player and a 10-km runner may both use plyometrics.

- e. State a benefit of using plyometrics for each type of athlete.

Touch rugby player

10-km runner

2 + 2 = 4 marks

Total 9 marks