



Victorian Certificate of Education 2012

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER

Figures

Words

Letter

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PHYSICAL EDUCATION

Written examination

Thursday 8 November 2012

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

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

QUESTION AND ANSWER BOOK

Structure of book

<i>Section</i>	<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
A	15	15	15
B	14	14	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 23 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

The system that produces energy at the fastest rate but has a finite capacity is the

- A. aerobic energy system.
- B. ATP-CP energy system.
- C. anaerobic energy system.
- D. anaerobic glycolysis energy system.

Question 2

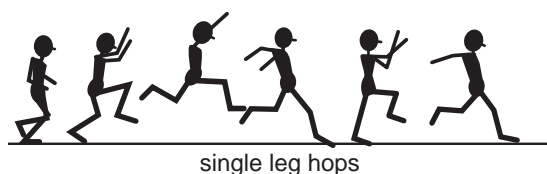
An initiative aimed at increasing physical activity levels for a given population is more likely to be successful if

- A. the policy level of the social-ecological model is targeted.
- B. the individual level of the social-ecological model is targeted.
- C. the multiple levels of the social-ecological model are targeted.
- D. the social and physical environment levels of the social-ecological model are targeted.

Question 3

Athletes often combine cola drinks and water as part of their hydration strategy during an event because

- A. caffeine in cola is a diuretic, so water is taken to avoid dehydration.
- B. cola drinks have a better taste than water and so they are more palatable to athletes.
- C. water reduces the concentration of caffeine in the body and helps to avoid detection.
- D. caffeine in cola is a stimulant and needs to be diluted with water to be absorbed by the body.

Question 4

Single leg hops are an example of a plyometric exercise.

In the take-off phase, which sequence of muscle contractions best describes the contractions utilised by plyometric exercises?

- A. an isometric contraction followed by a forceful concentric contraction
- B. a slow eccentric contraction followed by a forceful concentric contraction
- C. a rapid concentric contraction followed by a forceful eccentric contraction
- D. a rapid eccentric contraction followed by a forceful concentric contraction

Question 5

The most common reason for lack of participation in physical activity is lack of time.

To overcome this, a suitable workplace policy to encourage physical activity during work hours is to

- A. provide an on-site gymnasium for employees.
- B. provide showers and changing rooms for employees.
- C. extend lunch breaks for employees who participate in a work walking group.
- D. make employees participate in half an hour of physical activity each work day.

Question 6

Which of the following is aided by a passive recovery?

- A. liver glucose replenishment
- B. blood glucose replenishment
- C. muscle glycogen replenishment
- D. muscle phosphagen replenishment

Question 7

Questionnaires and surveys are often used to measure the physical activity levels of various populations.

A survey that asks respondents to record their physical activity from the **previous** week rather than a **typical** week is more useful because

- A. data from the previous week tends to overestimate physical activity levels.
- B. physical activity levels from the previous week provide the most recent data.
- C. respondents tend to overestimate physical activity levels when asked for a typical week.
- D. respondents tend to underestimate physical activity levels when asked for a typical week.

Question 8

As a result of endurance training, stroke volume will increase at rest and during submaximal exercise.

The mechanisms responsible for this increase are

- A. increased heart rate, cardiac hypertrophy and blood volume.
- B. increased venous return, cardiac hypertrophy and cardiac contractility.
- C. decreased heart rate, increased cardiac output and cardiac hypertrophy.
- D. decreased venous return, increased cardiac contractility and blood volume.

Question 9

Due to copyright restriction,
this material is not supplied.

Source: William D McArdle, Frank I Katch and Victor L Katch, *Exercise Physiology: Nutrition, Energy, and Human Performance*, Lippincott Williams & Wilkins, Baltimore, 2010, p. 460

As shown in the graph above, during the course of a 120-minute run at 75% VO_2 max, a trained endurance athlete's

- A. fat metabolism will decrease towards the end of the run.
- B. protein metabolism will increase towards the end of the run.
- C. carbohydrate metabolism will decrease towards the end of the run.
- D. fat metabolism will always be higher than carbohydrate metabolism.

Question 10

Fartlek training and continuous training are both forms of aerobic training that can be used to develop aerobic capacity.

Which statement best describes the main difference between the two types of training?

- A. Frequency – fartlek training should be performed 5–7 times per week and continuous training 3–4 times per week.
- B. Intensity – fartlek training has periods of higher intensity efforts, while continuous training is performed at a submaximal effort.
- C. Duration – fartlek training should be performed for at least 60 minutes per session and continuous training should be performed for at least 20 minutes per session.
- D. Specificity – fartlek training is specific to running, whereas continuous training can be designed for running, cycling and swimming.

Question 11

At exercise intensities beyond the lactate inflection point (LIP), there will be a sharp increase in blood lactate because of

- A. insufficient oxygen supply.
- B. lactate production exceeding removal.
- C. an increase in aerobic energy production.
- D. an increase in anaerobic energy production.

Question 12

An acute response to high-intensity exercise is

- A. decreased venous return.
- B. decreased arteriovenous difference.
- C. decreased venous blood oxygen concentration.
- D. decreased arterial blood oxygen concentration.

Question 13

The body responds to altitude training by

- A. increasing white blood cells, red blood cells, blood plasma and platelets.
- B. increasing bone marrow and, therefore, producing more blood, including red blood cells.
- C. stimulating production of erythropoietin (EPO) and producing greater numbers of red blood cells.
- D. stimulating production of EPO and producing greater numbers of red and white blood cells.

Question 14

The perceived benefits of altitude training will occur for an athlete

- A. after 2–3 weeks of altitude training and will last forever.
- B. while the athlete remains at altitude and will disappear at sea level.
- C. after 2–3 weeks of altitude training and will last for up to two months on return to sea level.
- D. as soon as the athlete begins altitude training and will last for up to six months on return to sea level.

Question 15

Part of the rationale for anti-doping codes is fairness.

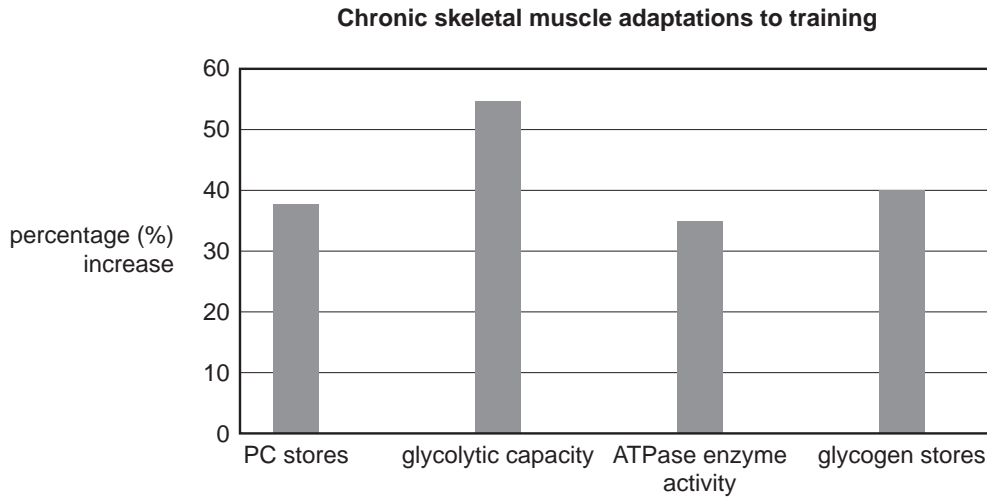
To uphold this rationale, which of the following would the World Anti-Doping Agency (WADA) consider to be doping?

- A. a missed in-competition test
- B. possession of a prohibited substance
- C. use of a pain-killing narcotic out of competition
- D. use of a prohibited substance after obtaining a therapeutic-use exemption

SECTION B – Short answer questions

Instructions for Section B
 Answer **all** questions in the spaces provided.

Question 1



a. From the data presented in the graph, what type of training is most likely to lead to the improvements shown?

1 mark

b. i. Are the improvements shown more likely to occur in fast- or slow-twitch fibres?

ii. Using the data provided, justify your answer to **part i.**

1 + 3 = 4 marks

Question 2

The world record times for running the 100-m and 400-m sprints are shown below.

100 m – 09.58 seconds

400 m – 43.18 seconds

- a. Explain why a 400-m race cannot be run at the same pace as a 100-m race. In your answer, make reference to energy system interplay.

3 marks

- b. State the most effective type of recovery for the 100-m and 400-m sprints, and describe how it assists in returning the body to pre-exercise levels.

100 m _____ recovery

400 m _____ recovery

6 marks

Question 3

Due to copyright restriction,
this material is not supplied.

Bridie Byrne, Whitehorse Leader, 'Healthy? Fat Chance',
10 August 2011

- a. At which level of the social-ecological model was this decision based?

_____ 1 mark

- b. Describe how the decision to remove funding for the Kids – 'Go for your life' program in schools could affect the physical activity levels of students in a school setting.

2 marks

- c.
 - i. Outline a school-based change targeting the level of the social-ecological model identified in **part a.** that could be implemented.

- ii. Give an example of how it may affect students' physical activity levels.

1 + 1 = 2 marks

- d. Describe how the interrelationship between the four levels of the social-ecological model can affect behaviour change. Use the school-based change outlined in **part c.** to support your answer.

3 marks

Question 4

- a. Evaluate the difference between drinking water and sports drinks as a hydration strategy during sustained endurance exercise, such as a marathon, and suggest the more suitable form of hydration.

3 marks

Carbohydrate gels are a convenient method of replenishing glycogen stores during endurance events. It is recommended that they be taken with water.

- b. Explain why it is important to follow this recommendation.

3 marks

Question 5

Charlotte, 17 years old, is doing VCE Physical Education and is planning to do her training program on tennis.

Charlotte completes the following steps: pre- and post-fitness testing, writing a training program, completing the training program over a six-week period and evaluating her results.

- a. Identify the step that Charlotte forgot to do.

_____ 1 mark

- b. Explain how the omission of this step will impact on the training program that she wrote and completed.

3 marks

As part of her battery of fitness tests, Charlotte conducts a series of strength tests. The results are shown in the table below.

Test	Result	Rating
hand grip dynamometer test	37 kg	excellent
1 RM* leg press	1.55 (weight lifted ÷ body weight)	good
1 RM bench press	0.79 (weight lifted ÷ body weight)	excellent
7-level abdominal strength test	level 3	average

*RM – repetition maximum

- c. Explain why Charlotte used four different tests to assess her strength levels.

2 marks

From the results, the 7-level abdominal strength test reveals a weakness in the fitness component of strength for Charlotte.

- d.** Describe two different circuit-based exercises that would improve the result of this test. You can use diagrams in your answer if required.

1. _____

2. _____

Diagrams

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2 marks

- e.** How could you modify one of the exercises described in **part d.** to change the focus from strength to endurance?

1 mark

Question 6

A large multimedia corporation provides its employees with an on-site gymnasium that is staffed by qualified trainers who can write and monitor training programs. Membership of the gymnasium is heavily subsidised, costing employees as little as \$3 per week. The gymnasium is open 24 hours a day, seven days a week and employees gain access using a swipe card. The corporation offers subsidised entry to community-based events, such as fun runs, that it also sponsors. Health promotion initiatives, such as ‘Active April’, are run throughout the year to encourage employees to join the gymnasium and to educate them on the benefits of increasing physical activity.

- a. i. How does the social-ecological model define the individual component?

- ii. Provide an example of how this workplace targets the individual.

1 + 1 = 2 marks

- b. Outline how removing the gymnasium subsidy will affect the other three levels in the social-ecological model.

3 marks

Question 7

- a. Other than promotion of muscle growth, identify and explain a physiological benefit of anabolic steroid use for a 100-m hurdler.

2 marks

- b. Why are the side effects of anabolic steroid use more pronounced in female athletes?

2 marks

- c. The World Anti-Doping Agency (WADA) was established in 1999. Outline the main reasons for its establishment.

2 marks

Protein supplementation can be used to gain some similar benefits to those gained from anabolic steroid use.

- d. In terms of WADA's rationale, explain why anabolic steroids are on the list of prohibited substances and methods, and protein supplementation is not.

2 marks

Athletes who use performance-enhancing drugs often take a masking agent to help prevent detection.

- e. Name a masking agent used and outline how it may help prevent detection.

2 marks

Question 8

Listed in the table below are individual Australian track cycling records.

Event	Record	Athlete
500-m time trial	33.381 seconds	Anna Meares
3000-m individual pursuit	3 minutes 27.650 seconds	Katie Mactier

- a. List the predominant energy system that is used in each of the following events.

500-m time trial _____

3000-m individual pursuit _____

2 marks

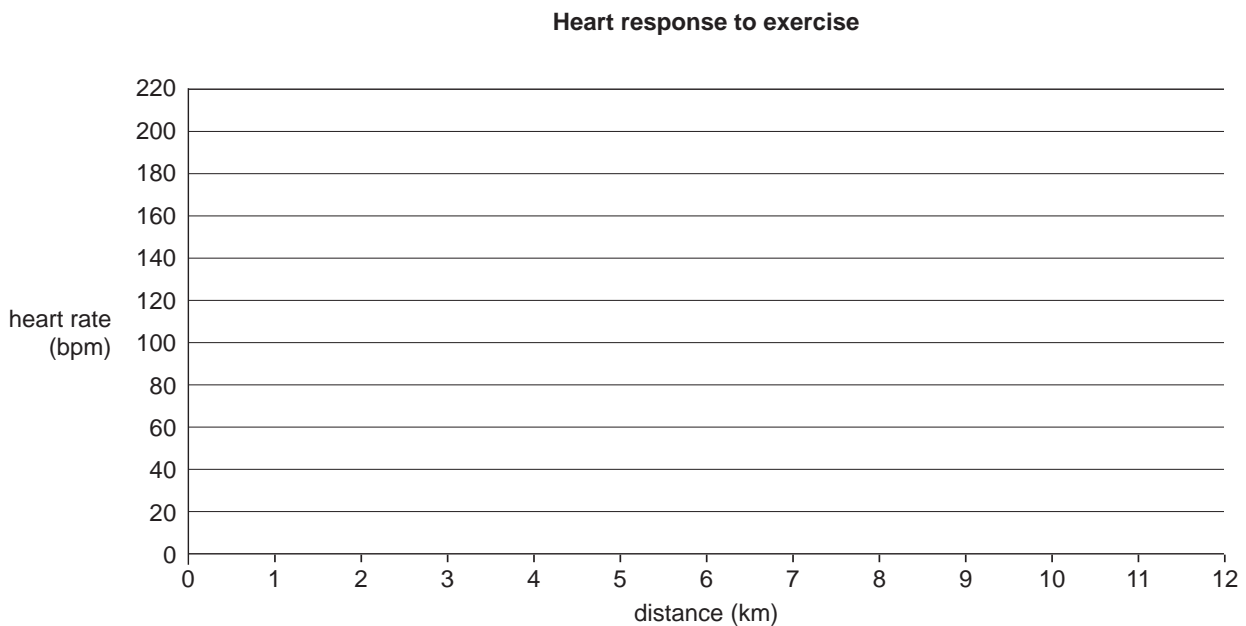
- b. Training their anaerobic capacity would be beneficial to both the 3000-m pursuit cyclist and the 500-m time trialist. Explain why this is the case.

3 marks

Question 9

A 20-year-old male completes a 10-km run as part of his pre-season football training. He wears a heart rate monitor to record changes in his heart rate and records a resting heart rate of 60 bpm. He knows that 160 bpm means he is working in his aerobic training zone. It takes him 1 km before he reaches a steady state at 80% of heart rate max. The 10-km course is relatively flat and he maintains this intensity throughout the run. As part of his routine, he works maximally for the last 500 m and then completes an active recovery for 2 km.

- a. On the axes below, draw and label a graph that demonstrates your understanding of the heart rate response to this training session. On your graph, include
- periods of O_2 deficit
 - steady state
 - periods of excess post-exercise oxygen consumption (EPOC).



4 marks

- b. Provide an explanation for the shape of the graph in **part a.** from 0 to 1 km.

2 marks

- c. How will the EPOC of the footballer be affected by him running at maximal intensity for the last 500 m instead of maintaining a steady state until the end of the run?

2 marks

- d. Provide an appropriate strategy for overloading this training session.

1 mark

- e. Suggest an alternative aerobic training method and explain how it could be manipulated to make training more specific to the needs of a football game.

2 marks

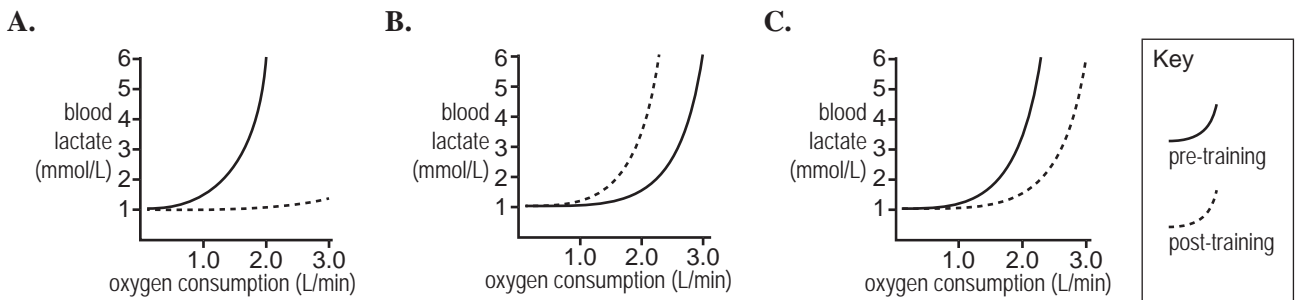
Question 10

a. Why do blood lactate levels remain relatively stable during submaximal exercise?

1 mark

b. Identify a training method that would be most beneficial for increasing an athlete's lactate inflection point (LIP)?

1 mark



c. i. Which of the graphs shown reflects the changes to the LIP and VO_2 max. after 12 weeks of the type of training identified in **part b.**?

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

1 + 3 = 4 marks

Question 11

Australian swimmer Ian Thorpe announced his comeback to international competition in February 2011, with the goal of qualifying for the 2012 London Olympics.

In the lead up to the Olympic qualifying trials, Thorpe’s times were well below standard and the pressure on him to qualify may have negatively affected his performances. There are different psychological strategies, such as mental imagery, that Thorpe could use to improve his performance.

- a. How could **past experiences** enhance Ian Thorpe’s ability to use mental imagery to improve his performance?

2 marks

The inverted U hypothesis is used to explain the relationship between an athlete’s arousal levels and the effect it can have on their performance.

- b. i. Outline **two** visual signs that would indicate that Ian Thorpe is under-aroused.

- ii. With reference to the inverted U hypothesis, explain how arousal levels can affect performance. You may use a diagram in your answer.

2 + 2 = 4 marks

Question 12

The 20-m shuttle run test requires participants to run between cones set 20 m apart in time to a recorded beep until they are unable to keep up with the recording.

- a. Name the component of fitness that is being assessed by the 20-m shuttle run test.

1 mark

Another recognised fitness test that is similar to the 20-m shuttle run test is the Yo-Yo intermittent recovery test, where participants run 20 m, turn and run back 20 m. Rather than stop at the start line, they walk or jog past the start line, turn at the 5 m mark and return to the start. They then wait for the signal to run again.

- b. How is the Yo-Yo intermittent recovery test more specific to team sports, such as soccer, hockey and rugby, than the 20-m shuttle run test?

2 marks

- c. Other than the 20-m shuttle run test and the Yo-Yo intermittent recovery test, identify another recognised field test that would be suitable to assess the same fitness component in secondary school students.

1 mark

VO₂ max. can also be determined in a laboratory, using a treadmill and gas analysis equipment. Both the laboratory test and 20-m shuttle run test will provide the participants with their VO₂ max.

- d. Describe the main difference between the two values obtained.

2 marks

At the end of both the 20-m shuttle run test and the Yo-Yo intermittent recovery test, the participant’s ability to maintain the required speed decreases and the participant has to stop the test.

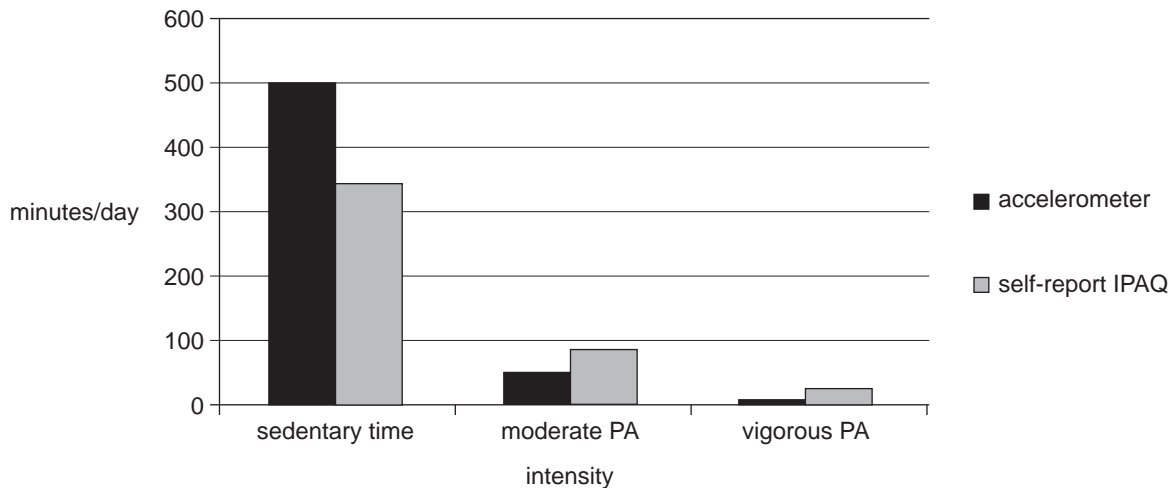
e. i. What is the major cause of fatigue in these tests?

ii. How does having a greater aerobic capacity delay the onset of this type of fatigue?

1 + 2 = 3 marks

Question 13

Physical activity (PA) data was collected from a group of 40-year-old adults using an accelerometer and a self-report International Physical Activity Questionnaire (IPAQ). The results are shown in the graph below.



a. Explain what may have caused the differences shown in the graph between the physical activity measured using these two methods.

3 marks

- b. Even though differences in the data have been identified using the two methods, suggest three reasons why someone may still choose to use a self-report to measure physical activity.

1. _____

2. _____

3. _____

3 marks

Jack has just started a new job in the health promotion industry and wants to measure the change in the physical activity of a large group of walkers who are participating in an eight-week program. Before the program started, Jack measured the group's physical activity using a self-report and at the completion of the program he used an accelerometer.

- c. Based on the information provided and the data in the graph, evaluate how useful you think any data collected would be for measuring real change in physical activity.

3 marks

Question 14

The table below shows the changes in stroke volume and cardiac output for a 45-year-old male as a result of endurance training.

		Stroke volume (ml)	Cardiac output (L/min)
Pre-training	rest	72	5
	maximal exercise	90	16.6
Post-training	rest	80	5
	maximal exercise	105	19.1

Source: George A Brooks, Thomas D Fahey, Kenneth M Baldwin, *Exercise Physiology: Human Bioenergetics and Its Applications*, McGraw-Hill, New York, 2005, p. 342; data: W Haskell

- a. Explain why there is no change in cardiac output at rest when comparing pre- and post-training test results.

2 marks

- b. Describe the changes that occur in heart rate, stroke volume and cardiac output as exercise intensity changes from submaximal to maximal.

2 marks

Prior to undertaking the endurance training program, the 45-year-old male ran at 10 km/h on a treadmill at an intensity of 80% HR max.

c. Tick (✓) the correct response.

Post-training, running at this speed (10 km/h), he would be working at

- i. a higher percentage of maximum heart rate.
- a lower percentage of maximum heart rate.
- the same percentage of maximum heart rate.

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

1 + 2 = 3 marks