VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

Victorian Certificate of Education 2019

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER | | | | | | | | | Letter |

PHYSICAL EDUCATION

Written examination

Thursday 7 November 2019

Reading time: 11.45 am to 12.00 noon (15 minutes)
Writing time: 12.00 noon to 2.00 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	11	11	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 correction fluid/tape.
- No calculator is allowed in this examination.

Materials supplied
- Question and answer book of 26 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

Improvements in skill development tend to be largest at which stage of learning?

A. gross
B. cognitive
C. associative
D. autonomous

Question 2

Weightlifters consume water after their final lift in a competition.
Water is used in recovery to

A. help an athlete return to pre-exercise levels.
B. refuel an athlete with carbohydrates to return this nutrient to pre-exercise levels.
C. refuel an athlete with protein and fats to return these nutrients to pre-exercise levels.
D. refuel an athlete with protein and carbohydrates to return these nutrients to pre-exercise levels.

Question 3

Which component of fitness is measured when performing one repetition maximum (RM) back squat test?

A. speed
B. agility
C. coordination
D. muscular strength

Question 4

During exercise, skeletal muscle capillaries dilate in order to

A. increase their surface area to enable greater diffusion to occur.
B. decrease the removal of metabolic by-products.
C. decrease the use of intramuscular substrates.
D. increase ventilation and stroke volume.

Question 5

To maintain aerobic power, an athlete should train

A. once a week.
B. twice a week.
C. below 60% of their maximum heart rate.
D. above 85% of their maximum heart rate.

Question 6

Which one of the following is an important component of the constraints-based approach to skill acquisition?

A. practising the skill in isolation from the game

B. repetition of the skill without opponents present

C. task simplification that maintains links between perception and action

D. a coach explicitly instructing an individual on how to perform the skill

Question 7

Which one of the following is an example of augmented feedback?

A. a hockey player seeing the ball go into the goal

B. a tennis player hearing the ball connect with the racquet

C. a coach telling a player to fully extend their leg when kicking

D. a soccer player feeling the ball make contact with their feet while dribbling

Question 8

A beginner basketballer often misses shots for goal by throwing the ball directly at the ring.

To increase the chance of a successful shot, a coach may suggest

A. standing closer to the basket.

B. increasing the angle of release.

C. decreasing the angle of release.

D. increasing the speed of release.

Question 9

Which one of the following is a sociocultural factor to consider when completing a body composition fitness test?

A. accuracy

B. motivation

C. test location

D. cultural beliefs

Question 10

If a gymnast goes from a full layout position to a tuck position, what will happen to their angular momentum?

A. It will stop.

B. It will increase.

C. It will decrease.

D. It will remain the same.

Question 11

In which one of the following sports is having a high mitochondrial mass most likely to provide an advantage to an athlete in a competition?

A. long-distance swimming

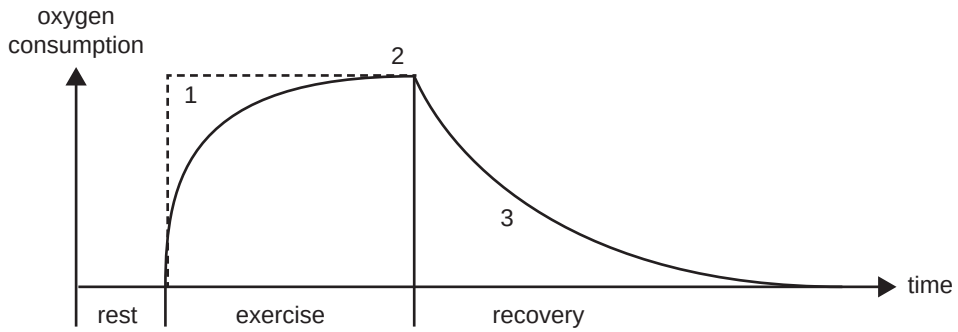
B. lawn bowls

C. gymnastics

D. karate

Use the following information to answer Questions 12–14.

Oxygen consumption during and after exercise



Question 12

The graph above represents oxygen consumption during and after exercise.

The area indicated by the number 1 is known as

A. excess post-exercise oxygen consumption (EPOC).

B. oxygen deficit.

C. oxygen debt.

D. steady state.

Question 13

During the period indicated by the number 2, oxygen demand is being met by oxygen supply.

Which energy system(s) supplies most of the energy for exercise during this period?

A. ATP-CP system

B. aerobic system

C. anaerobic systems

D. anaerobic glycolysis

Question 14

During the period indicated by the number 3, what is happening physiologically in the body?

A. Blood lactate levels are increasing.

B. Core body temperature is increasing.

C. Oxygen is restored to myoglobin and blood.

D. Oxygen demand is not being met in the body.

Question 15

A student wants to start a training program for a sport they have chosen.

What step should the student take first?

A. goal setting

B. fitness testing

C. activity analysis

D. Physical Activity Readiness Questionnaire (PAR-Q)

END OF SECTION A

CONTINUES OVER PAGE

SECTION B

Instructions for Section B

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

Question 1 (8 marks)

Basketball players spend many hours practising free throws to improve their performance of this skill. Research comparing free throw performance during training sessions and games has indicated several differences. These differences have allowed researchers to determine how free throws may be better practised. One difference noted was that players performed more free throws in a row during training than they do in a game.

	Game	**Training session**
Volume (average number of free throws performed in a row)	1–2 shots	7.53 shots
Percentage of successful free throws	69.2%	74.5%

Data: B Kozar et al., 'Basketball free-throw performance: Practice implications', *Journal of Sport Behavior*, vol. 18, issue 2, June 1995

a. A free throw in basketball is classified as a discrete skill.

Provide **one** characteristic of a discrete skill and outline why a free throw in basketball is classified as a discrete skill. 2 marks

b. In relation to practice variability, identify the type of practice the players undertake by repetitively practising free throws a number of times in a row. 1 mark

c. With reference to practice distribution, use the data provided on page 6 to explain the variations in volume and success of free throws between training sessions and games. 3 marks

d. Explain how Newton's first law relates to the free throw in basketball. 2 marks

Question 2 (11 marks)

An under-14 secondary school volleyball team completed a day of fitness testing and training at the Australian Institute of Sport with the national women's volleyball team.

Throughout the day, the students completed fitness testing specific to volleyball. One of the tests was the vertical jump.

a. Explain how informed consent should be applied to the under-14 volleyball team. 2 marks

b. Justify the suitability of the vertical jump for the elite athletes of the national women's volleyball team from physiological and psychological perspectives. Make specific reference to validity in your response. 4 marks

c. Individuals undergoing the vertical jump test are briefed on the correct jumping and landing techniques.

Use your understanding of impulse to explain why it is important for athletes to land correctly when performing the vertical jump test. 3 marks

d. Name and describe another standardised test for lower-body power that is suitable for volleyballers. 2 marks

Question 3 (13 marks)

In a study, elite-level male sprint and distance runners' blood lactate levels were assessed under different conditions. The runners had been training for three months and were in the middle of their competitive season.

The following data was collected.

Distance		Sprint runners	Distance runners
		Blood lactate (mmol/L)	**Blood lactate (mmol/L)**
400 m	baseline	1.3	1.3
	post-exercise	6.6	4.1
1600 m	baseline	1.4	1.5
	post-exercise	14.5	8.8

Data: TJ Canfield and KA Gabel, 'Blood lactate, heart rate, and rating of perceived exertion in collegiate sprint, middle distance, and long distance runners after 400 and 1600 meter runs', *International Journal of Medical, Health, Biomedical, Bioengineering and Pharmaceutical Engineering*, vol. 7, no. 8, 2013, p. 479

a. List **two** training methods the sprint runners should use as part of their regular training program. 2 marks

b. Indicate the physiological changes (increase, decrease, stay the same) that would be expected in the runners at the end of the 400 m for each of the following parameters. 3 marks

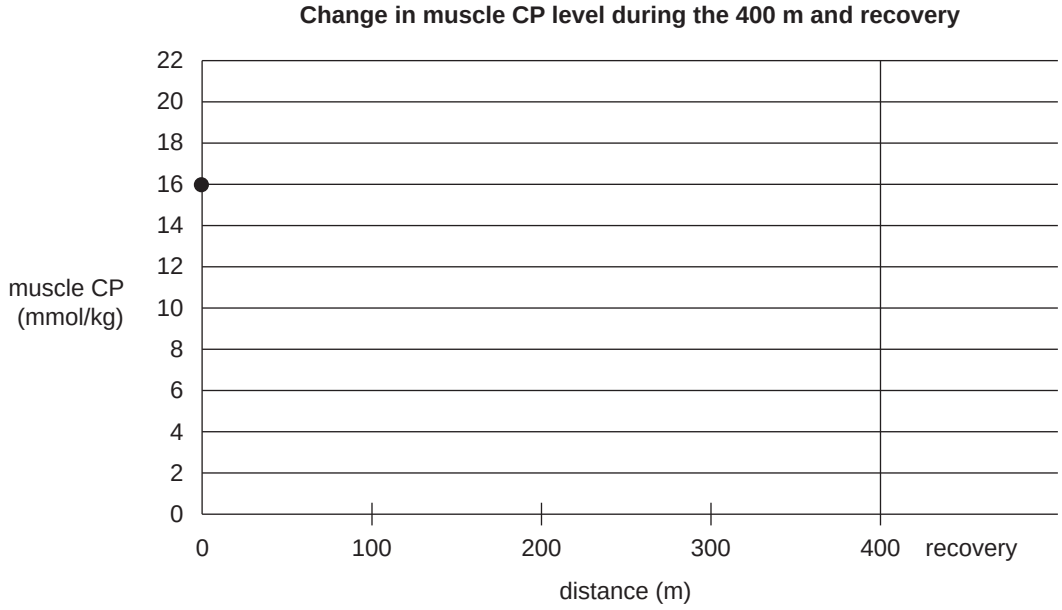
Diastolic blood pressure _____

Tidal volume _____

Intramuscular ATP _____

c. Referencing the data and using your understanding of anaerobic chronic adaptations, explain the differences in the sprint and distance runners' blood lactate levels. 3 marks

d. Complete the following graph to show the change in muscle creatine phosphate (CP) level during a 400 m sprint and passive recovery. The initial muscle CP level was 16 mmol/kg. 2 marks



e. Distance runners train to increase their anaerobic capacity.

Explain why increasing their anaerobic capacity would be beneficial to a distance runner's performance. 3 marks

Question 4 (15 marks)

Sport climbing is a new addition to the 2020 Summer Olympics. It will feature three disciplines, two of which are described below:

- Speed climbing involves two climbers securing safety ropes to themselves and attempting to scale a 15 m high wall faster than their opponent. The men's world record is 5.48 seconds and the women's world record is 7.32 seconds.
- Lead climbing involves climbers attempting to climb a specific route as high as they can on a wall measuring more than 15 m in height in a maximum of six minutes, with a safety rope attached.

Event	Speed of climber
speed climbing 	2.04 m/s
lead climbing 	0.041 m/s

Sources (from top): Artie Medvedev/Shutterstock.com; Marco Govel/Shutterstock.com

Muscular power and muscular endurance have been identified as important fitness components for speed climbing and lead climbing respectively.

a. Suggest an appropriate standardised fitness test for the upper body for each fitness component given in the table below. 2 marks

Event	Fitness component	Standardised fitness test
speed climbing	muscular power	
lead climbing	muscular endurance	

b. Using the information provided on page 12 and above, compare the interplay of energy systems that enable movements to occur in speed climbing and lead climbing by discussing the intensity and duration of the events. In your response, justify the need for muscular power in speed climbing and muscular endurance in lead climbing. 6 marks

c. At the 2020 Summer Olympics, each climber will compete in both disciplines.

Explain why muscular strength can aid both muscular power and muscular endurance. 2 marks

d. The sport climbing event will span four days and will have two rounds: a qualification round and a final round. Each round will comprise speed climbing (two runs) and lead climbing (one route), with a break varying from 15 to 40 minutes between each round of disciplines for each climber.

Explain an appropriate nutritional strategy that sport climbers could use at this event to enhance their recovery between each round of disciplines. 2 marks

e. The following is an example of a training program for lead climbers that is designed to improve muscular endurance.

Exercise	Repetitions	Sets	Rest
pull-ups	10	3	30 s
wall hangs	5 × 10 s on, 5 s off	5	3 mins
plank	1 × 1 min	3	30 s
bench press	3	3	5 mins

Critique the training program in terms of its effectiveness in developing muscular endurance. 3 marks

Question 5 (6 marks)

a. Outline the difference between a gross motor skill and a fine motor skill using suitable examples. 2 marks

b. Based on your understanding of the inverted U principle and using an example from your response to **part a.**, explain the impact of arousal levels on performance. You may use a diagram in your response. 3 marks

c. Name **one** strategy that an athlete in a heightened state of arousal may use to regulate their arousal levels. 1 mark

Question 6 (12 marks)

Noah, an 18-year-old student, wants to improve his sprinting ability in track cycling (500–1000 m distance). Noah has designed a 12-week training program for himself and shown below is a snapshot of the program.

Week	Monday	Wednesday	Thursday	Saturday
1	seated accelerations on stationary bike reps: 10 RPE: 9 recovery: 3 mins	sprint interval: 20 s and 40 s recovery RPE: 9 reps: 10	gym session deadlifts: 4 sets of 3 repetitions @95% RM box jumps: 3 sets of 8 repetitions	sprint interval: 20 s and 40 s recovery RPE: 9 reps: 10
4	seated accelerations on stationary bike reps: 11 RPE: 9 recovery: 3 mins	sprint interval: 20 s and 40 s recovery RPE: 9 reps: 11	gym session deadlifts: 4 sets of 3 repetitions @95% RM box jumps: 3 sets of 8 repetitions	sprint interval: 20 s and 40 s recovery RPE: 9 reps: 11
7	seated accelerations on stationary bike reps: 12 RPE: 9 recovery: 3 mins	sprint interval: 20 s and 40 s recovery RPE: 9 reps: 12	gym session deadlifts: 4 sets of 4 repetitions @95% RM box jumps: 3 sets of 8 repetitions	sprint interval: 20 s and 40 s recovery RPE: 9 reps: 12
10	seated accelerations on stationary bike reps: 13 RPE: 9 recovery: 3 mins	sprint interval: 25 s and 45 s recovery RPE: 9 reps: 13	gym session deadlifts: 4 sets of 4 repetitions @95% RM box jumps: 3 sets of 8 repetitions	sprint interval: 25 s and 45 s recovery RPE: 9 reps: 13
12	seated accelerations on stationary bike reps: 13 RPE: 9 recovery: 3 mins	sprint interval: 25 s and 45 s recovery RPE: 9 reps: 13	gym session deadlifts: 4 sets of 4 repetitions @95% RM box jumps: 3 sets of 8 repetitions	sprint interval: 25 s and 45 s recovery RPE: 9 reps: 13

Key
RM – repetition maximum
RPE – rate of perceived exertion
reps – repetitions
mins – minutes
s – seconds

a. **i.** Suggest **one** way for Noah to monitor his training. 1 mark

_____

ii. Using examples, explain why Noah should keep a record of his training. 2 marks

_____

_____

_____

_____

b. Using data from the training program, justify whether progression has been correctly applied in Noah's training program. 2 marks

c. Using the FITT principles (frequency, intensity, time and type), evaluate the effectiveness of this training program to improve sprint performance for track cycling. Use specific examples from the training program to support your response. 5 marks

d. Explain how an increase in the firing rate of motor units would aid Noah's performance in track cycling. 2 marks

Question 7 (9 marks)

The graph below shows the serve accuracy data of two badminton players over four training sessions.

a. Identify **one** method of data collection that a coach could have used to obtain the data above and provide **one** benefit of using this method. 2 marks

b. How may a coach benefit from using qualitative movement analysis data instead of quantitative serve accuracy data? 3 marks

c. After training session 1, Player 2 reported that they were uninterested in attending another session; however, following training session 2, Player 2 was excited to come back.

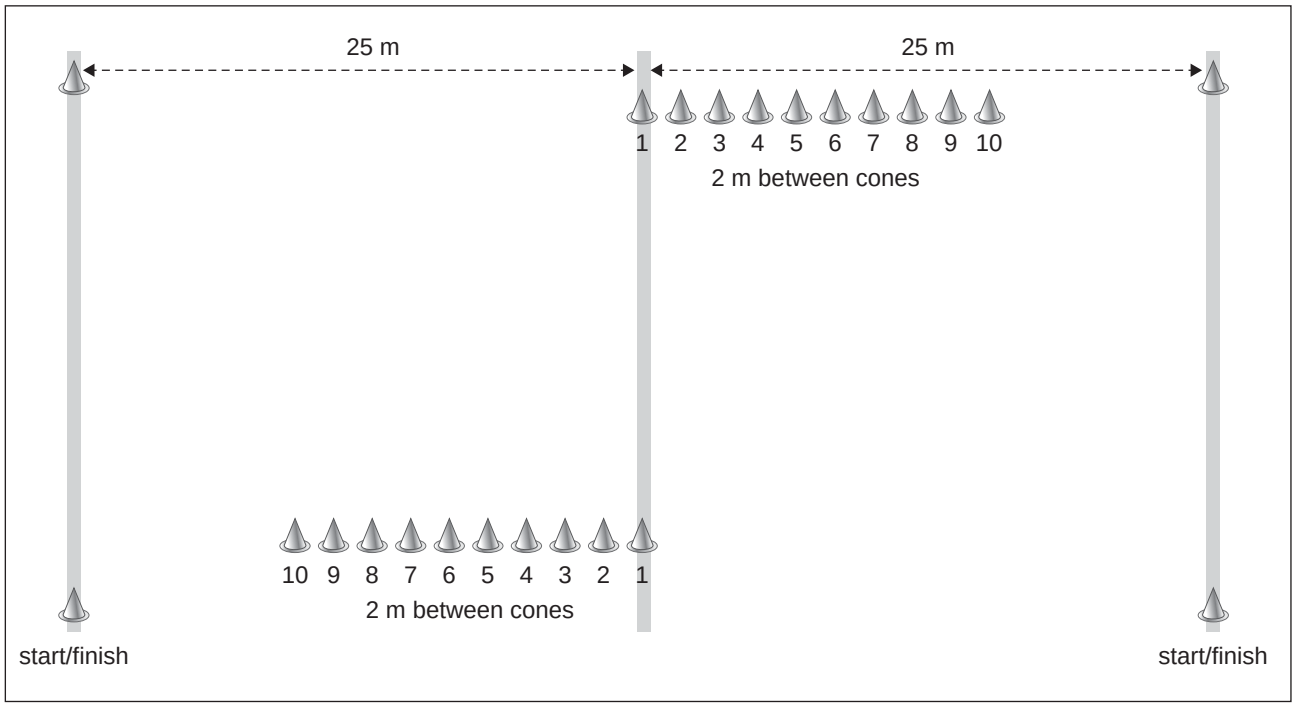
Referencing the data on page 18 and stages of learning, analyse the link between motor skill development, participation and performance. 4 marks

Question 8 (13 marks)

As part of a battery of fitness tests, athletes completed the phosphate recovery test shown in the diagram below. This test requires athletes to complete eight repetitions of seven-second sprints, departing every 30 seconds.

The results for one athlete are given in the results table below.

Short-course phosphate recovery test



Results for one athlete

Sprint number	1	2	3	4	5	6	7	8	**Total**
Score (cone reached)	8	7	6	5	5	4	4	3	42
Result	percentage decrement: 25%								

a. The athletes' performance declined over the course of the eight repetitions.

Use your understanding of energy systems, fatigue and recovery to explain why this decline in performance occurs. 8 marks

b. At the completion of the eight repetitions of seven-second sprints, the athletes performed an active recovery.

Give **three** reasons why an active recovery would be beneficial for the athletes. 3 marks

c. Identify **one** positive and **one** negative physiological consequence for recovery of choosing to complete a passive cool-down rather than an active cool-down. 2 marks

Question 9 (4 marks)

The coach of an under-nine baseball team suggests that the players use a longer and heavier bat so that they can hit the ball further. After three weeks, the players' performance did not show improvement.

Based on your understanding of biomechanical principles, discuss why changing the length and weight of the bat did not improve performance. Your response should include reference to:

- angular velocity
- mass
- force
- levers.

Question 10 (8 marks)

Jan is an under-18 Australian Rules football midfield player who wants to be drafted in the Australian Football League Women's (AFLW) in the next two years. She collected the following data on her past season to plan her off-season training.

Table 1. Global positioning system (GPS) data

Data	Jan's season average	AFLW player's season average
total distance covered	5.9 km	7.2 km
top speed	23 km/h	27 km/h
number of repeated sprints over 18 km/h	7	10

Table 2. Jan's fitness testing results

Test	Pre-season	Rating	Before finals	Rating
Yo-Yo intermittent recovery	level 13.0	below average	level 14.5	below average
vertical jump	35 cm	average	38 cm	average
semo agility	13 s	below average	12.2 s	below average
20 m sprint	3.24 s	above average	3.35 s	average
1.6 km run	9 mins 20 s	below average	9 mins	below average
stork stand	3 s	poor	15 s	fair

Analyse the data in Table 1 and Table 2 to design an appropriate four-day weekly training program for Jan (Table 3). State the goal of the training program and demonstrate the correct application of training principles and training methods. Explain how the selection of fitness components and training methods will achieve the goal of the training program. Use the data to support your response.

Goal _____

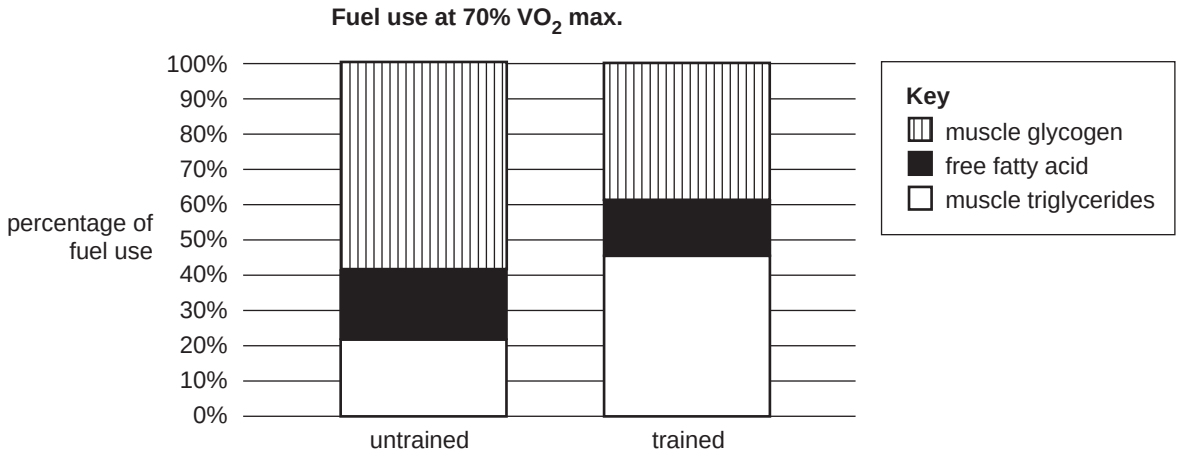
Table 3. Training program for Jan

Day				
Week 1				
Week 4				
Week 7				

Explanation _____

Question 11 (6 marks)

The graph below shows the changes in fuel use for a cross-country runner before and after a 12-week training program.



a. Identify the type of training that would cause the changes shown in the graph. 1 mark

b. Referencing the data, explain how the adaptation shown in the graph will improve the performance of the cross-country runner. 3 marks

c. Predict the variation in the tidal volume and respiratory rate of the trained athlete during a 60 km cross-country race. 2 marks

END OF QUESTION AND ANSWER BOOK