

**Victorian Certificate of Education
2018**

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER

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PHYSICAL EDUCATION**Written examination****Friday 9 November 2018****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**

<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	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

Which one of the following training methods would be the best way to train for weightlifting?

- A. fartlek
- B. resistance
- C. continuous
- D. plyometrics

Question 2

Tua, Caleb and Rocky all have a VO_2 max. of 3.8 L/min.

If Tua weighs 58 kg, Caleb weighs 98 kg and Rocky weighs 125 kg, who would be the most suited to running a 10 km race?

- A. Tua
- B. Caleb
- C. Rocky and Tua
- D. Caleb and Tua

Question 3

Aerobic power is the

- A. rate of anaerobic energy production.
- B. total amount of energy produced in the absence of oxygen.
- C. total amount of energy produced in the presence of oxygen.
- D. maximum rate of energy produced in the presence of oxygen.

Question 4

Open skills

- A. are self-paced.
- B. allow a person to repeat the same movement pattern.
- C. are performed when the conditions remain unchanged.
- D. vary depending on the requirements of the activity or game.

Question 5

A coach is providing crowd noises at a training session in order to simulate a game environment while a netballer is practising shooting goals.

Which type of constraint is being manipulated in this scenario?

- A. task
- B. personal
- C. individual
- D. environmental

Question 6

Which fuel produces the least amount of energy per molecule?

- A. triglycerides
- B. blood glucose
- C. muscle glycogen
- D. stored ATP and PC

Question 7

During exercise, an individual's heart rate and the force of their heart's contractions are increased.

As a result, there is

- A. no change in systolic blood pressure.
- B. a decrease in systolic blood pressure.
- C. an increase in systolic blood pressure.
- D. a large decrease in diastolic blood pressure.

Question 8

Which one of the following is a characteristic of an athlete in the autonomous stage of learning?

- A. The athlete performs subroutines out of order.
- B. The athlete is able to detect some of their errors on their own.
- C. The athlete has difficulty anticipating what movement is needed.
- D. The athlete can vary the accuracy, speed and uniformity of their movements.

Question 9

In the 2018 American football Super Bowl, Tom Brady, who was in the quarterback position, was seen quickly assessing the movement and position of his teammates and the opposition, before making a decision about where to pass the ball.

In plays such as this, Brady would be using which type of attention?

- A. broad-internal focus
- B. broad-external focus
- C. narrow-internal focus
- D. narrow-external focus

Question 10

The estimated maximum heart rate of a 50-year-old athlete would be

- A. 150 bpm
- B. 170 bpm
- C. 190 bpm
- D. 220 bpm

Question 11

Which one of the following factors affects flexibility?

- A. blood volume
- B. body mass index
- C. muscle fibre type
- D. range of movement around the joint

Question 12

The coach of a local cricket team is deciding on a weekly practice schedule for the team during the competitive season.

Day of the week	Schedule A	Schedule B	Schedule C	Schedule D
Sunday				practice 9.00 am – 10.00 am
Monday			practice 5.00 pm – 6.00 pm	
Tuesday	practice 5.00 pm – 7.00 pm	practice 5.00 pm – 6.00 pm	practice 5.00 pm – 6.00 pm	practice 5.00 pm – 6.30 pm
Wednesday			practice 5.00 pm – 6.00 pm	
Thursday	practice 5.00 pm – 7.00 pm	practice 5.00 pm – 7.00 pm	practice 5.00 pm – 6.00 pm	practice 5.00 pm – 6.30 pm
Friday		practice 5.00 pm – 6.00 pm		
Saturday	game 1.00 pm – 6.00 pm	game 1.00 pm – 6.00 pm	game 1.00 pm – 6.00 pm	game 1.00 pm – 6.00 pm

Which schedule in the table above would be considered the most massed practice schedule for the team?

- A. Schedule A
- B. Schedule B
- C. Schedule C
- D. Schedule D

Use the following information to answer Questions 13–15.

In aerial skiing, the athlete skis down a relatively short hill and off a jump, and then they perform a variety of twists and flips in the air before landing.



Source: StockphotoVideo/Shutterstock.com

Question 13

Which one of the following fitness components would be the most important in aerial skiing?

- A. speed
- B. reaction time
- C. aerobic power
- D. muscular power

Question 14

Which biomechanical principle is the athlete applying to their performance by spreading their arms away from the torso during aerial skiing?

- A. acceleration
- B. displacement
- C. Newton's first law of motion
- D. conservation of angular momentum

Question 15

Which one of the following psychological strategies could an aerial skier use seconds before their jump in order to regulate feelings of stress and anxiety?

- A. biofeedback
- B. pump-up music
- C. mental imagery
- D. jumping around

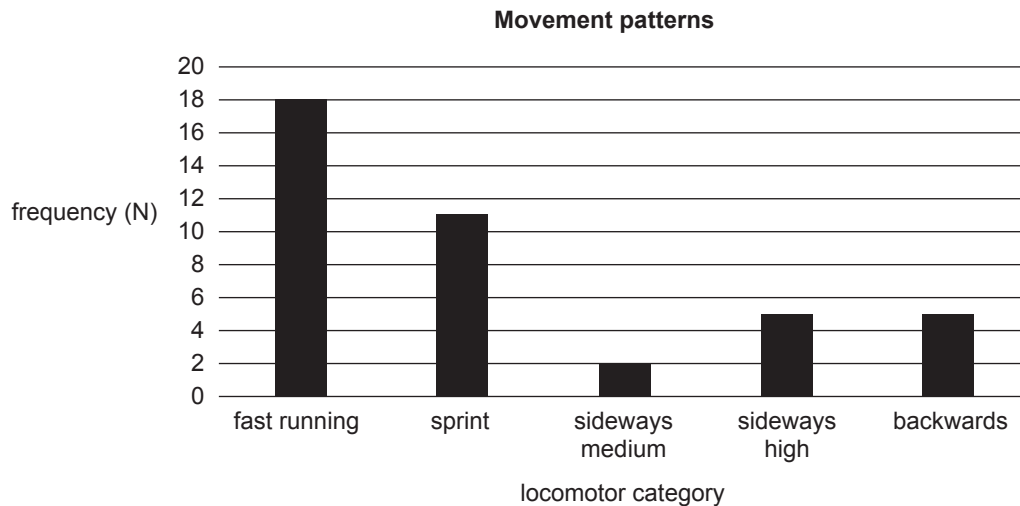
**END OF SECTION A
TURN OVER**

SECTION B**Instructions for Section B**

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

Question 1 (9 marks)

A coach collected data on one player during a 60-minute recreational European handball match. The data is presented in the following graph and table.



Source: data and ideas from SCA Povos, et al., 'Physical and Physiological Demands of Recreational Team Handball for Adult Untrained Men', *Biomed Research International*, 2017, p. 5

Skill–frequency table

throws	20
jumps	27
changes of direction	13

- a. The coach wants to assess the level of agility of his recreational European handball team.

Name a suitable standardised fitness test and justify why this test is suitable, based on the physiological requirements of the European handball team.

3 marks

Fitness test _____

Justification _____

The players undertake a plyometric training program.

- b.** Describe **two** possible plyometric exercises that the coach could use as part of the plyometric training program. 2 marks

- c.** **i.** Identify **one** muscular adaptation that a European handball player would develop after undertaking a plyometric training program. 1 mark

- ii.** Outline how this muscular adaptation would improve the performance of the European handball player. 1 mark

- d.** The overhand throw in European handball is an example of the use of a third-class lever. Explain how the mechanical advantage of a third-class lever is beneficial when throwing in European handball. 2 marks

Question 2 (2 marks)

Ventilation is the product of tidal volume and respiratory rate.

Describe the relationship between ventilation and oxygen consumption when moving from a resting state to exercising, and explain why the relationship occurs.

Question 3 (11 marks)

Three male subjects, all 20 years of age, participated in a three-month training program. Physiological data was collected for each subject prior to commencing the program and at the end of the program. This data is shown in the results table below.

Factor	Subject 1		Subject 2		Subject 3	
	Pre-program	Post-program	Pre-program	Post-program	Pre-program	Post-program
resting heart rate (bpm)	60	55	63	65	50	45
maximum heart rate (predicted) (bpm)	200	200	200	200	200	200
sub-maximal heart rate (bpm)	140	130	160	160	130	125
stroke volume (sub-maximal) (mL/beat)	110	135	110	115	140	155
maximum a-vO ₂ diff. (mL of O ₂ /100 mL of blood)	12	16	12	12	16	18

Subject 1 and Subject 3 undertook the same training program for the three-month period. Subject 2 participated in a different training program.

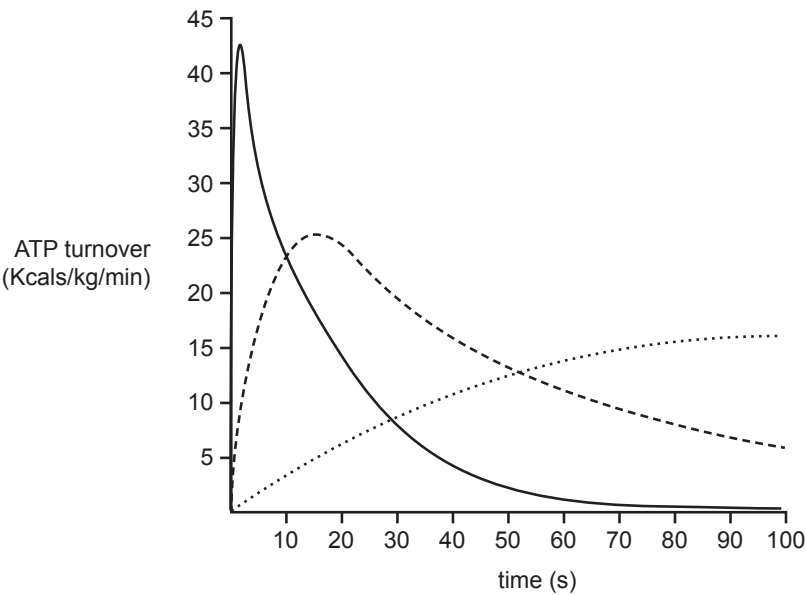
- a. What type of training did Subject 1 and Subject 3 most likely undertake? Justify your response using data from the results table on page 8. 4 marks

- b. Explain how the changes reflected in the pre-program and post-program physiological data for Subject 1 and Subject 3 may lead to improvements in performance. 3 marks

- c. With reference to intensity, discuss reasons why Subject 3 did not show the same improvement as Subject 1. Use data from the results table on page 8 to support your response. 4 marks

Question 4 (6 marks)

Energy system interaction and the differences in rates of ATP turnover during short-term intense exercise to fatigue



Source: JS Baker, MC McCormick and RA Robergs, ‘Interaction among skeletal muscle metabolic energy systems during intense exercise’, in *Journal of Nutrition and Metabolism*, vol. 2010, article ID 905612, 13 pages, 2010, p. 8, <<https://doi.org/10.1155/2010/905612>>; © 2010 Julien S Baker, et al.

Examples of track and field events in athletics

Track	Field
100 m	shot put
400 m	long jump
5000 m	pole vault

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

Question 5 (13 marks)

Jalena is a 17-year-old student who wants to design a training program for her upcoming lacrosse season.

- a. What is the first step Jalena should complete when designing a training program for herself? 1 mark

- b. As part of her training program, Jalena completes the following battery of fitness tests to assess her fitness levels.

Test	Result	Rating
multi-stage fitness test	level 8 shuttle 2	average
35 m sprint	5.29 sec	excellent
shoulder rotation test	34 cm	fair
phosphate recovery test	43%	poor

Analyse Jalena's results in the table above to identify the fitness components that she should aim to improve. Provide reasons for your answer.

3 marks

Jalena aims to participate in long interval training twice per week and circuit training three times per week over four weeks.

- c. Outline **one** strategy Jalena could use to monitor her training. 1 mark

- d. Design a long interval training session that would be suitable for Jalena.

2 marks

Muscular endurance of both the upper and lower body is important in lacrosse.

Jalena's circuit training includes undertaking the following activities for two minutes each, with 30 seconds' rest in-between:

- | | |
|--------------|---------------|
| • skipping | • depth jumps |
| • high knees | • leg swings |
| • side steps | • sit-ups |
| • star jumps | • dips |
| • push-ups | • plank |

- e. Evaluate the effectiveness of this circuit training to improve muscular endurance for lacrosse. 3 marks

- f. After six weeks of following her program, Jalena started to lose motivation and developed sore shins.

Outline **one** psychological strategy that Jalena could use to stay committed to her program.

1 mark

- g.** Suggest a suitable nutritional strategy that Jalena could use after her training sessions and explain how this strategy could optimise her recovery. 2 marks

Question 6 (8 marks)

The size of a playing area for soccer can be manipulated using the constraints-based approach to skill coaching and instruction.

- a.** Outline what type of constraint the size of a playing area is and explain how reducing the size of the playing area will influence opportunities to improve skills for players in the game of soccer. 2 marks

- b.** A kick in soccer could be classified as an open skill or a closed skill.

Classify the soccer kick as an open skill or a closed skill and justify your response. 3 marks

- c. The following table presents selected physiological data collected from players in a study of soccer that compared activity levels during five-a-side soccer games. Players completed two games of four minutes' duration, with one game on each of two different field sizes. There was three minutes of activity recovery between games.

	Player averages	
	Small field size (20 m × 28 m)	Large field size (30 m × 42 m)
Heart rate (% of maximum)	86	87
Blood lactate concentration (mmol/L)	3.9	4.6
Rating of perceived exertion (RPE) (/10)	5.9	6.2

Source: data and methods based on E Rampinini, FM Impellizzeri, C Castagna, G Abt, et al.,
 'Factors influencing physiological responses to small-sided games',
 in *Journal of Sports Sciences*, April 2007, p. 662

Using the data provided, compare the factors that cause fatigue associated with playing small-field and large-field soccer.

3 marks

Question 7 (12 marks)

Hayley and her teammates undertook a Cooper 12-minute run test as part of their local under-18 football team's pre-season battery of fitness tests. The Cooper 12-minute run test is a run around an athletics track to achieve a maximum distance in 12 minutes.

- a.** Hayley's blood lactate level remained relatively stable during the majority of the Cooper 12-minute run test.

Explain why.

2 marks

- b.** The Cooper 12-minute run test is a field test.

Justify the selection of this test for the under-18 football team from a physiological, psychological and sociocultural perspective.

5 marks

- c. Hayley's coaches developed a specific training program for her to improve her score on the Cooper 12-minute run test before the end of the season.

- i. List two training methods that could have been incorporated into Hayley's training program to improve her performance.

2 marks

1. _____

2. _____

- ii. For **one** of the training methods listed in **part c.i.**, design the conditioning phase of one of Hayley's training sessions using the correct application of training principles.

3 marks

Question 8 (14 marks)

Pita Taufatofua is an athlete from Tonga who has competed in both the summer and winter Olympic Games. He competed in taekwondo in the 2016 Summer Olympic Games in Rio and in cross-country skiing in the 2018 Winter Olympic Games in Pyeongchang.

Taufatofua is only the second athlete from a Pacific nation to compete in a Winter Olympic Games. As there is no snow in Tonga or near his base in Brisbane, Australia, Taufatofua initially trained by running on sand dunes with wooden planks strapped to his feet to simulate being on snow. He then trained on roller skis. These two training techniques assisted with developing balance and fitness, and the glide technique required for cross-country skiing. Taufatofua learnt to ski in the snow in three months. He competed in the men's 15 km free cross-country event with a time of 56:41.10 and finished 114th out of the 118 competitors. His time was just under 23 minutes slower than that of the gold medallist for the event.

- a. When Taufatofua first began to learn to ski, what stage of learning was he in? 1 mark

- b. Taufatofua stated, prior to the 2018 Winter Olympic Games in Pyeongchang, that he wanted to 'finish before they turn the lights off' and 'not ski into a tree'.

Identify the psychological strategy that Taufatofua may have used to prepare for the event and outline how this psychological strategy may have improved his performance. 2 marks

- c. Select **one** sociocultural factor and explain how it may have affected the development of Taufatofua's skiing skills. 2 marks

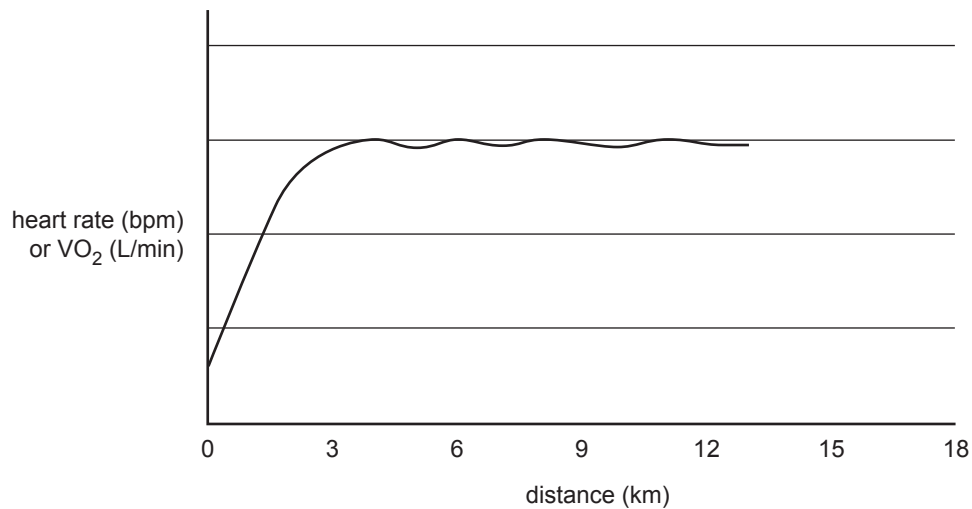
During the men's 15 km free cross-country event, Taufatofua's average speed was recorded during four different distance sectors of the course. The results are shown in the table below.

Distance sectors (km)	Average speed (km/h)
0–1.5	16.84
1.5–7.5	16.22
7.5–13.5	15.13
13.5–15	17.75

- d. Explain why, physiologically, when participating in the 15 km free cross-country event, Taufatofua's average speed declined over the first 13.5 km of the race.

3 marks

The graph below is a representation of Taufatofua's oxygen consumption during the first 13.5 km of the 15 km free cross-country event. The final 1.5 km of the course is flat.



- e. Complete the graph above for the last 1.5 km of the event and the 2 km Taufatofua completed as recovery. Shade and label the graph to demonstrate your understanding of Taufatofua's oxygen consumption, including:

- steady state
- periods of O_2 deficit
- period of excess post-exercise oxygen consumption (EPOC).

4 marks

- f. During recovery, Taufatofua's heart rate remained elevated.

Explain what is occurring physiologically.

2 marks

The table below shows average speed data for two skiing events.

Explain how a skier can generate a higher average speed in a short (sprint) event compared to a long event. Use the data from the table above and your knowledge of energy system interplay in your response.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Question 10 (8 marks)

Source: Corepics VOF/Shutterstock.com

- a. Identify **two** forces acting on the cyclists in the image above.

2 marks

The cyclist ahead is accelerating away from the other cyclist.

- b. Use Newton's second law of motion to explain how this is occurring if the net (overall) force acting on both cyclists is the same.

2 marks

- c. Provide an example of an intrinsic form of feedback that the cyclist ahead would experience and explain how this could assist their performance during a race.

2 marks

- d.** A road cycling race began at midday and took an average of four hours and 50 minutes to complete. It was completed in 29 °C.

Explain **one** way in which the body regulates its temperature and the effect this has on performance.

2 marks

Question 11 (16 marks)

Scott brings his friend Renee to his group fitness classes, where everyone completes the same strength-based resistance training program. The weekly program is shown below.

Monday	back squat 5 sets × 3 repetitions @85% of 1 repetition maximum (RM)	front squat 5 sets × 3 repetitions @85% of 1 RM	weighted walking lunges 3 sets × 20 m
Tuesday	shoulder press 5 sets × 3 repetitions @85% of 1 RM	weighted pull-ups 3 sets × 3 repetitions	long interval rowing 1 set × 3 repetitions (1 km) @85% HR max W:R = 1:1
Thursday	dead lift 5 sets × 3 repetitions @85% of 1 RM	weighted single-leg squat 4 sets × 4 repetitions	kettlebell swings 10 sets × 20 repetitions 60 sec rest after each set
Friday	bench press 5 sets × 3 repetitions @85% of 1 RM	weighted pull-ups 3 sets × 3 repetitions	burpees 4 sets × 25 repetitions 2 min rest after each set

Scott has been training for two years and Renee has never done formal strength-based resistance training before.

- a. Critique the training program for its effectiveness in improving Scott's strength and maintaining his anaerobic capacity.

4 marks

Both Scott and Renee measured their strength through fitness testing by performing four major lifts at the beginning and end of an eight-week training program. The results are shown in the table below.

	Percentage change	
	Scott	Renee
Back squat	increased 2%	increased 40%
Shoulder press	increased 1%	increased 20%
Dead lift	increased 3.5%	increased 60%
Bench press	increased 1.5%	increased 30%

- b. State a physiological purpose and a psychological purpose of undertaking the initial fitness testing of Scott's and Renee's strength. 2 marks

Physiological purpose _____

Psychological purpose _____

- c. Describe **two** ways in which the reliability of the fitness tests undertaken can be ensured. 2 marks

- d.** Explain the difference in results achieved by Scott and Renee by applying your understanding of physiological, biomechanical and skill acquisition principles for improving performance. Your response should include a discussion of:
- chronic adaptations
 - force production
 - stages of learning.

8 marks

[illegible]