

Victorian Certificate of Education
2022

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER Letter

PHYSICAL EDUCATION**Written examination****Monday 7 November 2022****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 31 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

In preparation for the 2020 Tokyo Olympic Games, BMX freestyle cyclist Logan Martin recreated the course that he would compete on in his backyard.

Which one of the following psychological strategies was Martin using by practising on this recreated course?

- A. simulation
- B. mental imagery
- C. biofeedback
- D. goal setting

Question 2

Which one of the following activities is likely to represent the highest level of practice variability for a passing skill in lacrosse?

- A. modified games
- B. closed drills
- C. isolated drills
- D. practising passing to a target on a wall

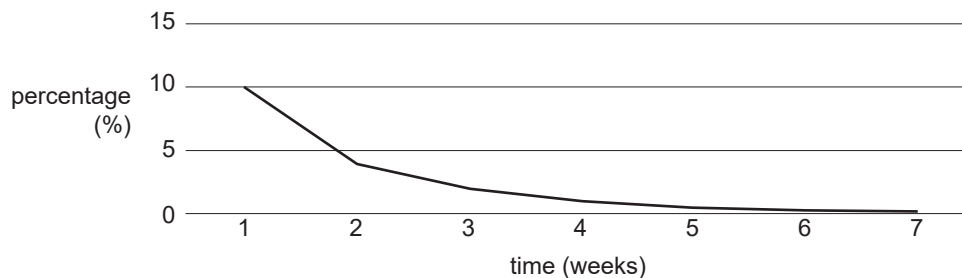
Question 3

The most likely muscular adaptation resulting from a 12-week long-interval training program is

- A. increased Type II fibres.
- B. decreased resting heart rate.
- C. increased CP stores.
- D. increased size and number of mitochondria.

Question 4

The graph below shows the percentage of improvement on an agility test over seven weeks.



Which training principle is shown in the graph above?

- A. progression
- B. reversibility
- C. diminishing returns
- D. individuality

Question 5

Which one of the following training methods is the most effective for improving muscular endurance?

- A. plyometric training
- B. resistance training
- C. short-interval training
- D. flexibility training

Question 6

Which one of the following is an example of sociological data that could be maintained in a training diary?

- A. resting heart rate
- B. hours of sleep
- C. motivation levels
- D. training partners

Question 7

A tennis racquet that rotates during a forehand stroke experiences

- A. linear velocity.
- B. angular velocity.
- C. linear displacement.
- D. an increase in mass.

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Question 8

To ensure fitness testing is valid, it is important to

- A. select a test that measures the intended fitness component.
- B. obtain informed consent.
- C. check and calibrate the equipment.
- D. complete the warm-up routine.

Question 9

Which one of the following occurs when steady state is achieved during exercise?

- A. Oxygen supply does not equal demand.
- B. All ATP is resynthesised through aerobic pathways.
- C. Oxygen demand is increasing.
- D. Oxygen supply equals demand.

Question 10

The most likely fatigue mechanism for a trained marathon runner who completes a marathon in approximately three hours is

- A. CP depletion.
- B. accumulation of metabolic by-products.
- C. glycogen depletion.
- D. exceeding lactate inflection point (LIP).

Question 11

Which one of the following is the most suitable to test anaerobic capacity for an under-16 basketball team?

- A. vertical jump
- B. phosphate recovery test
- C. 30-second Wingate test
- D. multi-stage fitness test

Question 12

Which one of the following is the most often associated with constraint-based approaches to coaching?

- A. coach-led learning
- B. prescriptive instruction
- C. learners exploring movement solutions
- D. a coach passing on knowledge to learners

Use the following information to answer Questions 13 and 14.

The graph below shows the percentage of energy contributed by carbohydrates and fats as exercise intensity changes.



Source: adapted from SK Powers and ET Howley, *Exercise Physiology: Theory and Application to Fitness and Performance*, McGraw-Hill, New York, 2009, p. 61

Question 13

Which one of the following statements is correct?

- A. As the exercise intensity increases, the contribution of fats to energy production increases.
- B. As the exercise intensity increases, the contribution of carbohydrates to energy production increases.
- C. At 60% VO_2 max, there is a higher contribution from fats than from carbohydrates to energy production.
- D. At 50% VO_2 max, there is an even contribution between fats and carbohydrates to energy production.

Question 14

When comparing the rate and yield of energy (ATP) production, which one of the following statements is correct?

- A. At 20% VO_2 max, fats produce the largest yield of ATP at the slowest rate.
- B. At 40% VO_2 max, carbohydrates produce the largest yield of ATP at the slowest rate.
- C. At 60% VO_2 max, fats produce the largest yield of ATP at the slowest rate.
- D. At 80% VO_2 max, carbohydrates produce the largest yield of ATP at the slowest rate.

Question 15

Which one of the following is an example of Newton's second law of motion?

- A. when performing a somersault, rotating at the same angular velocity unless an external force acts to change the rotation
- B. when performing a long jump, swinging the legs forward, which causes the upper body and arms to rotate forward
- C. when performing bicep curls, putting more weight on the dumbbell, which requires more force to lift the dumbbell
- D. when performing a throw in netball, the netball not travelling with the same acceleration as a tennis ball when thrown with the same force

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**END OF SECTION A
TURN OVER**

SECTION B**Instructions for Section B**

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

Question 1 (12 marks)

During the 2020 Tokyo Olympic Games, Australian athlete Ariarne Titmus won gold medals in the 200 m and 400 m freestyle swimming events.

- a. i.** Identify the stage of learning Titmus was in at the 2020 Tokyo Olympic Games. 1 mark

- ii.** List **two** characteristics of the stage of learning identified in **part a.i.** 2 marks

- b.** Explain why the frequency and use of intrinsic and augmented feedback should have changed as Titmus progressed through the stages of learning. 3 marks

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Question 2 (10 marks)

In baseball, the pitcher may throw different types of pitches, such as fastballs, curveballs and change-up pitches. The batter has to respond differently to these pitches because they travel at different speeds, come from different directions and are thrown at different heights.

- a. i. Is batting in baseball classified as an open skill or a closed skill? 1 mark

- ii. Give **two** reasons to support your response in **part a.i.** 2 marks

During batting practice, batters may use ball projection machines. Using these machines allows batters to hit many balls in a short period of time and to practise consistently and repetitively while focusing on one specific movement.

- b. For each skill acquisition principle in the table below, circle the option that would best suit practising batting with a ball projection machine. 3 marks

Skill acquisition principle	Option 1	Option 2
coaching approach	direct	constraints-based
stage of learning	associative	cognitive
practice variation	random	blocked

- b. During a jump serve, to strike the ball with power, the player moves their striking arm backwards in preparation and then, while in the air, the player swings their striking arm forward to strike the ball. While the player moves their striking arm backwards (clockwise in the image below), they also move their legs backwards (anticlockwise in the image below). While still in the air, the player swings their striking arm forward to strike the ball (anticlockwise in the image below) and their legs also swing forward (clockwise in the image below).



Source: Liliia P/Shutterstock.com

Using Newton's third law of motion and concepts of angular momentum, explain why the action of the player's arms and legs occurs as described above.

3 marks

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- c. To improve their maximum jump height while serving and to improve their blocking and spiking skills, a team of volleyball players were prescribed a training program, including the following effective conditioning phase to improve muscular power. The training program is completed three times a week for 12 weeks, with a rest day in between each session.

Exercise	Load (% of 1RM)	Repetitions	Sets	Speed of contraction	Rest time
weighted squats	50% of 1RM	3 reps	5 sets	as fast as possible	3 min rest between sets
dead lift	40% of 1RM	6 reps	3 sets	as fast as possible	2 min rest between sets
kettle bell swings	30% of 1RM	12 reps	3 sets	as fast as possible	1 min rest between sets

Note: ‘reps’ stands for ‘repetitions’.

Discuss **three** correct applications of training principles in the conditioning phase to improve muscular power. Make **one** recommendation to fix any errors in this conditioning phase.

4 marks

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- d. A typical point in volleyball involves a player performing repeated vertical jumping actions, such as a serve followed by blocks and/or spikes.

Explain how the physiological adaptations of increased phosphocreatine (PC) stores and increased motor unit recruitment as a result of the conditioning phase to improve muscular power could improve the performance needed for scoring a typical point in volleyball.

3 marks

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SECTION B – continued
TURN OVER

- b. Identify **one** psychological strategy the goalkeeper could use to reduce arousal during a shootout and describe how they could use this strategy to improve their performance during the shootout.

2 marks

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SECTION B – continued
TURN OVER

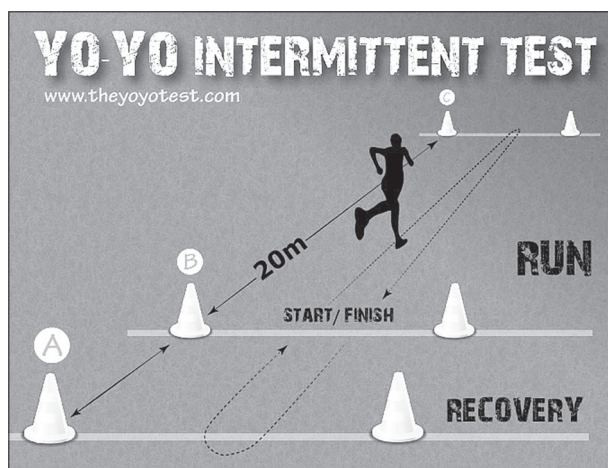
Question 6 (14 marks)

The table below shows data resulting from an activity analysis of 17-year-old male handball players during a state-level tournament.

Speed of movement	Distance covered (m)
sprint	98
high-intensity running	163
jogging	1136
walking	362

Data: MS Chelly et al., 'Match analysis of elite adolescent team handball players', *Journal of Strength and Conditioning Research*, vol. 25, no. 9, 2011, p. 2414

The handball players were also required to complete the Yo-Yo intermittent recovery test shown in the diagram below. This is a fitness test that involves running at increasing speeds between markers placed 20 metres apart and recovering in between runs. The test continues until the runner is exhausted.



Source: R Wood, 'The Complete Guide to the Yo-Yo Test', 2018, <www.theyoyotest.com>

- a. Name and define the fitness component that is assessed in the Yo-Yo intermittent recovery test. 2 marks

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- b. Using the data provided in the table on page 16, justify why, from a physiological perspective, the Yo-Yo intermittent recovery test was selected to assess the handball players' fitness.

3 marks

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- c. i.** Outline how an alternative fitness test, assessing the same fitness component as the Yo-Yo intermittent recovery test, could correctly be conducted. Include a diagram in your response. 2 marks

- ii.** Outline the possible advantage, from a psychological and sociocultural perspective, of using the alternative test from **part c. i.** 2 marks

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- d. Prior to the Yo-Yo intermittent recovery test, a pre-participation health screening survey – a Physical Activity Readiness Questionnaire (PAR-Q) – was conducted.

Outline the purpose of the survey.

2 marks

- e. One of the handball players scored 8.8 on the Yo-Yo intermittent recovery test. This was the lowest score for the team.

- i. State the minimum number of days per week this handball player will have to train to improve the fitness component identified in **part a**.

1 mark

- ii. List **two** training methods this handball player could use to improve the fitness component identified in **part a**.

2 marks

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SECTION B – continued
TURN OVER

Question 7 (4 marks)

- a. The graph below shows blood lactate concentration over time, comparing different recovery methods following intense exercise.



Source: adapted from SK Powers and ET Howley, *Exercise Physiology: Theory and Application to Fitness and Performance*, McGraw-Hill, New York, 2009, p. 54

With reference to the graph above, explain whether passive recovery or active recovery is more beneficial following intense exercise.

3 marks

- b. Name the term used to describe the oxygen consumed above resting levels following intense exercise.

1 mark

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SECTION B – continued
TURN OVER

Question 8 (8 marks)

The table below shows data resulting from a comparison of small-sided soccer games used as training for under-17s. Each small-sided game lasted three minutes, the pitch measured 40 m × 30 m and each team consisted of four players plus a goalkeeper. The coaches manipulated the constraints of each game, which influenced player movement and motor skill development. During ‘unlimited touches’ games, players were allowed unlimited ball touches per ball possession; during ‘two touches’ games, they were allowed a maximum of two ball touches per ball possession; and during ‘one touch’ games, they were allowed a maximum of one ball touch per ball possession.

Mean per player (under-17)	Small-sided soccer game constraints		
	Unlimited touches	Two touches	One touch
total distance covered (m)	428	418	407
distance walked (m)	36	39	40
distance jogged (m)	351	334	328
distance run (m)	41	45	39
number of successful passes	3.8	5.2	5.8
number of unsuccessful passes	1.1	1.6	1.8
number of shots on target	0.5	0.3	0.4
number of goals scored	0.3	0.2	0.2

Data: adapted from D Coutinho et al., ‘Exploring how limiting the number of ball touches during small-sided games affects youth football players’ performance across different age groups’, *International Journal of Sports Science & Coaching*, vol. 17, 2022, pp. 545–547

- a. What type of constraint is being manipulated by changing the number of ball touches per ball possession during the small-sided soccer games?

1 mark

- b. Explain how manipulating the constraint identified in **part a.** influenced the skill performance and skill development during the small-sided soccer games.

3 marks

- c. List **two** acute muscular responses that would have occurred during the small-sided soccer games.

2 marks

- d. Select **one** of the acute muscular responses from **part c.** and explain how this response would assist the soccer player in their performance.

2 marks

Acute muscular response _____

Explanation _____

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SECTION B – continued
TURN OVER

Question 9 (10 marks)

a. In golf, a driver (a long club with a large striking head) can hit a golf ball further than a 9-iron (a shorter club with a smaller striking head). They are approximately the same mass despite their difference in length.

Based on your understanding of biomechanical principles, give **two** reasons why the driver can hit the golf ball further. Your response should include reference to how the following will impact performance:

- lever length
- conservation of momentum

4 marks

A young golfer is having their swing technique assessed by their coach. The coach has prepared a checklist and has observed the golfer’s swing technique.

b. Explain why using digital recording as part of a qualitative analysis is the optimal method of observation to analyse and improve the golfer’s swing technique.

2 marks

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- c. Outline **two** limitations of using direct observation to analyse the golfer's swing technique. 2 marks

- d. Outline the two remaining steps in a qualitative analysis that the coach is undertaking in order to be able to give feedback to the golfer about their swing technique. 2 marks

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SECTION B – continued
TURN OVER

Question 10 (14 marks)

During a soccer match, soccer referees cover significant ground to be able to best adjudicate the game.

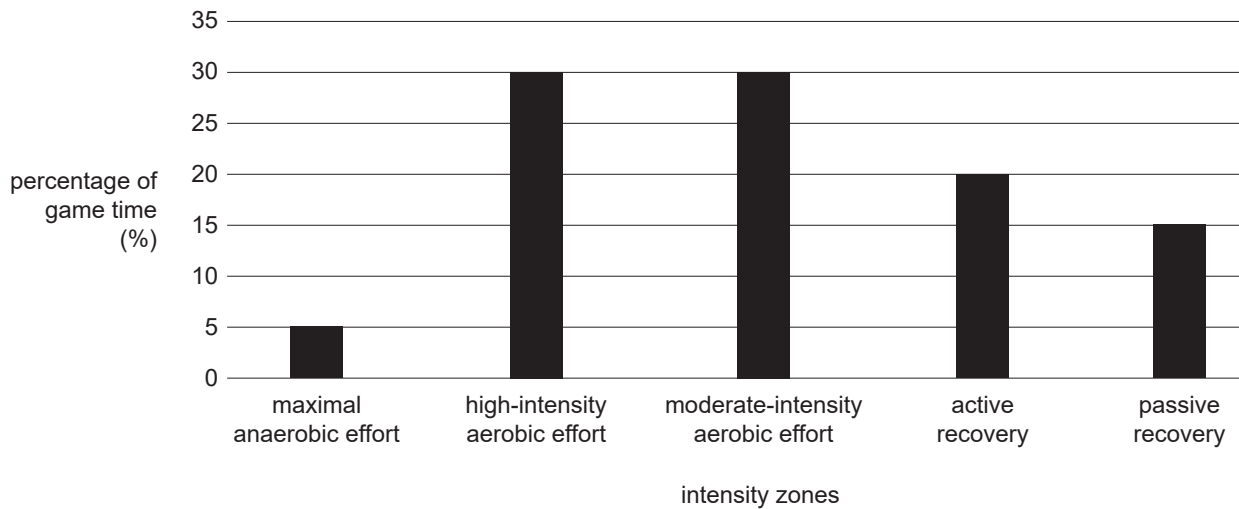
Following a soccer game in 33 °C heat, soccer referees undertake a rehydration protocol of 1.5 L of rehydration fluid per 1 kg of body weight lost.

- a. With reference to blood plasma, explain the benefit of this rehydration protocol for soccer referees. 2 marks

- b. Discuss the benefit of including carbohydrates in the rehydration fluid for soccer referees. 2 marks

- c. The graph below and the table on page 27 show data resulting from an activity analysis of elite soccer referees.

Percentage of game time in varied intensity zones



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Time and distance spent in different intensity zones for soccer

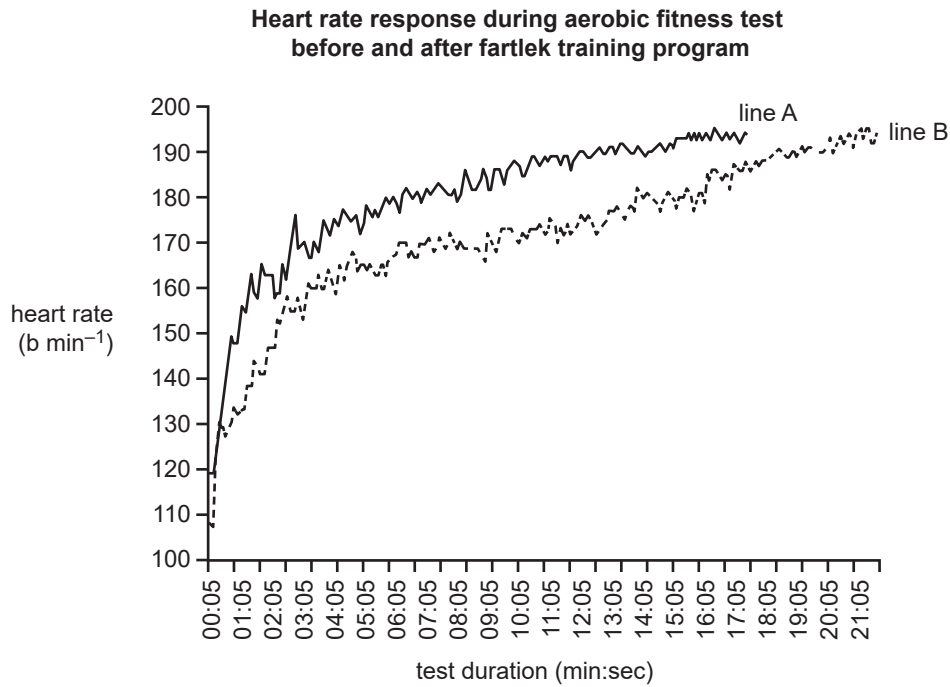
	Sprinting	Running	Jogging	Walking	Standing
Intensity of effort	maximal anaerobic effort	high-intensity aerobic effort	moderate-intensity aerobic effort	active recovery	passive recovery
Distance of average effort	10 m	65 m	40 m	20 m	0 m
Time of average effort	1.7 s	20 s	20 s	45 s	40 s

Based on the data provided in the graph on page 26 and the table above, design the conditioning phase of a fartlek training program for the soccer referees, focusing specifically on high-intensity and moderate-intensity aerobic efforts.

4 marks

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- d. Before commencing the fartlek training program, the soccer referees completed an aerobic fitness test. The aerobic fitness test was repeated after they finished the fartlek training program. The test results for one referee are shown in the graph below.



Source: adapted from M Weston et al., ‘The impact of specific high-intensity training sessions on football referees’ fitness levels’, *The American Journal of Sports Medicine*, vol. 32, no. 1 suppl., 2004, p. 58S; © 2004 AJSM/SAGE; reprinted by permission of SAGE Publications

Referring to the data in the graph above, identify which line – line A or line B – shows the test result after the fartlek training program. Justify your response by referring to **two** chronic adaptations that would explain the improved test result.

4 marks

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- e. List **two** considerations to ensure reliable test results after the fartlek training program.

2 marks

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SECTION B – continued
TURN OVER

Question 11 (10 marks)

The graph below shows heart rate data from a highly trained amateur trail runner who has completed two 12 km training sessions, on different training days, on a trail-running track in an area with frequent uphill and downhill sections. The trail runner’s heart rate was recorded every four minutes. The trail runner completed the two training sessions in approximately 64 minutes each.



Source: adapted from R Lopez et al., ‘Examining the influence of hydration status on physiological responses and running speed during trail running in the heat with controlled exercise intensity’, *Journal of Strength & Conditioning Research*, vol. 25, no. 11, 2011, p. 2946

- a. On both training days, the temperature was above 27 °C but the trail runner was well hydrated.

Identify and discuss a likely cause of fatigue for the trail runner.

2 marks

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