

Victorian Certificate of Education
2020

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER

Letter

PHYSICAL EDUCATION

Written examination

Wednesday 25 November 2020

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	10	10	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 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

In the cognitive stage of learning, what is the learner trying to do?

- A. understand the skill
- B. refine their performance
- C. make the actions automatic
- D. organise a more efficient movement pattern

Question 2

Heart rate responses were taken at regular intervals during a 20-minute continuous run. For the time period between three and seven minutes, heart rate readings were between 110 bpm and 113 bpm.

Which one of the following physiological statements could explain these readings?

- A. The ATP resynthesis rate is finite.
- B. The anaerobic threshold is being met.
- C. Oxygen supply is equal to oxygen demand.
- D. The lactate inflection point (LIP) has been surpassed.

Question 3

Which one of the following is a psychological benefit of sleep?

- A. improved motivation
- B. increased stress hormones
- C. decreased immune function
- D. increased perception of fatigue

Question 4

The advantage of a second-class lever is

- A. an increase in the angular velocity of the lever.
- B. an increase in the range of motion of the lever.
- C. a decrease in the force required to move a mass.
- D. a decrease in the mechanical advantage of the lever.

Question 5

A short interval training session at 90% HR max., with a work-to-rest ratio of 1:8, would train which energy system(s)?

- A. aerobic system
- B. ATP-CP system
- C. anaerobic glycolysis system
- D. ATP-CP, aerobic and anaerobic glycolysis systems

Question 6

Which one of the following adaptations would be observed in the respiratory system after 12 weeks of fartlek training three times per week?

- A. maintained lung volumes
- B. increased haemoglobin levels
- C. decreased alveolar surface area
- D. increased ventilation at maximal intensity

Question 7

A high jumper has been taking part in a resistance training program. They have recently improved their performance by 10 cm.

Which one of the following adaptations may have contributed to this increase?

- A. increased ATPase
- B. increased lactate tolerance
- C. increased glycolytic enzymes
- D. increased muscle glycogen stores

Question 8

In relation to practice distribution, which one of the following practice schedules would be described as the most massed practice?

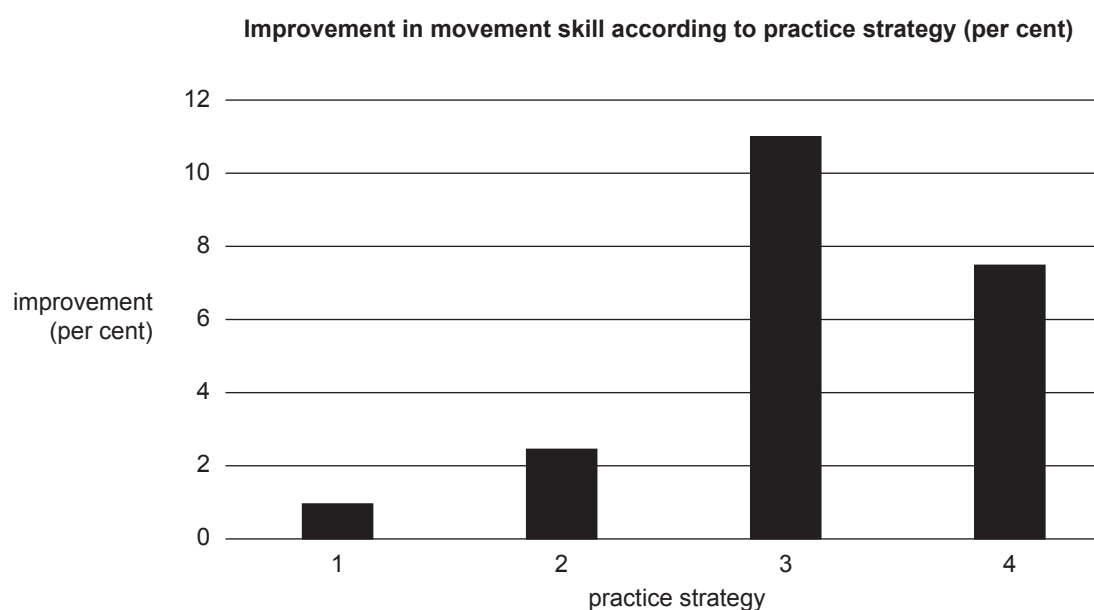
- A. 2 × 90-minute sessions per week
- B. 3 × 60-minute sessions per week
- C. 1 × 180-minute session per week
- D. 6 × 30-minute sessions per week

Question 9

Four different practice strategies were used to improve a movement skill. The table below gives a description of each of the four practice strategies used.

Practice strategy	Description
1	same skill repeated over and over in one practice session
2	variations of the same skill repeated in one practice session
3	multiple skills practised in any order in one practice session
4	multiple skills practised in a set order in one practice session

The graph below shows the improvement achieved by using each practice strategy.



What is the name of the practice strategy that led to the greatest improvement in performance?

- A. massed practice
- B. blocked practice
- C. random practice
- D. distributed practice

Question 10

The energy system with the highest yield of ATP but slowest rate is the

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

Question 11

‘The rate of fitness gains will decrease as an athlete gets closer to their genetic potential.’

Which training principle does this statement refer to?

- A. detraining
- B. progression
- C. overtraining
- D. diminishing returns

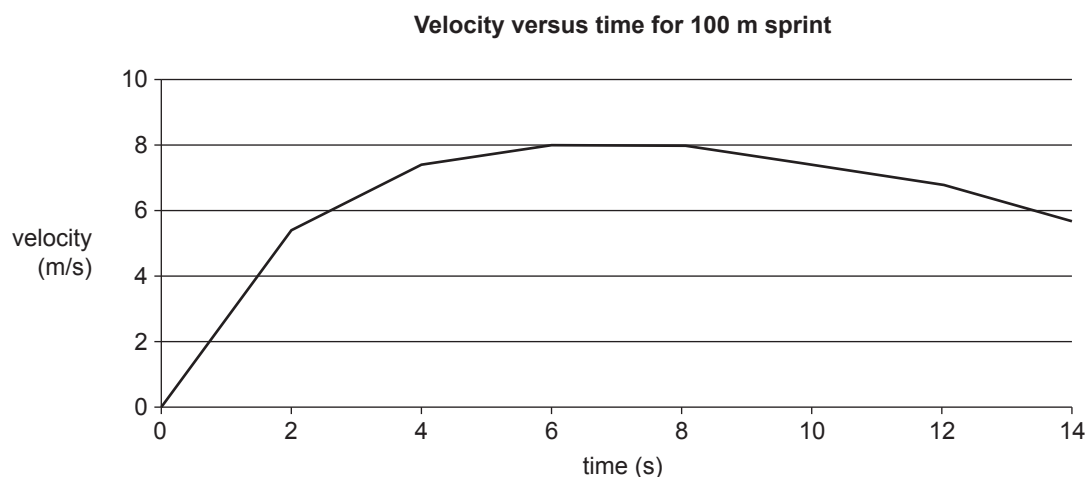
Question 12

Agility is the ability to

- A. control equilibrium while moving.
- B. change direction while maintaining balance.
- C. move the body quickly from one point to another.
- D. exert a maximum amount of force in the shortest period of time.

Use the following information to answer Questions 13–15.

The following questions relate to a student's performance in 100 m sprints conducted during their Physical Education class. The data for the student's sprint is shown in the graph below.



Question 13

Based on the graph above, which one of the following statements best describes the student's sprint performance?

- A. The student ran at a constant velocity for 100 m.
- B. The student ran at their maximum velocity for 100 m.
- C. The student accelerated positively throughout the sprint.
- D. The student accelerated positively until they reached their maximum velocity.

Question 14

The teacher provided the following feedback to the student: 'Your time for the 100 m sprint was 14 seconds.'

Which type of feedback was provided to the student?

- A. knowledge of performance
- B. knowledge of results
- C. proprioceptive
- D. intrinsic

Question 15

The student asks to run again to beat their time. This time the student uses a crouch start rather than a standing start.

Biomechanically, in a crouch start the student will have

- A. a lower centre of gravity and lower angle of release.
- B. higher force production and a higher angle of release.
- C. a lower centre of gravity and lower inertia to overcome.
- D. higher force production and higher inertia to overcome.

SECTION B

Instructions for Section B

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

Question 1 (6 marks)

Below is an example of a high-intensity interval training (HIIT) program.

Frequency	Intensity	Work period	Recovery period	Type	Repetitions
3 × per week	80–90% VO ₂ max.	4 min	1–3 min	running	4–6

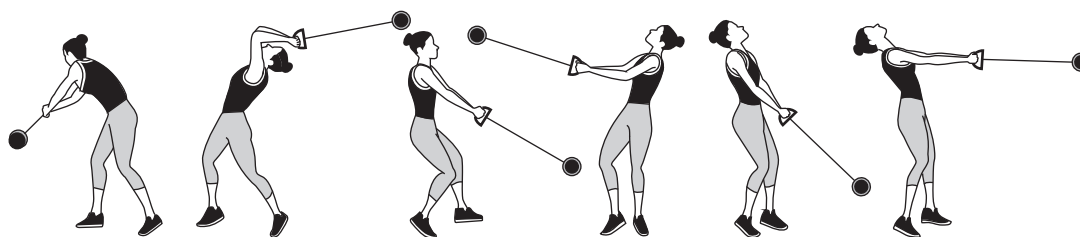
- a. i. State the fitness component being targeted by the training program above. 1 mark

- ii. Outline **one** benefit of HIIT compared to long interval training. 1 mark

- b. i. List **two** chronic adaptations that occur as a result of using the HIIT method. 2 marks

- ii. Explain how **one** of the chronic adaptations listed in **part b.i.** can improve running performance. 2 marks

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Question 2 (10 marks)

The diagram above shows the sequence for a hammer throw. Flexibility is an important fitness component in hammer throwing.

- a. Define 'flexibility' and explain the importance of flexibility in hammer throwing.

2 marks

- b. Based on your understanding of levers, explain why it is important for a hammer thrower to release the hammer with straight arms.

3 marks

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c. Plyometrics is often used as a training method for the hammer throw.

- i. In the table below, design a plyometrics training session for the hammer throw. Include two exercises in the conditioning phase. You may use diagrams to explain the exercises.

4 marks

Warm-up	Conditioning phase	Cool-down
	1.	
	2.	

- ii. Give **one** example of how progression could be applied to the conditioning phase of the plyometrics training session designed in **part c.i.**

1 mark

Question 3 (7 marks)

Students in a Physical Education class took part in the following long interval training session for running.

Repetitions	Sets	Distance (m)	Recovery time (s)	Intensity (% HR max.)
3	2	500	90	80

- a. Name the energy system with the greatest contribution during the long interval training session above. 1 mark

Two students in the class, Sarah and Mark, debated the benefits of long interval training. Sarah believed that long interval training would improve lactate inflection point (LIP). Mark disagreed and claimed that long interval training would increase lactate tolerance.

- b. Who is correct – Sarah or Mark? Justify your response with reference to the long interval training session above. 4 marks

- c. State the type of recovery – active or passive – that should be undertaken after completing an endurance event and outline why this type of recovery would be suitable. 2 marks

With reference to the relevant biomechanical principles, discuss the type of feedback that Peta can provide to the players to correct this error and refine their skill. Your response should include reference to:

- feedback
- summation of momentum
- angular velocity
- levers.

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Question 5 (10 marks)

Data from a study comparing hockey player activity in games played by teams with a standard number of players and teams with a reduced number of players on the same full-sized hockey field is presented in the table below.

Average skill frequency for a 25-minute hockey game

	Standard no. of players (11 players per team)	Reduced no. of players (8 players per team)
	Skill frequency (number)	Skill frequency (number)
Successful pass	6.36	8.55
Unsuccessful pass	3.36	2.46
Total passes	9.73	11.00
Skills performed under high pressure	1.82	2.64
Skills performed under medium pressure	2.64	3.45
Skills performed under low pressure	1.64	2.18

Data: EA Timmerman, D Farrow and GJP Savelsbergh,
 ‘The effect of manipulating task constraints on game performance in youth field hockey’,
International Journal of Sports Science and Coaching, 12(5), 2017, pp. 588–594

- a. Using data from the table above, analyse how reducing the number of players per team influences skill practice opportunities for players in the game of hockey.

3 marks

- b. Identify the type of constraint that reducing the number of players in a game of hockey represents.

1 mark

- c. Outline one advantage and one disadvantage of a constraints-based approach to coaching.

2 marks

Advantage _____

Disadvantage _____

- d. With reference to impulse and momentum, explain how a hockey player may improve their push pass to result in a ball travelling faster.

4 marks

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SECTION B – continued
TURN OVER

Question 6 (12 marks)

Water polo is a pool-based sport that involves two teams of seven players attempting to score goals by throwing a ball into the opposing team's net. A water polo match consists of four seven-minute quarters and two minutes of rest. Each quarter, players use a combination of swimming, treading water, throwing, catching and shooting to beat the opposing team by scoring more goals. Players are not allowed to touch the bottom of the pool or hold on to the lane ropes.



Source: luca85/Shutterstock.com

In each quarter, a water polo player:

- completes a 'swim off', where they maximally swim 10–15 m to gain possession of the ball and pass it back to teammates
- swims and moves to a position where they can score
- holds their position against an opposing player
- catches the ball, then propels themselves out of the water and shoots at the goal net
- will repeat several intervals with little rest in between, resulting in back-to-back intense swims that may total 25–30 seconds.

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6 marks

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2 marks

- c. Dry land muscular endurance resistance training is recommended for elite water polo players. A suggested program is outlined in the table below.

Monday	Tuesday	Wednesday	Thursday	Friday
front squats 5 sets × 5 reps	seated row 2 sets × 20 reps	heavy weight walk 1–2 reps × 400 m	sumo squats 1 set × 20–30 reps	push-ups 5 sets × 5 reps
	triceps dips 2 sets × 10 reps		triceps dips 1 set × 20 reps	chin-ups 5 sets × 5 reps

Source: adapted from Michael Reid, Water Polo Planet,
<www.waterpoloplanet.com/a-strength-training-template-for-water-polo-part-ii/>

Note: ‘reps’ stands for ‘repetitions’

Critique the effectiveness of this program for improving a water polo player’s performance through the development of muscular endurance.

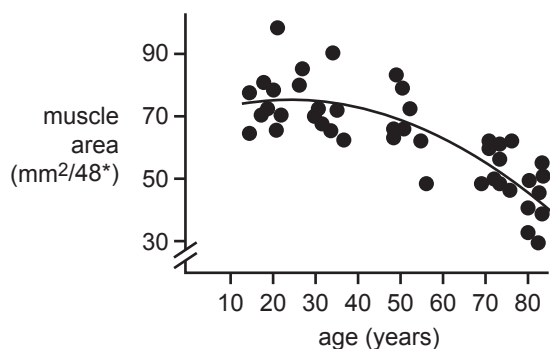
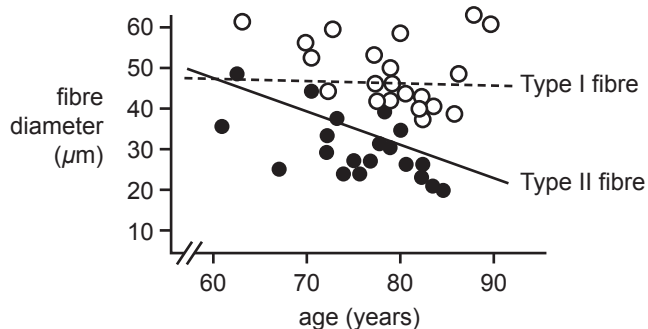
4 marks

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SECTION B – continued
TURN OVER

Question 7 (10 marks)**Muscle cross-sectional area versus age****Muscle fibre diameter versus age**

Source: adapted from JF Signorile, *Bending the Aging Curve: The Complete Exercise Guide for Older Adults*, Human Kinetics, Champaign, pp. 6 and 7

* $\text{mm}^2/48$ – corresponds to the number of squares ($1 \times 1 \text{ mm}$) examined

- a. Other than the three factors shown in the graphs above, name **one** factor that can affect muscular strength.

1 mark

- b. Using the data in the graphs above, analyse the influence of age on the cross-sectional area and fibre size of a muscle. Include how this in turn affects muscular strength.

4 marks

- c. An example of a training program designed to improve muscular strength is shown below.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
weighted circuit	resistance training		weighted circuit	resistance training		cycling
85% of 1 RM	85% of 1 RM		85% of 1 RM	85% of 1 RM		65% HR max.
fixed reps = 6	maximum reps		fixed reps = 6	maximum reps		20 min
4 rotations	4 sets		4 rotations	4 sets		
40 s rest between each station	10 s rest between each set		40 s rest between each station	10 s rest between each set		
8 stations, all lower-body exercises	all lower-body exercises		8 stations, all lower-body exercises	all lower-body exercises		

Key

reps – repetitions

RM – repetition maximum

s – seconds

Using the FITT principles (frequency, intensity, time and type), evaluate the effectiveness of this training program in improving lower-body muscular strength. Use specific examples from the training program to support your response.

5 marks

Question 8 (14 marks)

The Ironman Triathlon consists of a 3.86 km swim, a 180.25 km bicycle ride and a 42.20 km marathon, raced in that order. Races generally last eight hours for world-class performers.

- a. With reference to the likely cause of fatigue, discuss fuel usage throughout the event and how this may have an impact on performance. 4 marks

- b. List **one** acute response and describe how it results in increased oxygen uptake during exercise. 2 marks

DO NOT WRITE IN THIS AREA

- c. The Ironman Triathlon is usually scheduled to be held at a time when athletes will not have to compete in high temperatures.

Explain, physiologically, what occurs when exercising in high temperatures and suggest what implications this could have on an athlete's performance.

4 marks

- d. Explain, physiologically, why carbohydrates are beneficial for the athletes within the first 30 minutes of finishing the Ironman Triathlon.

2 marks

- e. Suggest why an athlete would ingest protein in combination with carbohydrates after a race to aid recovery.

2 marks

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SECTION B – continued
TURN OVER

Question 9 (14 marks)

The sport of skateboarding will be featured for the first time at the Tokyo Olympic Games. One of the two disciplines on the skateboarding program at the Tokyo Olympic Games will be the street skateboarding competition.

This competition will be held on a street-like course featuring stairs, handrails, kerbs, benches, walls and slopes. A variety of tricks will be performed, such as sliding the skateboard along the kerbs or handrails. Competitors will complete two 45-second runs on the same course with approximately one hour between runs. Their five best tricks will be scored.

- a. Explain the importance of balance for street skateboarding.

2 marks

- b. The image below shows a skateboarder performing a trick.



Source: homydesign/Shutterstock.com

From a biomechanical perspective, describe how a skateboarder could manipulate their centre of gravity, base of support and line of gravity to improve stability when performing the trick shown above.

3 marks

- c. Identify and describe **one** acute muscular response that would likely occur in the first run of the street skateboarding competition.

2 marks

- d. At the Tokyo Olympic Games, music will be played during the skateboarding events to help develop a festival atmosphere.

State **one** psychological strategy that could be used in training leading up to the Tokyo Olympic Games and explain how this strategy could improve a skateboarder's performance.

3 marks

- e. Explain the contribution of the anaerobic energy systems to the energy requirements of competitors in the street skateboarding competition. Use the information on page 22 to support your response.

4 marks

Question 10 (13 marks)

In a women's gymnastics floor event, the gymnasts take part in movements that are performed on a square floor space.

Throughout the 90-second routine, the gymnasts are expected to make fast tumbling passes across the floor, often up to five in a routine, combined with several combinations of skills in succession, such as a sprint, leap, twist, somersault, flip and handstand, that require explosive energy. The gymnasts then rest for no more than a few seconds before repeating another high-intensity combination of moves lasting from three seconds to 20 seconds. This continues for the entire 90 seconds of the routine.

- a. With reference to the intensity and duration of the floor routine, and using the information provided above, explain the interplay of energy systems that provide the energy required for a gymnast to perform a floor routine.

6 marks

- b. Inca is a gymnast waiting to compete in the floor routine. A strategy Inca uses while waiting is controlled breathing.

Describe how this strategy could help enhance Inca's performance.

2 marks

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- c. Classify the floor event in gymnastics as an open skill or a closed skill and provide two characteristics of this type of skill to justify your response.

3 marks

Classification _____

Characteristic 1 _____

Characteristic 2 _____

- d. Explain how Newton's third law of motion relates to the take-off when performing a somersault as part of a floor routine in gymnastics.

2 marks
