

VCE Physical Education

Written examination – End of year

Sample questions

These sample questions are intended to demonstrate how new aspects of Units 3 and 4 of VCE Physical Education may be examined. They do **not** constitute a full examination paper.

SECTION A – Multiple-choice questions

Question 1

Which one of the following is a serial skill?

- A. darts
- B. shot-put
- C. triple jump
- D. riding a bike

Question 2

A golfer takes a large back swing during a drive in order to increase the speed of the club.

Which biomechanical principle is being used by the golfer?

- A. inertia
- B. impulse
- C. projectile motion
- D. moment of inertia

Question 3

The mechanical advantage of a second-class lever system is used in which one of the following situations?

- A. squat
- B. bicep curl
- C. sit-up (upward phase)
- D. sit-up (downward phase)

Question 4

What changes in the moment of inertia and angular velocity occur when a diver tucks in during a somersault dive?

	Moment of inertia	Angular velocity
A.	decrease	increase
B.	increase	increase
C.	increase	decrease
D.	decrease	decrease

Question 5

Flexing the forearm at the elbow is an example of which type of lever?

- A. first-class
- B. second-class
- C. third-class
- D. depends on the resistance being applied

Question 6

Why does a learner in the cognitive stage of learning instinctively move their arms out to the side when on a balance beam?

- A. to increase agility
- B. to increase the force arm
- C. to increase stability by increasing the moment of inertia
- D. to increase stability by moving their centre of mass higher

Question 7

What type of movement skill does the sport of fencing use?

- A. open, fine, serial skill
- B. closed, gross, discrete skill
- C. open, gross, continuous skill
- D. closed, gross, continuous skill

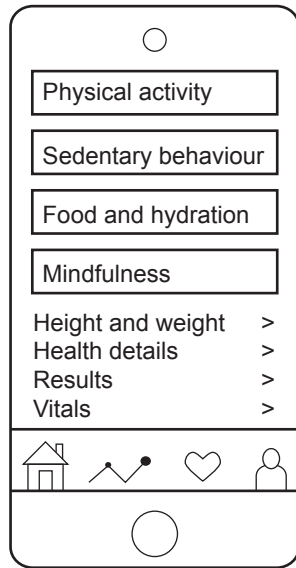
Question 8

Which one of the following scenarios gives an example of Newton's third law of angular motion?

- A. A wet football does not travel with the same acceleration as a dry football kicked with the same force.
- B. An athlete's arms move downwards and their legs move upwards during the flight phase of a long jump.
- C. A diver will continue to rotate at a constant angular velocity unless an external force acts on the body.
- D. An increase in the angular velocity of the leg when running will result in greater linear velocity of the body.

Question 9

The diagram below represents a physical activity tracking app on a mobile phone.



Based on the diagram above, which type of training data can the app record?

- A. sociological and psychological data
- B. physiological and sociological data
- C. physiological and psychological data
- D. physiological, psychological and sociological data

SECTION B

Question 1 (4 marks)

The 20 m shuttle run test is an appropriate fitness test for a group. One advantage of the 20 m shuttle run test is that it can test many subjects at the same time.

Explain **two** sociocultural factors that should be taken into consideration when conducting group testing.

Question 2 (16 marks)

Michael is training for a district long jump competition for athletes under 18 years of age. Images 1–4 below show Michael’s run-up in sequence.



Image 1



Image 2



Image 3

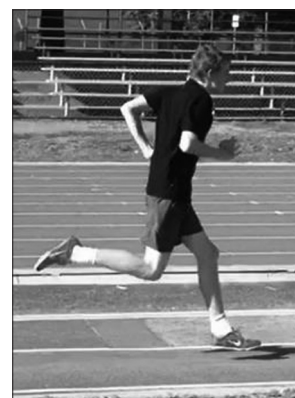


Image 4

- a. Identify the classification of movement skills shown in the images above by circling the correct option from each pair given below. 3 marks
- gross OR fine
 - continuous OR discrete
 - open OR closed

- b.** In terms of the conservation of angular momentum, explain the importance of the position of Michael's left leg in Image 2. 3 marks

- c.** Identify and justify two fitness components that are essential for competing in the long jump at an elite level. 4 marks

Fitness component 1 _____

Justification _____

Fitness component 2 _____

Justification _____

- d.** Images 1, 2 and 3 show when Michael's leg is in contact with the ground, which determines stride length, a factor in determining speed. 3 marks

Explain the importance of stride length in terms of impulse.

- e. As Michael runs, his right leg moves forward at the same time as his left arm.

Using Newton's third law of motion, explain the importance of these actions.

3 marks

Question 3 (8 marks)

The table below shows the 100 m times, mass and initiation of body movement for the four fastest finalists at the 2009 IAAF World Championships in Athletics in Berlin.

Athlete	Fastest 100 m time (sec.)	Mass (kg)	Initiation of body movement (sec.)
Usain Bolt	9.58	94	0.146
Tyson Gay	9.71	75	0.144
Asafa Powell	9.84	87	0.134
Daniel Bailey	9.93	68	0.129

- a. Using the data in the table above, apply Newton’s first and second laws of motion to the starting action of the 100 m sprint.

4 marks

Newton’s first law of motion _____

Newton’s second law of motion _____

- b. Jamaica has produced some of the top male and female 100 m runners in recent history. Explain **two** possible sociocultural reasons for this.

4 marks

Question 4 (3 marks)

A relatively new training method involves bouts of maximal effort (greater than 90% HR max.) lasting 10–30 seconds, followed by periods of lower-intensity recovery.

- a. Identify the training method described above. 1 mark

- b. What is the main energy system targeted by this training method? 1 mark

- c. Outline **one** benefit that this training method has over others that target the same energy system. 1 mark

Question 5 (6 marks)

The record for the men's 100 m sprint has improved at a steady rate between the inaugural modern Olympic Games in Athens in 1896 and the 1968 Olympic Games in Mexico City. Below are some examples of the changing practices associated with the 100 m sprint and the corresponding fastest recorded time.

Year	Modification	Previous practices	Fastest time recorded (sec.)
1896	Thomas Burke used a crouch start position for the first time.	Athletes started from a standing, often side-on, stance.	11.8
1900	Athletes began training regularly, with a specific focus on sprinting.	Athletes used training methodologies for physical preparedness.	10.8
1904	Athletes practised and developed specific starting and finishing techniques for the race.	Athletes started without a practised start technique or 'lunge at the finish line' skill technique.	10.6
1936	Athletes trained using a body angle of 45 degrees for the acceleration phase of the race.	Athletes moved from the crouch start position to a standing position as quickly as possible.	10.3
1948	Starting blocks were used for the first time.	Athletes dug holes with a garden trowel for their feet to fit in.	10.3
1964	Power training for athletes was widely adopted.	It was believed that light-framed athletes were better at sprinting.	10.0
1968	For the first time a synthetic track was used in an international competition.	Compressed ash and soil were used to create a softer track. These tracks were different at each venue.	9.95

Analyse the data provided above to determine the impact of **two** significant biomechanical modifications that led to an improvement in performance in the men's 100 m sprint at the Olympic Games held between 1896 and 1968.

Question 6 (6 marks)

The table below presents a history of winners of the men's 1500 m race at different Olympic Games, along with the predominant training methodology they used to prepare for the competition.

Year	Athlete and training methodology	Race time
1924	Paavo Nurmi (Finland) won the 1500 m and 5000 m race. Nurmi was one of the first athletes to use interval training in order to prepare for distance running.	3:53.6
1960	Herb Elliott (Australia) used a dedicated training camp away from his regular place of residence. At the camp, Elliott trained by doing runs of varied distances up and down sand dunes, training at his lactate inflection point (LIP) or at his VO_2 max.	3:35.6
1964	Peter Snell (New Zealand) ran at a steady pace, no matter the incline or decline of the terrain, completing over 35 km per day in the lead-up to the Olympic Games. Snell recalled having a resting heart rate of 35 beats per minute in the year of the Olympics.	3:38.1
1980	Sebastian Coe (Great Britain) adapted interval training into what is now known as speed endurance training. He completed sprints of 800 m as fast as possible, followed by one-minute rests, with constant repetitions. His progressive overload was the number of 800 m sprints he did in a training session.	3:38.4
2004	Hicham El Guerrouj (Morocco), the 1500 m and 5000 m champion, practised altitude training. He went on training camps to locations far above sea level and used the principles of interval training originally used by Paavo Nurmi 80 years earlier.	3:34.18

Explain the training methods used by **two** different Olympic champions listed above and, with reference to the data, evaluate the effectiveness of these training methods in improving performance in the 1500 m race.

Question 7 (9 marks)

Consider the movement skills performed in the images below. The young child in Image 1 and Image 2 is demonstrating the basic movement pattern needed to perform a handstand. The adult in Image 3 is executing a complex movement skill.

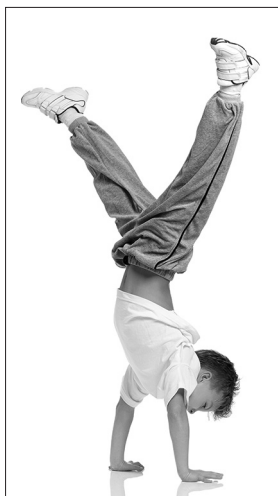


Image 1

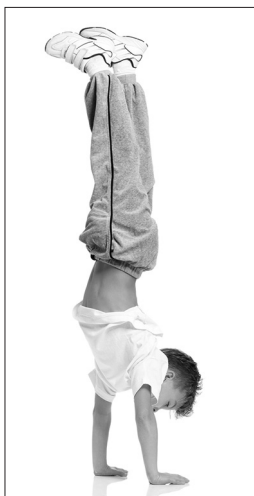


Image 2



Image 3

Sources: VaLiza/Shutterstock.com (Image 1 and Image 2); ITALO/Shutterstock.com (Image 3)

- a. Identify the stage of learning the child in Image 1 and Image 2 is demonstrating. 1 mark

- b. Outline **three** characteristics of the stage of learning identified in **part a**. 3 marks

- c.** With reference to all three images on page 13, discuss the relationship between skill progression and the biomechanical principle of stability for the handstand. 3 marks

- d.** Feedback provides the adult gymnast in Image 3 with information that he can use to improve his performance. 2 marks
- Explain what information the gymnast would receive from his 'knowledge of performance' and why it is important during his routine.

Question 8 (9 marks)

The Australian Football League Women's (AFLW) Draft Combine is an event at which potential draftees display their athletic capacities and relevant Australian Rules football skills. Participants are required to undergo a series of medical, psychological, motor skill, athletic and fitness tests.

The tests include the following:

- Yo-Yo intermittent recovery test
- a 2 km time trial
- an agility test
- a 20 m sprint
- a running vertical jump
- a standing vertical jump
- skinfolds, height and weight

a. The AFLW Draft Combine requires players to keep detailed training records.

Explain the importance of maintaining both physiological and psychological training records. 3 marks

- b.** Discuss the considerations for fitness testing female athletes at the AFLW Draft Combine from a physiological, psychological and sociocultural perspective. 6 marks

Question 9 (8 marks)

The image below shows students assisting other students while exercising.



Source: wavebreakmedia/Shutterstock.com

- a. Identify the fitness test that is most likely being undertaken in the image above. 1 mark

- b. Identify the fitness component that is probably being assessed by the test identified in **part a**. Outline **two** factors that affect this fitness component. 3 marks

Fitness component _____

Factors _____

- c. How does informed consent apply to the fitness test shown in the image above? 2 marks

- d.** With reference to Newton's third law of motion, explain why the fitness test is undertaken with one partner holding the other's feet.

2 marks

Question 10 (6 marks)

Adrienne is a personal trainer. She uses a battery of fitness tests to determine the strengths and weaknesses of her clients before designing a training program for them.

Test
Cooper 12-minute run
sum of skinfold measurements
1 RM bench press

Judy is 55 years old and has been relatively sedentary for over 10 years. She has decided that she needs to improve her fitness. She joins Adrienne’s personal training group and, in the first session, she undertakes each of the three tests listed above.

Based on your knowledge and understanding of the physiological, psychological and sociocultural perspectives on fitness assessment, evaluate the suitability of the listed tests for Judy.

Question 11 (5 marks)

In a group fitness session, participants are expected to complete the following program of exercises.

Warm-up

10 minutes of continuous cycling on a stationary bike

Conditioning phase

Each of the following exercises, with a 60-second rest between sets:

- 10 push-ups (three sets)
- 30 sit-ups (three sets)
- 10 kettle bell swings (three sets)
- 12 squats (three sets)
- 15 calf raises (three sets)

Cool-down

- a five-minute walk
- a static stretch (major muscles)

a. What type of training is demonstrated in the program above? 1 mark

b. i. Select one of the exercises from the conditioning phase in the program above and provide a suitable modification to increase or decrease the difficulty of the exercise to cater for differences in the fitness levels of the group participants. 1 mark

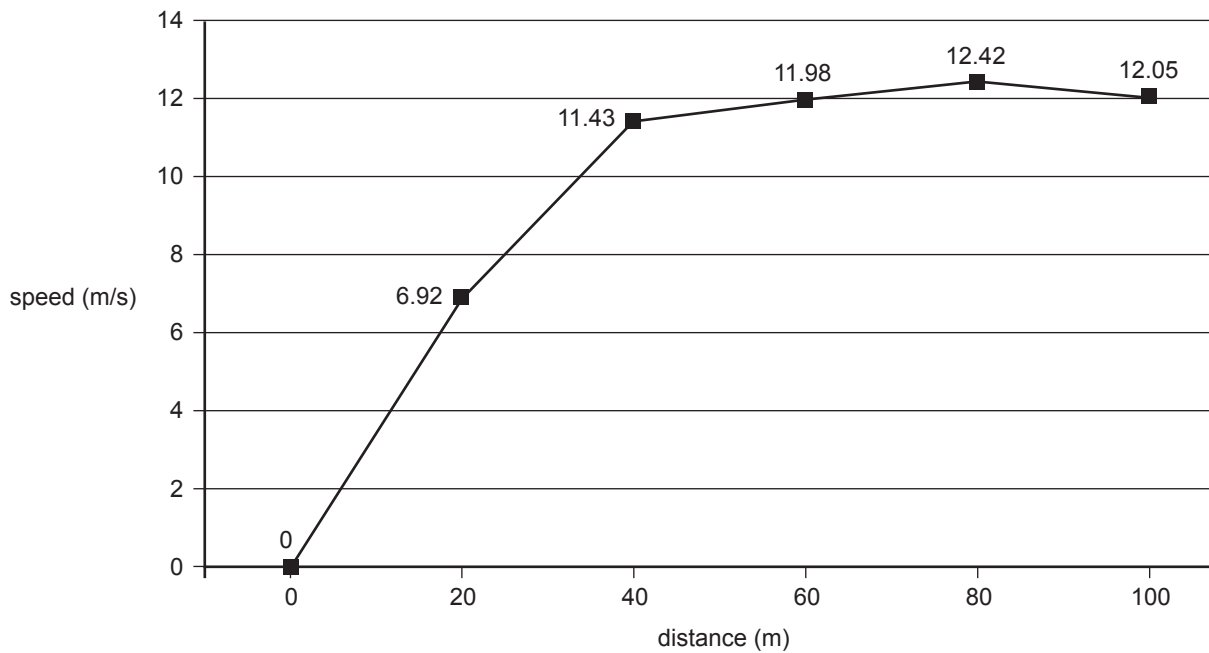
Selected exercise _____

Modification _____

ii. Explain how the application of a biomechanical principle results in the exercise being made easier or more difficult. You may use a diagram to support your answer. 3 marks

Question 12 (8 marks)

The graph below shows the 20 m split times for Usain Bolt's world record in the men's 100 m sprint at the 2009 IAAF World Championships in Athletics in Berlin.



Data: H Hommel et al., 'Scientific Research Project: Biomechanical Analyses at the Berlin 2009 IAAF World Championships in Athletics, Final Report, Sprint Men', Deutscher Leichtathletik-Verband [German Athletics Foundation], Berlin, 2009, p. 5; IAAF, <www.iaaf.org/development/research>

Write a qualitative analysis of Usain Bolt's performance in this race. Your answer should include references to distance, periods of positive and negative acceleration, and maximum speed. Use data from the graph to support your answer.

Question 13 (6 marks)

A young softball player is pitching the ball above the batter's head.

Based on your understanding of projectile motion, provide feedback to assist the player in pitching in the strike zone. You may use an annotated diagram to support your answer.

Question 14 (6 marks)

- a. List an individual, a task and an environmental constraint that may influence the motor skill development of an under-10 soccer team.

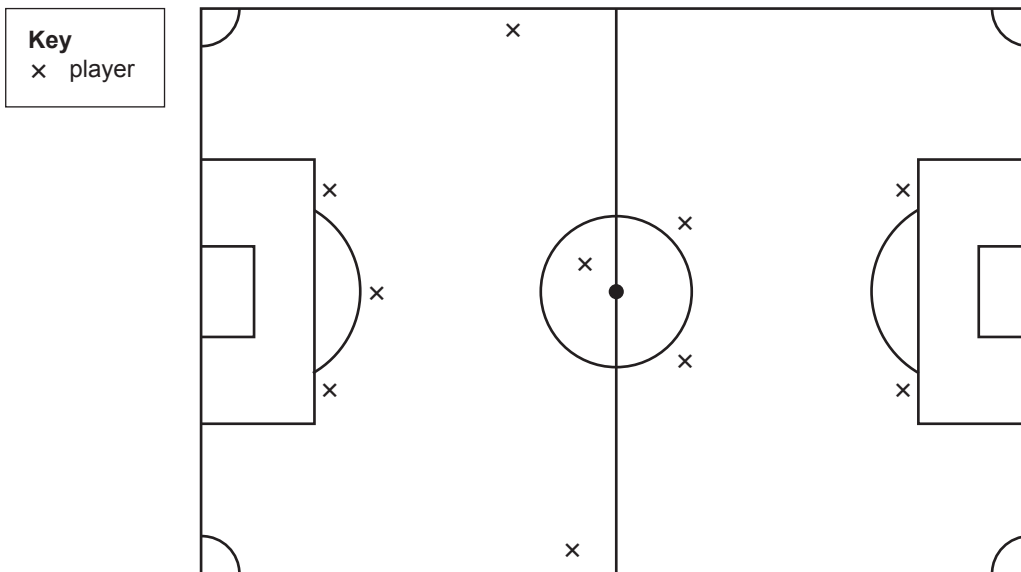
3 marks

Individual constraint _____

Task constraint _____

Environmental constraint _____

The coach of the under-10 soccer team has the following drill set up for the players on a full-size pitch. Teams of five are playing ‘keepings off’.



- b. i.** Provide an example of a modification to the drill shown in the image above that manipulates one of the constraints identified in **part a.** 1 mark

- ii.** Explain how the modification provided in **part b.i.** may positively influence the motor skill development of the under-10 soccer team. 2 marks

Answers to multiple-choice questions

Question	Answer
1	C
2	B
3	D
4	A
5	C
6	C
7	C
8	B
9	C