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Sports, exercise and health science
Standard level
Paper 2

26 April 2024

Zone A morning | **Zone B** morning | **Zone C** morning

Candidate session number

1 hour 15 minutes

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Instructions to candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all questions.
- Section B: answer one question.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[50 marks]**.

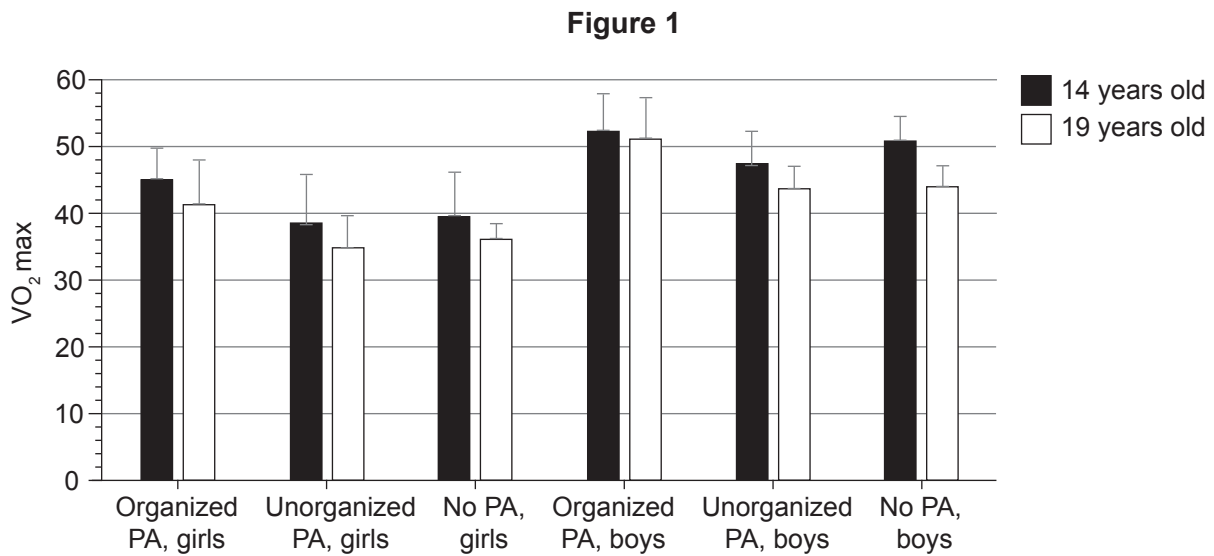


Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

1. A study investigated whether there was a relationship between weekly participation in physical activity (PA) and a person's VO_2 max. The participants were boys and girls aged 14 and 19. Participants' physical activity involvement was categorized in the following way:
- organized physical activity,
 - unorganized physical activity, or
 - no physical activity.

The results are shown in **Figure 1**.



- (a) Identify which group had the highest VO_2 max at 19 years old. [1]

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.....

- (b) Calculate the difference between no physical activity for boys and no physical activity for girls at 14 years old. [1]

.....

.....

(This question continues on the following page)



(Question 1 continued)

(c) (i) Using **Figure 1**, distinguish maximal oxygen consumption (VO_2 max) between males and females. [1]

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.....

(ii) Explain **two** reasons why maximal oxygen consumption (VO_2 max) is different in males and females. [2]

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(d) Identify the component of fitness that was measured in this study. [1]

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.....

(This question continues on page 5)



Please **do not** write on this page.

Answers written on this page
will not be marked.



(Question 1 continued)

- (e) VO_2 max was tested in the study using a laboratory test. Evaluate laboratory testing for gathering data. [3]

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- (f) At both age intervals, there were only two participants represented in the 'no physical activity' group. Describe how this impacts the reliability of the data. [2]

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- (g) Explain the mechanics of inhalation during an aerobic fitness test. [4]

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2. The diagram shows a football (soccer) player.



(a) Identify the type of synovial joint that enables flexion of the football (soccer) player's knee.

[1]

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(b) Identify the inferior bone that articulates at the hip joint.

[1]

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.....

(c) Using an example from sport, describe how a whole-part-whole presentation can be used to teach a skill to a novice athlete.

[2]

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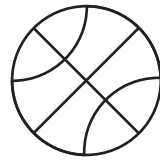
3. (a) Define the term *impulse*. [1]

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(b) Two different balls of the same diameter are shown.



Ball A
560 g



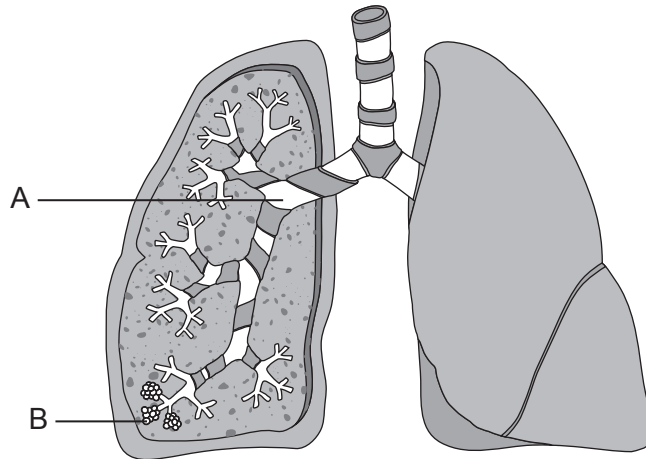
Ball B
200 g

Explain how Newton's second and third laws of motion would influence each of the balls. [3]

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4. The diagram shows part of the ventilatory system.



Identify the structures labelled A and B.

[2]

A:
B:

5. (a) Outline the oxygen deficit experienced by an athlete when completing the multistage fitness test.

[2]

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(b) Explain the role of adenosine triphosphate (ATP) in providing energy for a sprinter's muscles at the beginning of a 100 m race.

[3]

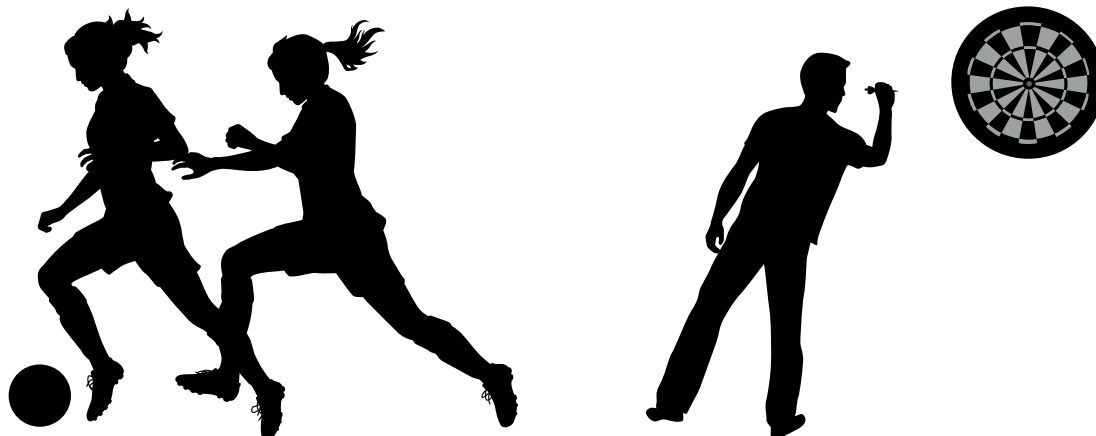
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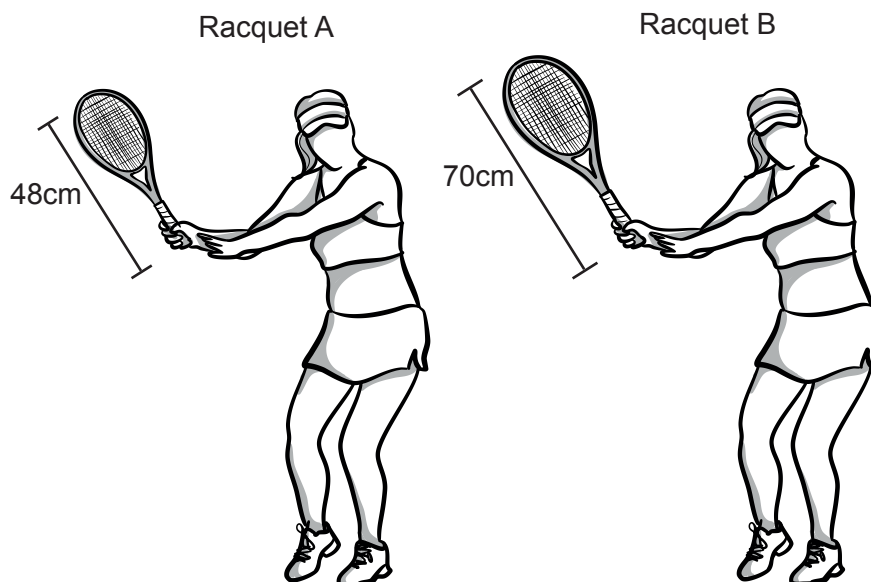
Section B

Answer **one** question. Answers must be written within the answer boxes provided.

- 6. (a) Outline the changes that occur in the muscle sarcomere after calcium is released from the sarcoplasmic reticulum. [5]
- (b) A 5 km runner is about to warm up for their race. Analyse systolic and diastolic blood pressure before they begin their warm-up **and** during their race. [5]
- (c) Distinguish between the motor skill profile of a football (soccer) dribble and a dart throw. [2]



- (d) The diagram shows two tennis players using different length racquets with identical mass.

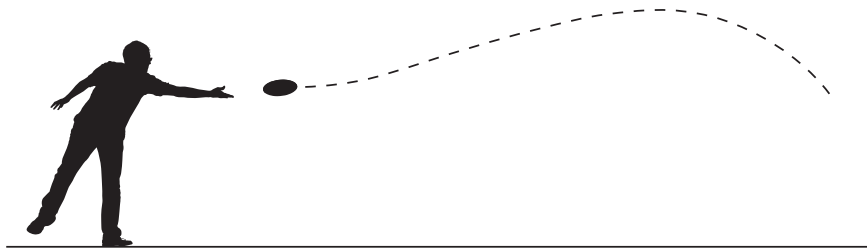


Referring to angular momentum, discuss why the length of Racquet A is more appropriate for a child during a tennis match. [4]

- (e) Articular cartilage is a feature of synovial joints. Outline **four** other features of synovial joints. [4]



7. (a) A player is trying to throw a frisbee as far as they can in a game of Ultimate Frisbee. The diagram shows the trajectory of a long frisbee throw to begin a game of Ultimate Frisbee.



- Outline how Bernoulli's principle acts on the frisbee whilst in flight. [5]
- (b) A football (soccer) player is learning a number of new free kick routines. Suggest **five** different methods the player could use to remember these in a match. [5]
- (c) Describe the production of adenosine triphosphate (ATP) from fatty acids by the aerobic system. [3]
- (d) A runner recorded their mean heart rate during a training session while in hot and humid conditions. They maintained the same steady pace throughout.

Distance interval	5 km	10 km	15 km	20 km	25 km	30 km
Heart rate / bpm	155	157	170	170	175	180

- Explain the reasons for the increase in heart rate at the 15 km mark. [5]
- (e) Distinguish between fibrous and cartilaginous joints. [2]



8. (a) Suggest **four** factors that contribute to the different rates of learning an Olympic lifting technique.

[4]



- (b) Describe the role of adrenaline during exercise. [4]
- (c) Variety is a principle of training programme design. Using examples, discuss how an athlete will manage overload and periodization. [5]
- (d) Outline the dominant energy system during the Illinois agility test. [3]
- (e) Describe the importance of considering response time when gathering data using handheld stopwatches. [4]



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16EP12

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16EP13

Turn over

A large rectangular area containing horizontal dotted lines for writing.



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References:

- Figure 1** Lagestad, P. and Mehus, I, 2017. The Importance of Adolescents' Participation in Organized Sport According to VO_2 peak: A Longitudinal Study. *Research Quarterly for Exercise and Sport*, 89(2), pp. 143–152.
2. msan10, 2023. *Soccer player kicking ball, isolated vector illustration. Footballer in red jersey.* [image online] Available at: <https://www.gettyimages.co.uk/detail/illustration/soccer-player-kicking-ball-isolated-vector-royalty-free-illustration/1300104007?adppopup=true> [Accessed 16 June 2023]. Source adapted.
4. wetcake, 2023. *Retro Lungs Diagram.* [online] Available at: <https://www.gettyimages.co.uk/detail/illustration/retro-lungs-diagram-royalty-free-illustration/452509353> [Accessed 13 June 2023].
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6. (d) A-Digit, 2023. *Female Tennis Player Forehand.* [image online] Available at: <https://www.gettyimages.co.uk/detail/illustration/femaletennisplayerforehand-royalty-free-illustration/1274558122?adppopup=true> [Accessed 13 June 2023]. Source adapted.
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8. (a) msan10, 2023. *Weightlifting, woman lifting big barbell, isolated vector silhouette, ink drawing.* [image online] Available at: <https://www.gettyimages.co.uk/detail/illustration/weightlifting-woman-lifting-big-barbell-royalty-free-illustration/1167946015?phrase=weightlift&adppopup=true> [Accessed 25 July 2023].

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16EP16