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Sports, exercise and health science
Standard level
Paper 2

6 November 2025

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]**.



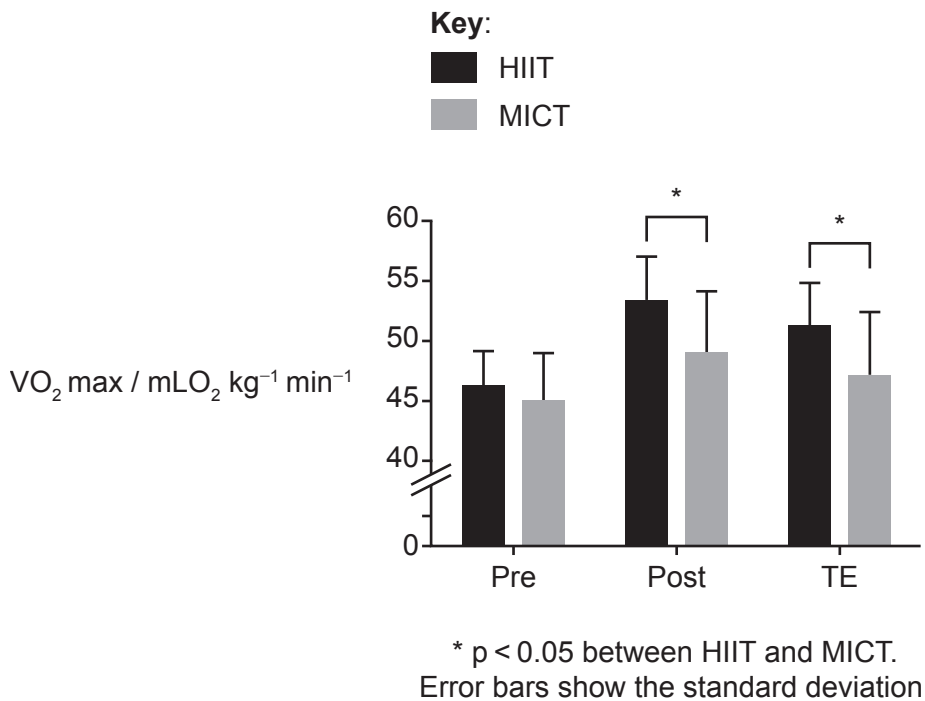
Section A

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

1. A study investigated the effect of high-intensity interval training and moderate-intensity continuous training on VO_2 max. Participants were randomly placed into two groups and completed an 8-week training protocol.
 - HIIT: high-intensity interval training
 - MICT: moderate-intensity continuous training

VO_2 max was measured prior to training (Pre), following the training protocol (Post), and four weeks after the training protocol had ended (TE). Data is presented in **Figure 1**.

Figure 1: Comparison of VO_2 max pre-training, post-training and four weeks after training has ended (TE)



(This question continues on the following page)



(Question 1 continued)

- (a) Identify the group with the largest change in VO_2 max from pre-training to post-training. [1]

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- (b) Calculate the change in VO_2 max, in $mLO_2 \text{ kg}^{-1} \text{ min}^{-1}$, for the MICT group pre- and post- training. [1]

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- (c) Using the data, deduce the effects of HIIT and MICT training on VO_2 max. [3]

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- (d) Explain how the standard deviation is useful for comparing the means between two data samples. [1]

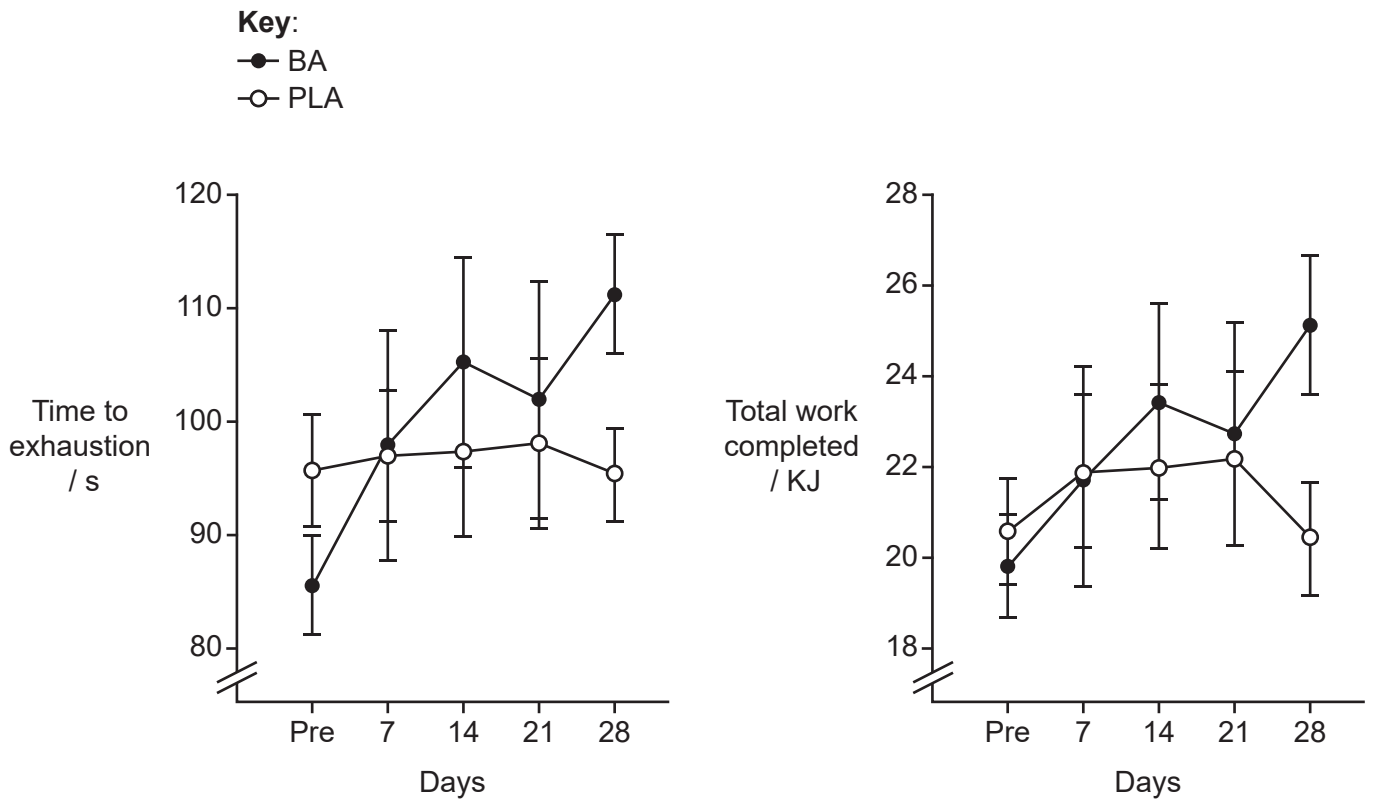
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2. A study investigated the effects of beta-alanine (a non-essential amino acid) supplementation for 28 days on high-intensity cycling. The athletes were placed into two groups.
- BA: beta-alanine amino acid supplements group
 - PLA: placebo group

Cyclists were measured for time to exhaustion and total work completed. Data was collected prior to the training protocol (Pre) and every 7 days for 28 days. Data is presented in **Figure 2**.

Figure 2



(a) State the time to exhaustion (in seconds) for the BA group after 28 days. [1]

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(b) Calculate the difference in total work completed (in KJ) for the BA group between the pre-test values and day 28 of the study. [1]

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(This question continues on the following page)



(Question 2 continued)

(c) Using the data, deduce the effect of the 28-day beta-alanine supplementation on cycling performance.

[3]

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(d) Outline the difference between an essential and non-essential amino acid.

[2]

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(e) The study applied the principles of study design. Analyse **three** aspects of effective study design to demonstrate causality.

[3]

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3. (a) Using an example related to appendicular skeleton bones, describe the anatomical term *distal*. [2]

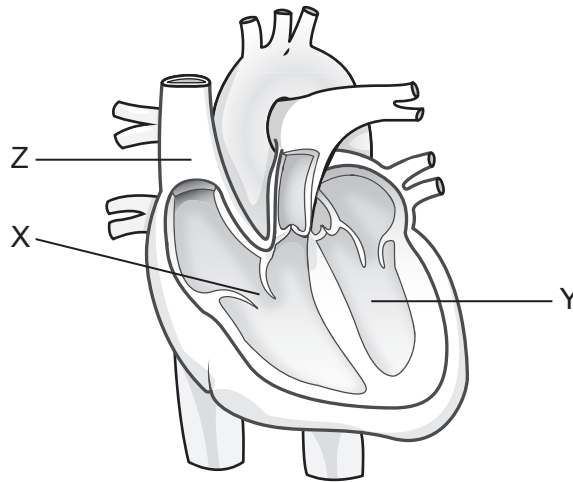
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(b) Define the terms *origin* and *insertion* of muscles. [2]

Origin:

Insertion:

(c) The diagram shows a heart.



State the names of structures X, Y and Z. [3]

X:

Y:

Z:

(This question continues on the following page)



(Question 3 continued)

(d) State the equation for cardiac output. [1]

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(e) Explain reciprocal inhibition as the elbow joint extends while throwing a ball. [3]

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(f) Suggest reasons why a coach may select progressive part presentation of a skill. [3]

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Section B

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

- 4. (a) Outline **three** features of a synovial joint. [3]
- (b) Analyse the process of gaseous exchange at the alveoli during exercise. [5]
- (c) The image shows a sprint track cyclist.



- Explain how the characteristics of fast-twitch type IIb muscle fibres are optimal for track cyclists participating in a sprint. [4]
- (d) Discuss how motivation, fitness and coach contribute to different rates of learning. [5]
 - (e) Giving an example, outline the characteristics of an unsaturated fatty acid. [3]
5. (a) With reference to the action of the muscles involved, explain the mechanics of inhalation during strenuous exercise. [6]
- (b) Discuss the regulation and function of glucagon during endurance exercise. [4]
 - (c) Using Bernoulli's principle, describe how backspin affects lift, velocity and air pressure around a golf ball. [3]
 - (d) Outline **three** different types of skill. [3]
 - (e) A road cyclist is planning progressive training sessions to improve their performance. Suggest **four** other principles they can use to manipulate aspects of training programme design. [4]



6. (a) Analyse the fuel sources and duration of the three energy systems and their relative contributions to exercise. [6]
- (b) Explain the causes and prevention of delayed onset muscle soreness (DOMS). [4]
- (c) Outline Newton’s three laws of motion. [3]
- (d) Outline factors that could reduce response time for athletes. [4]
- (e) The bleep test and flexed arm hang are tests of aerobic capacity and muscular endurance, respectively. Identify **three** other components of fitness and their tests. [3]



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16EP11

Turn over

A large rectangular area containing 25 horizontal dotted lines for writing.



16EP13

Turn over

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References:

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Figure 2 Used with permission of Springer Nature BV, from Incremental effects of 28 days of beta-alanine supplementation on high-intensity cycling performance and blood lactate in masters female cyclists., Kavouras et al., volume 47, 2015; permission conveyed through Copyright Clearance Center, Inc.

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