

Sports, exercise and health science
Standard level
Paper 2

Thursday 21 May 2015 (afternoon)

Candidate session number

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1 hour 15 minutes

Instructions to candidates

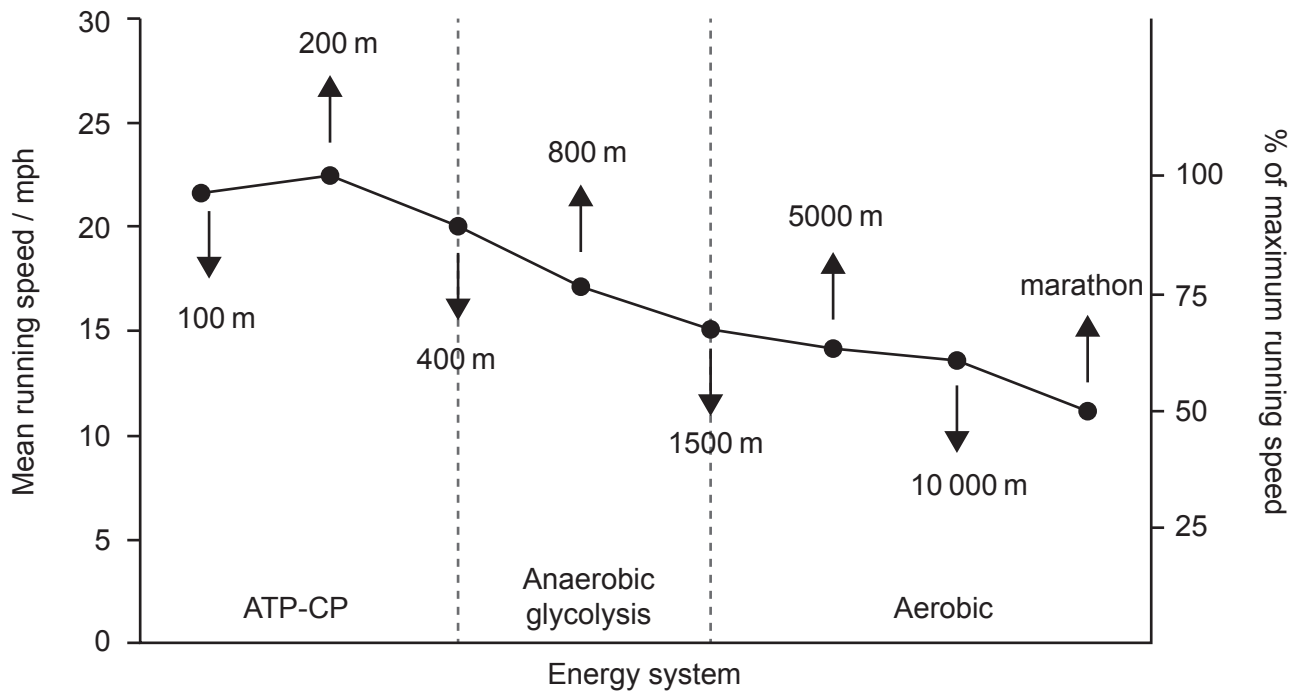
- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all questions.
- Section B: answer one question.
- Write your answers in the boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination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



Section A

Answer **all** questions. Write your answers in the boxes provided.

- 1. A study on world record times shows that humans can maintain maximum sprinting speed for approximately 200 m. The graph below shows the mean running speed and percentage of maximum running speed for distances ranging from 100 m to the marathon. The graph also shows the main energy system used for these distances.



[Source: www.nismat.org/patients/fitness/sports-physiology/muscle-energy-supply]

- (a) State the mean running speed for the 1500 m run and the percentage of maximum running speed for the marathon. [1]

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- (b) Identify the main energy system for events that involve running speeds lower than 60 % of maximum running speed. [1]

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(Question 1 continued)

- (c) Discuss the hypothesis that mean running speed is associated with running distance. [2]

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- (d) Explain how Newton's second and third laws of motion enable an athlete to increase his/her running speed. [3]

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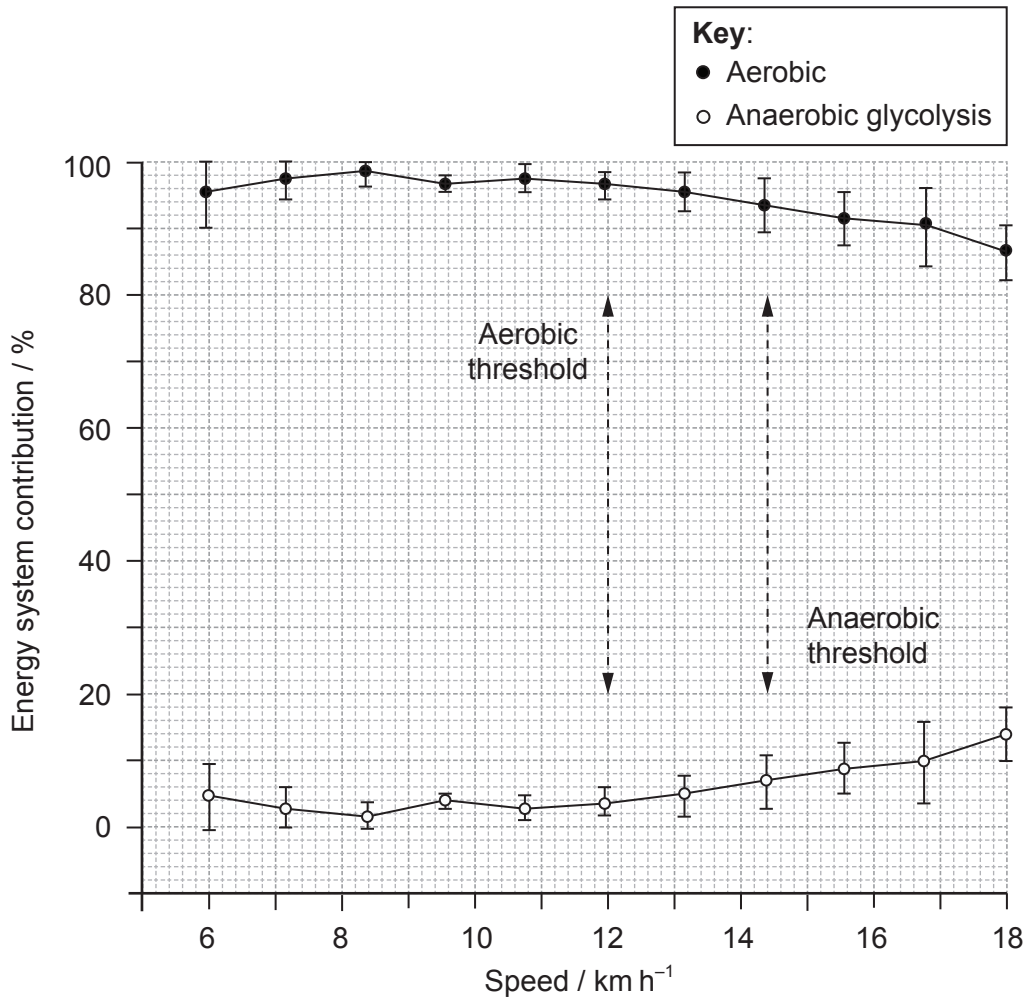
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(Question 1 continued)

A study was carried out to determine the relative contributions of energy systems for ten distance runners during an incremental exercise test on a treadmill.

The percentage contributions of the aerobic system and anaerobic glycolysis system for each stage are shown in the graph below.



[Source: Reprinted from *Journal of Sports Science and Medicine*, 12, Rômulo Bertuzzi, Eduardo M.F. Nascimento, Rodrigo P. Urso, Mayara Damasceno and Adriano E. Lima-Silva, 'Energy System Contributions During Incremental Exercise Test', pp. 454–460, Copyright 2013, with permission from the JOURNAL OF SPORTS SCIENCE AND MEDICINE.]

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(Question 1 continued)

- (e) Compare the contribution of the anaerobic glycolysis system and aerobic energy system at both the aerobic and anaerobic thresholds.

[2]

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- (f) Outline the ways in which exercise intensity can be monitored.

[2]

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2. (a) Define the term *joint*.

[1]

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(b) Distinguish between the axial and appendicular skeleton in terms of function.

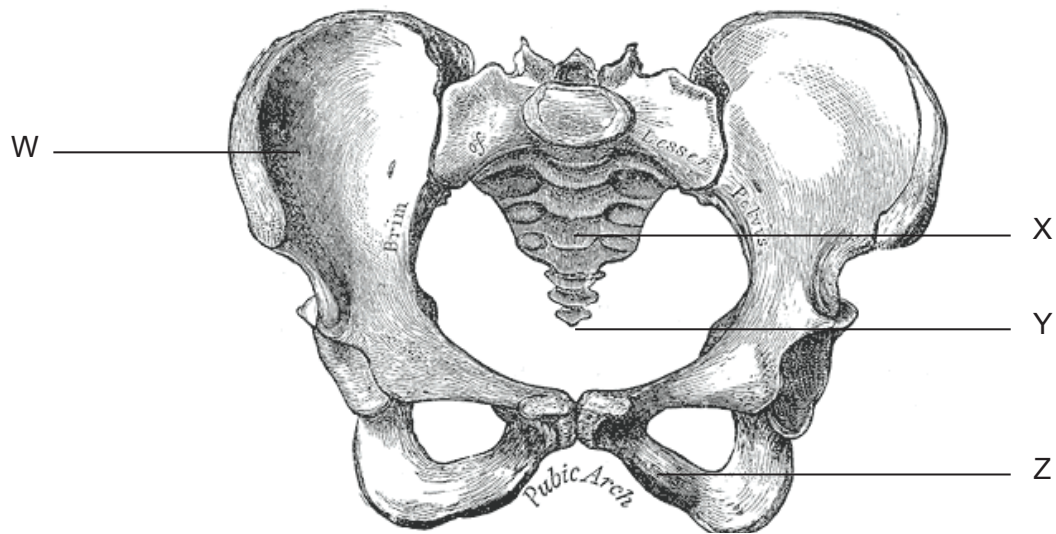
[2]

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(Question 2 continued)



[Source: "Gray242" by Henry Vandyke Carter - Henry Gray (1918) Anatomy of the Human Body (See "Book" section below) Bartleby.com: Gray's Anatomy, Plate 242. Licensed under Public Domain via Wikimedia Commons - <https://commons.wikimedia.org/wiki/File:Gray242.png#/media/File:Gray242.png>]

(c) State the name of structures W, X, Y and Z. [2]

W:

X:

Y:

Z:

(d) Outline the features of **three** types of muscle. [3]

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3. (a) (i) Define *stroke volume*. [1]

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- (ii) Discuss cardiac output during jogging before and after an endurance training programme. [3]

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- (b) Distinguish between the pulmonary circulation and the systemic circulation. [2]

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- (c) Compare the distribution of blood at rest and the redistribution of blood during continuous sub-maximal exercise. [3]

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4. Compare the skill classification of archery versus cycling.

[2]

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Section B

Answer **one** question. Write your answers in the boxes provided.

5. (a) Outline **six** differences between a skilled and a novice performer using sporting examples. [6]
- (b) Distinguish between health-related fitness and performance-related (skill-related) fitness. [4]
- (c) Explain the factors that influence the signal-detection process. [6]
- (d) Explain **two** types of presentation using a sport of your choice. [4]
6. (a) Describe the process of glycogenolysis. [4]
- (b) Distinguish between the function of the different types of blood cells. [6]
- (c) Explain maximal oxygen consumption. [6]
- (d) Discuss the role of muscle contraction on glucose uptake during exercise. [4]
7. (a) Describe the role of stretching in a general training programme. [4]
- (b) Discuss the key principles of training programme design for resistance training. [6]
- (c) Outline how the centre of mass can be used to enhance performance in a sport. [4]
- (d) Explain how the Bernoulli principle applies to a ball sport. [6]



