

**Sports, exercise and health science**  
**Standard level**  
**Paper 2**

Monday 15 May 2017 (afternoon)

Candidate session number

1 hour 15 minutes

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**Instructions to candidates**

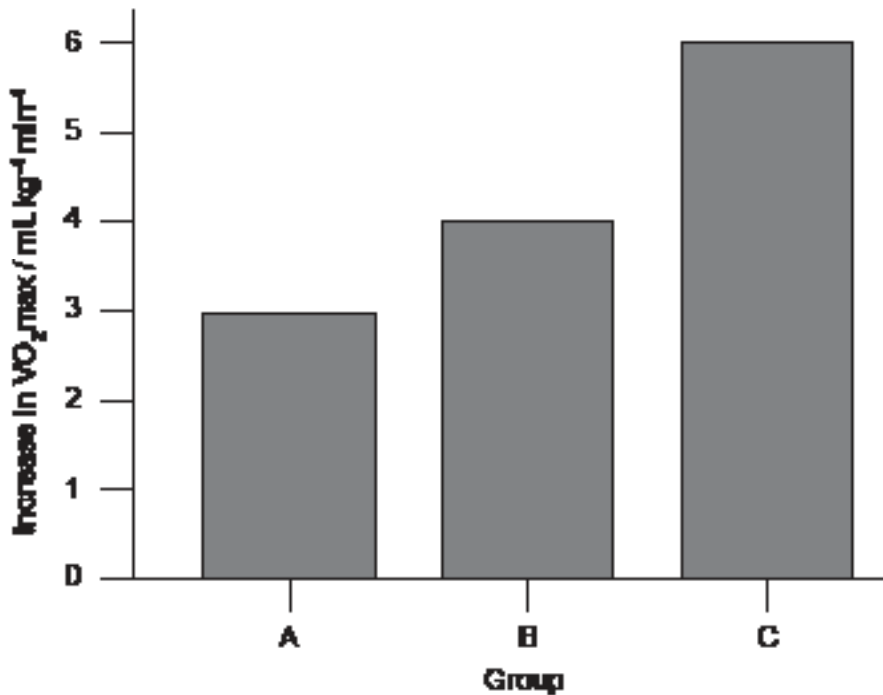
- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all questions.
- Section B: answer one question.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark 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 impact of different training intensities on the  $VO_2$ max of athletes. Athletes were randomly allocated to three groups for a 12-week training programme. Group A trained at 75%, Group B at 85%, Group C at 92% of heart rate maximum. The mean increase in  $VO_2$ max for each group is shown below.



[Source: Reprinted from *Journal of Science and Medicine in Sport*, 17, Trine Moholdt, Erik Madssen, Oivind Rognmo and Inger Lise Aamot, 'The higher the better? Interval training intensity in coronary heart disease,' pp. 506–510. Copyright (2014), with permission from Elsevier.]

- (a) Calculate the difference in the mean increase in  $VO_2$ max between Group A and Group C.

[2]

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**(Question 1 continued)**

(b) Describe the trend shown in the graph. [2]

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(c) Discuss why the athletes were randomly allocated to groups. [2]

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(d) Outline **two** adaptations of the heart that occur as a result of endurance training. [2]

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(e) Suggest how variety can be applied to the training programme of a long-distance runner. [2]

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**(Question 1 continued)**

Another study investigated mean physiological responses during peak exercise in pre-pubertal boys and girls. The results are shown below.

Physiological response	Boys	Girls
Peak $VO_2$ ( $L\ min^{-1}$ )	1.41	1.23
Heart rate ( $beats\ min^{-1}$ )	195	192
Respiratory exchange ratio	1.07	1.08
Stroke volume (mL)	53	52
Arterio-venous oxygen difference ( $mL\ 100\ mL^{-1}$ )	14.8	12.6

[Source: Reprinted from *Journal of Science and Medicine in Sport*, 12, Richard J. Winsley, Jon Fulford, Anushia C. Roberts, Joanne R. Welsman and Neil Armstrong, 'Sex difference in peak oxygen uptake in prepubertal children', pp. 647–651, Copyright (2009), with permission from Elsevier.]

(f) Identify the gender with the higher mean stroke volume. [1]

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(g) (i) State how cardiac output is calculated. [1]

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(ii) Calculate, using appropriate units, the mean cardiac output of the girls. [2]

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**(Question 1 continued)**

(h) Using the data, explain the difference in peak  $VO_2$  between boys and girls.

[3]

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2. (a) Label the type of bone that forms the shaft of a long bone indicated in the diagram below.

[1]

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X: .....

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- (b) Distinguish between learning and performance using a sporting example.

[2]

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- (c) Explain the motor skill profile of a swimmer who races in 100m freestyle events.

[3]

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3. (a) Describe the following types of muscle contraction:

(i) concentric

[1]

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(ii) eccentric

[1]

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(b) Explain the role of ATP in muscle contraction.

[3]

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(c) Construct a diagram showing a closed loop motor programme.

[2]

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### Section B

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

4. (a) Outline **two** types of connective tissue of joints. [2]
- (b) Describe the functions of erythrocytes, platelets and leucocytes. [3]
- (c) Evaluate the Harvard Step Test. [3]
- (d) Explain the role of insulin in the body. [6]
- (e) Describe the types of movement of the ball and socket joint at the shoulder. [6]
5. (a) Distinguish between fibrous and cartilaginous joints. [2]
- (b) Describe the essential elements of a generalized training programme. [6]
- (c) Outline cardiovascular drift. [3]
- (d) Discuss the characteristics of the lactic acid system during exercise. [6]
- (e) Explain the process of oxygen exchange at the alveoli. [3]
6. (a) Outline **two** characteristics common to muscle tissue. [2]
- (b) Explain how acetylcholine contributes to skeletal muscle contraction. [3]
- (c) Outline **six** different types of feedback used in sport. [6]
- (d) Describe how coding, chunking and association can be used to improve memory when learning a new skill. [3]
- (e) Explain the concept of reciprocal inhibition occurring at the knee when kicking a ball. [6]





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16EP09

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16EP11

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16EP13

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16EP14

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16EP15

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