Diploma Programme
Programme du diplôme
Programa del Diploma

Sports, exercise and health science
Standard level
Paper 3

Thursday 19 November 2015 (morning)

1 hour

Candidate session number

Instructions to candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Answer all of the questions from two of the Options.
- Write your answers in the boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[40 marks]**.

Option	Questions
Option A — Optimizing physiological performance	1 – 4
Option B — Psychology of sport	5 – 8
Option C — Physical activity and health	9 – 12
Option D — Nutrition for sport, exercise and health	13 – 16

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Option A — Optimizing physiological performance

1. A study examined performances from more than 9000 professional tennis matches from 1991 to 2008. Factors associated with either winning or losing matches were recorded. Conclusions from the study were used to propose guidelines for coaches and players when preparing for future matches.

The mean values (±SD) for each factor is shown in the table below.

	Match outcome	
Factor	**Win**	**Lose**
Age / years	25.2 (3.4)	25.4 (3.4)
Height / cm	184.7 (6.2)	184.2 (6.4)
Mass / kg	79.3 (6.6)	78.5 (6.7)
Time as a professional / years	6.8 (3.2)	6.6 (3.3)
World ranking	59.6 (85.9)	93.2 (101)
Aces	8.9 (6.4)	6.6 (5.7)
Double faults	4.2 (3.1)	5.3 (3.4)
% serve points won	67.4 (6.3)	56.4 (6.8)
% return points won	42.8 (6.9)	32.1 (7.4)
% total points won	54.7 (4.2)	44.5 (4.4)

[Source: Shang-Min Ma *et al.* (2013), 'Winning matches in Grand Slam men's singles: An analysis of player performance-related variables from 1991 to 2008'. *Journal of Sports Sciences*, **31** (11), pages 1147–1155, reprinted by permission of the publisher (Taylor & Francis Ltd, http://www.tandfonline.com).]

(a) Identify the mean value of double faults a winning player makes per match. [1]

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(b) Discuss, with reference to the data, the hypothesis that older players with more years as a professional will win more matches. [2]

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(Option A continues on the following page)

(Option A, question 1 continued)

(c) Describe interval training. [3]

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2. (a) State, with appropriate units, the normal physiological range for core body temperature. [1]

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(b) Describe the formation of sweat and the sweat response by the body. [2]

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(c) Discuss heat cramps as a health risk associated with exercising in hot environments. [3]

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(Option A continues on the following page)

(Option A continued)

3. (a) Outline how the body thermoregulates when swimming in cold water. [2]

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(b) Explain why the surface area-to-body mass ratio is important for heat preservation during exercise in a cold environment. [3]

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4. Discuss the proposed and actual benefits that some athletes would hope to gain by using beta blockers. [3]

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End of Option A

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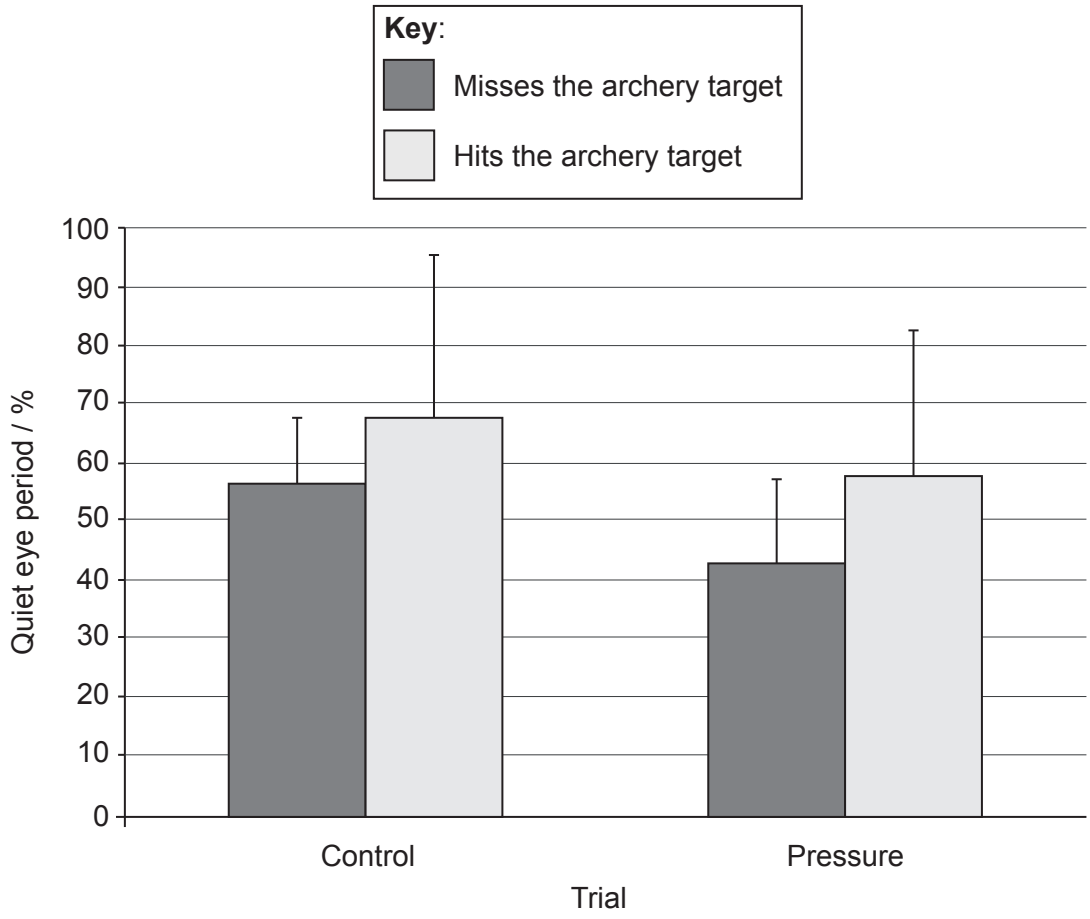
Option B — Psychology of sport

5. A study investigated the effect of state anxiety on performance by measuring the quiet eye period of participants. The quiet eye period is the duration that a participant is able to concentrate on an archery target. The higher the percentage of quiet eye period, the greater the individual will be able to concentrate on a target.

Participants were measured during two trials:

- A control trial
- A pressure trial designed to stimulate feelings of high state anxiety

The mean (±SD) results of the study are given below.



[Source: L. Burke (2005) 'State anxiety and visual attention: The role of the quiet eye period in aiming to a far target'. *Journal of Applied Physiology*, **88**, pages 1284–1290, reprinted by permission of the publisher (Taylor & Francis Ltd, http://www.tandfonline.com).]

(a) State the quiet eye period for participants who hit the archery target during the pressure trial. State appropriate units for your answer. [1]

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(Option B continues on the following page)

(Option B, question 5 continued)

(b) Discuss how the quiet eye period is affected by state anxiety during archery performance. [3]

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(c) Define the term *anxiety*. [1]

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(d) Distinguish between trait and state anxiety. [2]

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(Option B continues on the following page)

(Option B continued)

6. (a) Outline the progressive muscular relaxation (PMR) technique. [2]

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(b) Outline thought stopping as a self-talk technique. [2]

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(c) Discuss the **three** phases of a psychological skills training (PST) programme. [3]

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(Option B continues on the following page)

(Option B continued)

7. (a) Define the term *motivation*. [1]

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(b) Describe the learned helplessness aspect of Weiner's Attribution Theory. [2]

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8. Discuss the interactionist approach to personality. [3]

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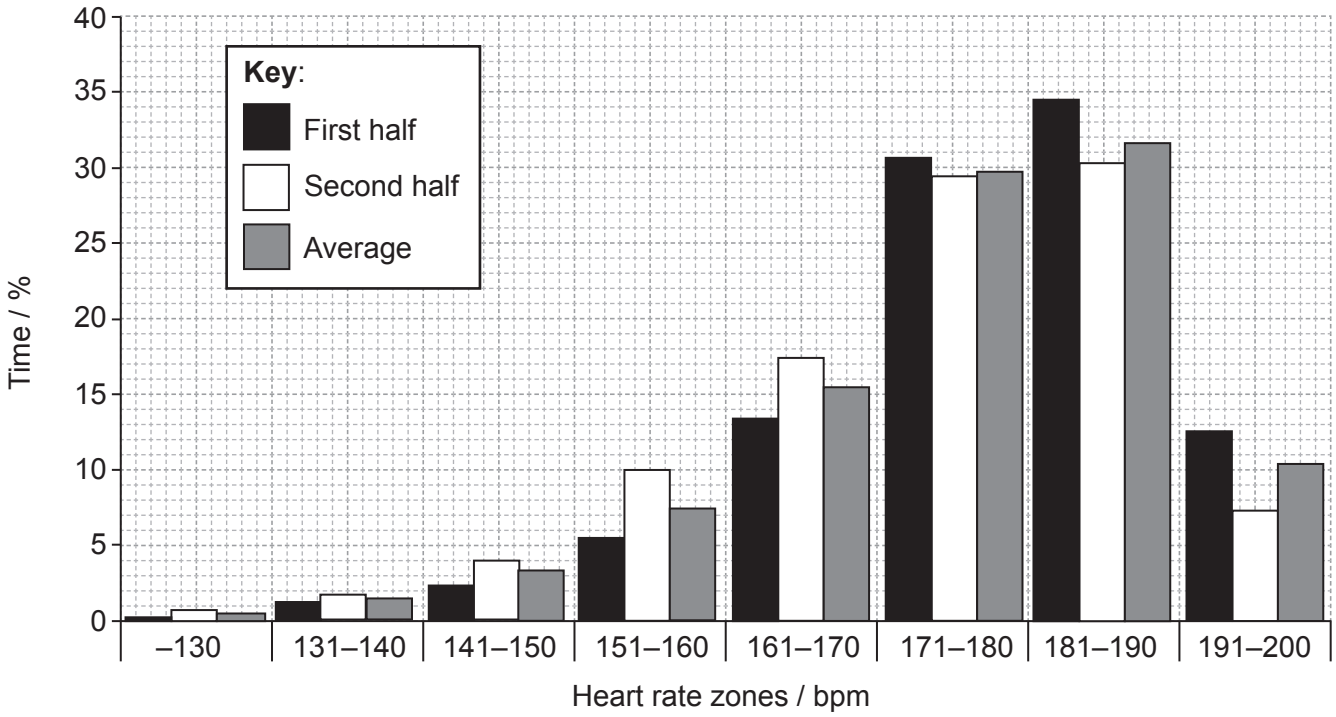
End of Option B

Option C — Physical activity and health

9. Futsal is a version of five-a-side indoor soccer. A study monitored the heart rates of ten players during competitive futsal matches. The data below shows the percentage of time spent in one of eight heart rate zones during the first and second half of the matches. An overall average value is also shown.



[Source: J. C. Barbero-Alvarez *et al.* 'Match analysis and heart rate of futsal players during competition'. (2008) *Journal of Sports Sciences*, **26** (1), pages 63–73, reprinted by permission of the publisher (Taylor & Francis Ltd, http://www.tandfonline.com).]

(a) Identify the percentage of time spent in the 151–160 bpm zone during the second half of the match. [1]

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(b) Comment on the percentage of time spent in each of the heart rate zones. [2]

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(Option C continues on the following page)

(Option C, question 9 continued)

(c) Discuss the environmental barriers to physical activity. [3]

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10. (a) Distinguish between the terms sport and habitual physical activity. [2]

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(b) Outline **two** aims of exercise for individuals with a hypokinetic disease. [2]

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(Option C continues on the following page)

(Option C continued)

11. (a) Identify **one** blood vessel of the coronary circulation. [1]

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(b) Define the term *atherosclerosis*. [1]

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(c) Explain the concept of risk factors in cardiovascular disease. [3]

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(Option C continues on the following page)

(Option C continued)

12. (a) Describe how body mass index (BMI) can be used to determine obesity. [2]

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(b) Discuss the concept of energy balance. [3]

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End of Option C

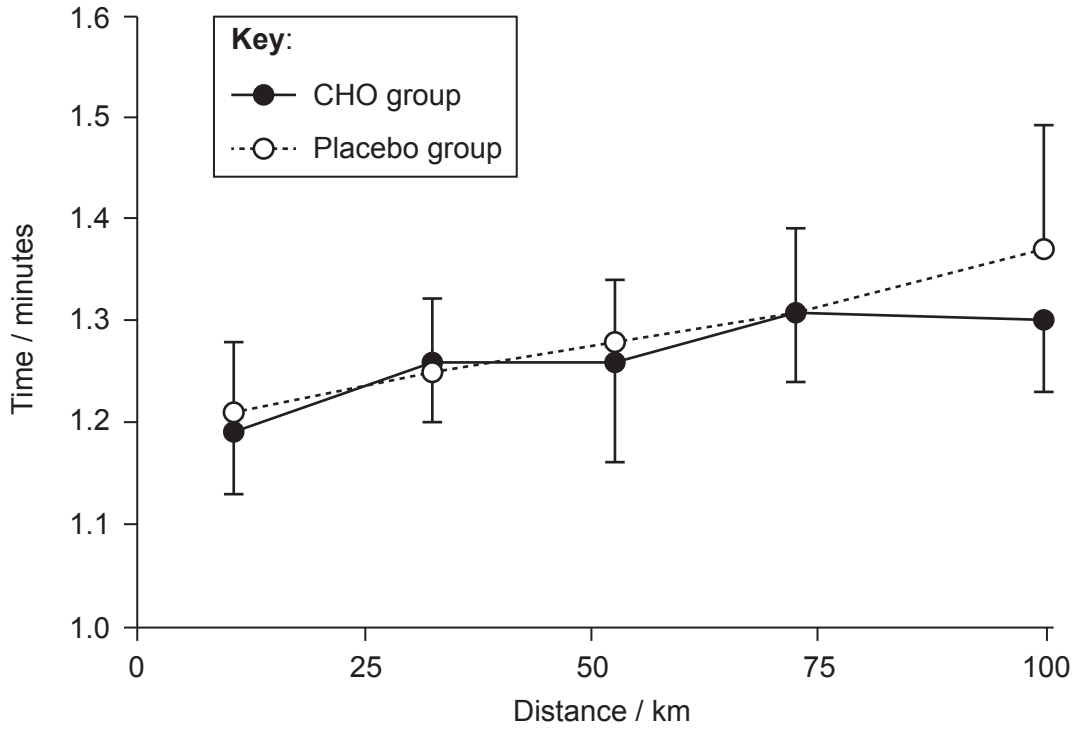
Option D — Nutrition for sport, exercise and health

13. A study investigated the effect of carbohydrate loading on cycling performance. Participants performed five 1 km sprints at regular intervals during a 100 km time trial.

Participants were divided into two groups:

- A placebo group
- A carbohydrate loading group (CHO group)

The mean (±SD) time for each of the five 1 km sprints for both groups are shown below.



[Source: Burke *et al.* (2000) *Journal of Applied Physiology*, **88**(4), pp. 1284–1290. Used with permission.]

(a) State, with appropriate units, the mean time taken by the CHO group to complete the final time trial. [1]

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(Option D continues on the following page)

(Option D, question 13 continued)

(b) Compare the performance of the CHO group with the performance of the placebo group. [3]

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(c) Discuss dietary practices employed by athletes to manipulate their body composition and the associated risks. [3]

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14. (a) Identify **one** function of the gall bladder. [1]

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(b) Explain the need for enzymes in the process of digestion. [2]

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(Option D continues on the following page)

(Option D continued)

15. (a) Outline how the hydration status of an athlete can be monitored. [2]

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(b) Describe the role of the loop of Henlé in maintaining the water balance of the blood. [2]

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(Option D continues on the following page)

(Option D continued)

16. (a) List **two** sources of protein that are suitable for vegetarian athletes. [1]

1. . . . . .

2. . . . . .

(b) Describe, with reference to exercise intensity, athletic activities that require high rates of muscle glycogen utilization. [2]

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(c) Discuss the use of bicarbonate as a nutritional ergogenic aid in sport. [3]

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End of Option D

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