Diploma Programme
Programme du diplôme
Programa del Diploma

Sports, exercise and health science
Higher level
Paper 3

5 November 2025

Zone A afternoon | **Zone B** afternoon | **Zone C** afternoon

Candidate session number

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.
- Answer all of the questions from two of the options.
- 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]**.

Option	Questions
Option A — Optimizing physiological performance	1 – 5
Option B — Psychology of sports	6 – 10
Option C — Physical activity and health	11 – 16
Option D — Nutrition for sports, exercise and health	17 – 22

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Option A — Optimizing physiological performance

1. A study investigated the effect of a 15-day heat acclimatization protocol on resting heart rate (RHr), end-of-training core temperature (ET*c*) and resting core temperature (RT*c*) during ultramarathon running. The data recorded is presented in **Figure 1**.

Figure 1: Physiological adaptations over the 15-day acclimatization period

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(Option A continues on the following page)

(Option A, question 1 continued)

(a) (i) Identify the day with the lowest resting heart rate (beats min^{-1}). [1]

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(ii) Calculate the difference in RT*c* (°C) between the start and the end of the 15-day acclimatization protocol. [1]

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(iii) Comment on the effectiveness of the 15-day acclimatization protocol. [3]

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(b) Describe how an athlete should acclimatize to heat stress. [3]

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(Option A continues on the following page)

(Option A continued)

2. (a) Define *training*. [1]

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(b) Discuss possible indicators of overtraining. [3]

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(c) Analyse the three cycles within periodization. [3]

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3. Define the term *ergogenic aid*. [1]

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(Option A continues on the following page)

(Option A continued)

4. (a) Recovery is an important part of improving as an athlete. Identify possible indicators of recovery. [2]

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(b) Cryotherapy is often used for recovery. Define *cryotherapy*. [1]

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(c) Evaluate the use of cryotherapy for athletes. [3]

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(Option A continues on page 7)

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will not be marked.

(Option A continued)

5. (a) State a height range (in m) for moderate altitude. [1]

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(b) Athletes train at altitude to enhance performance when returning to sea level. Predict **two** adaptations resulting from altitude training. [2]

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End of Option A

Option B — Psychology of sports

6. A study asked athletes to complete a cross-sectional online questionnaire during a period of social distancing. The questionnaire asked the athletes if their motivation to exercise changed from before to during the social distancing. The results from the questionnaire were assessed to determine change in motivation. The number of athletes with lower motivation, unchanged motivation and higher motivation are presented in the table.

Table 1: Change in motivation to exercise

		Lower	Unchanged	Higher
Gender	Female	23	15	13
	Male	10	24	10
Type of sport	Individual	15	20	10
	Team	15	17	11
	Both	2	2	0

(a) (i) Identify the number (*n*) of team athletes with unchanged motivation to exercise. [1]

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(ii) Calculate how many female athletes (*n*) completed the questionnaire. [1]

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(iii) Comment on the motivation to exercise for the different types of sports from before and during social distancing. [3]

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(Option B continues on the following page)

(Option B, question 6 continued)

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

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(c) Atkinson's model of achievement motivation suggests that athletes can be motivated in one of two ways. Describe the need to achieve characteristics linked to Atkinson's model of achievement motivation. [4]

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(Option B continues on the following page)

(Option B continued)

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

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(b) Evaluate the Sport Competition Anxiety Test (SCAT). [3]

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8. Analyse **two** phases of the psychological skills training (PST) programme. [2]

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(Option B continues on the following page)

(Option B continued)

9. (a) Outline **two** psychological behaviours that aid the evolution of talent. [2]

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(b) Psychological behaviours help athletes through stages of talent evolution. Analyse the four stages of development suggested by Bloom (1985) and Cote (1999). [4]

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10. Outline **two** characteristics of self-determination theory. [2]

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End of Option B

Option C — Physical activity and health

11. Data on characteristics of populations and health systems was collected. The data presents the population characteristics, cardiovascular disease (CVD) and diabetes rates of five countries labelled A, B, C, D and E.

Table 2: Population data from five countries

	Countries				
	A	**B**	**C**	**D**	**E**
Population characteristics					
Population / millions	161.9	1311.0	28.5	189.0	21.0
Rural population / %	65.7	67.3	81.4	61.2	81.6
Life expectancy at birth / years	71.6	68.0	69.6	66.2	74.8
Diabetes / age standardised %	9.2	8.3	9.5	12.1	7.6
Age standardised CVD and diabetes death rates					
CVD death rate per 100 000	363.9	352.6	295.2	530.9	239.9
CVD death rate / % of total deaths	36.5	30.4	29.6	44.0	38.0
Diabetes death rate per 100 000 in 2015	67.1	43.3	35.7	53.0	50.9
Diabetes death rate / % of total deaths	6.7	3.7	3.6	4.4	8.1

(a) (i) Identify the country with the highest percentage of total deaths from cardiovascular disease (CVD). [1]

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(ii) Calculate the difference in percentage (%) of total diabetes deaths between country B and C. [1]

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(Option C continues on the following page)

(Option C, question 11 continued)

(iii) Comment on the hypothesis that countries with a greater rural population (%) have a higher percentage death rate from diabetes. [3]

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(b) Describe habitual physical activity. [2]

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(c) Hypokinetic diseases have become more prevalent in the past 50 years. Discuss the relationship between the increase in hypokinetic diseases and major societal changes. [3]

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(Option C continues on the following page)

(Option C continued)

12. Define the term *mood*. [1]

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13. Individuals encounter barriers to activity even though they understand the health benefits involved. Discuss potential environmental barriers to physical activity. [3]

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14. State where hormones that affect appetite regulation are released. [2]

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(Option C continues on the following page)

(Option C continued)

15. (a) Explain the physiological benefits of walking that reduce the risk of hypokinetic disease. [3]

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(b) Outline the causes of sudden cardiac death (SCD) in athletes. [3]

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(Option C continues on page 17)

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(Option C continued)

16. (a) Define *musculoskeletal injuries*. [1]

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(b) Having badly fitting footwear is a common cause of running-related injuries. Outline **two** other causes of running-related injuries. [2]

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End of Option C

Option D — Nutrition for sports, exercise and health

17. A study investigated the effect of an electrolyte sports drink on blood markers in a group of trained individuals.

Participants consumed an electrolyte sports drink during each training session of a 4-week training programme. Electrolytes and hematocrit (volume percentage of red blood cells in the blood) were measured prior to (baseline) and after (post) the 4-week programme. The results are presented in the table.

Table 3: Changes in blood indices before and after rehydration

Blood index	Baseline	Post 4 weeks	P value
Sodium ion / mmol L^{-1}	140.1546	141.2305	0.083
Chloride ion / mmol L^{-1}	105.2481	104.7825	0.264
Potassium ion / mmol L^{-1}	4.2351	4.0345	0.051
Calcium ion / mmol L^{-1}	2.3648	2.3700	0.190
Hematocrit / %	35.9010	35.6547	0.660

(a) (i) Identify the electrolyte with the lowest baseline blood level. [1]

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(ii) Calculate the difference in hematocrit (%) between the baseline and post 4 weeks. [1]

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(Option D continues on the following page)

(Option D, question 17 continued)

(iii) Comment on the blood index following a 4-week electrolyte consumption programme. [3]

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(b) Describe how athletes can monitor hydration status during physical activity. [2]

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(c) When athletes become dehydrated, the body will try to retain water. Explain how antidiuretic hormone (ADH) aids in maintaining the water balance of the blood. [4]

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(Option D continues on the following page)

(Option D continued)

18. Basal metabolic rate is one component of energy expenditure. State **one** other component of energy expenditure. [1]

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19. (a) Athletes use sports drinks, bars and gels as nutritional ergogenic aids, evaluate their use. [3]

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(b) State the daily recommended intake of protein for adult non-athletes. [1]

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(Option D continues on the following page)

(Option D continued)

20. (a) Outline **two** causes of hypoglycemia. [2]

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(b) Outline the effects a 6-week cross-training exercise programme has on the ability to uptake glucose at the cellular level. [2]

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(Option D continues on page 23)

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(Option D continued)

21. Evaluate the effects of alcohol on athletic performance. [3]

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22. Outline **two** harmful effects of free radicals at the cellular level. [2]

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End of Option D

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References:

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17. Yang, Z. and Xia, S., 2020. The Effect of Exercise Fluid Supplement on Human Metabolism after Load Exercise. *Journal of Coastal Research*, 104, pp. 504–507. [e-journal] Available at: https://www.jstor.org/stable/48640960. [Accessed 7 March 2023.] Source adapted.