Diploma Programme
Programme du diplôme
Programa del Diploma

Sports, exercise and health science
Standard level
Paper 3

7 November 2024

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

Candidate session number

1 hour

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 **[40 marks]**.

Option	Questions
Option A — Optimizing physiological performance	1 – 3
Option B — Psychology of sports	4 – 7
Option C — Physical activity and health	8 – 9
Option D — Nutrition for sports, exercise and health	10 – 13

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Option A — Optimizing physiological performance

1. A study investigated the effects of different intensities of resistance training over a 12-week period. Participants engaged in resistance training at various intensities: 20 %, 40 %, 60 %, and 80 % of their one-repetition maximum (1RM).

Percentage change in muscle cross-sectional area (CSA) and strength of biceps brachii were recorded and presented in the graph shown.

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(a) Identify which intensity of resistance training showed the greatest increase in muscle strength over the 12-week training period. [1]

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(b) Calculate the difference in percentage change in muscle CSA between 20 % of 1RM and 80 % of 1RM training intensities. [1]

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(Option A continues on the following page)

(Option A, question 1 continued)

(c) Using the data, discuss the hypothesis that lifting weights greater than 80 % 1RM is necessary to increase muscle CSA. [3]

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2. (a) Explain how the three phases of periodization could be organised to optimise muscle strength and avoid overtraining in strength training. [4]

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(b) Outline the possible harmful effects of using anabolic steroids. [3]

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(Option A continues on page 5)

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will not be marked.

(Option A continued)

3. Endurance athletes often use warm weather training at altitude to prepare for competitions in hot climates.

(a) State the normal physiological range for core body temperature in °C. [1]

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(b) Exercising in a hot climate can put athletes at risk of heat stress. Explain heat stroke. [3]

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(c) Outline how athletes could acclimatise to heat stress. [4]

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End of Option A

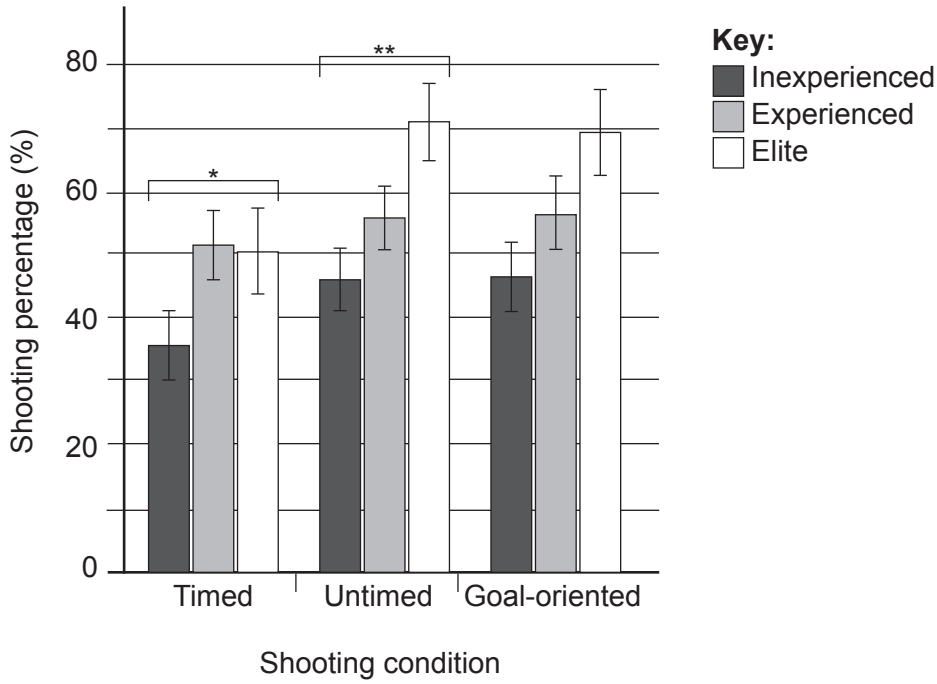
Option B — Psychology of sports

4. A study examined the effect of time constraints and goal-setting on the performance of basketball free-throw shooting. Participants were grouped into three categories based on their basketball skill level: elite, experienced and inexperienced.

Each group was assessed under three distinct shooting conditions:

- Timed condition: Successful free-throws recorded in a 30-second timeframe.
- Untimed condition: Attempt the same number of free-throws as in the Timed condition, without time pressure.
- Goal-oriented condition: Within a 30-second timeframe, players aimed to surpass their highest number of successful free-throws.

The graph shows the shooting percentages of the players for the three shooting conditions.



* $p < 0.05$ compared to goal-oriented condition
** $p > 0.05$ compared to goal-oriented condition

(a) Identify the group that showed the smallest percentage change from the timed to the untimed condition. [1]

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(Option B continues on the following page)

(Option B, question 4 continued)

(b) Calculate the difference in shooting percentage for the elite players between the timed and goal-oriented conditions. [1]

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(c) Using the data, discuss the effect of a goal-oriented condition on shooting performance under time constraints. [3]

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(Option B continues on the following page)

(Option B continued)

5. Describe **five** principles of effective goal-setting in sports performance. [5]

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6. (a) Define the term *personality*. [1]

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(b) Discuss the Interactionist Theory and how it relates to the reactions of players in competitive sports. [4]

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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) Discuss the influence of extrinsic motivators on intrinsic motivation in sport. [4]

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End of Option B

Option C — Physical activity and health

8. A study investigated the effect of three 16-week treatments on people with mild to moderate depression. Participants were divided into three treatment groups:

- Medication Only: Patients were given a type of antidepressant medication.
- Exercise and Medication: Patients did regular exercise and also took antidepressant medication.
- Exercise Only: Patients only did regular exercise.

At the end of the 16-week treatment, participants were monitored for a six-month period.

The graph shows the percentage of patients who experienced depression during the six-month period post-treatment.

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(a) State the percentage of patients who experienced depression within six months post-treatment for the Exercise and Medication group. [1]

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(b) Calculate the difference in the percentage of patients who experienced depression within the six-month period post-treatment between the Medication Only group and the Exercise Only group. [1]

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(Option C continues on the following page)

(Option C, question 8 continued)

(c) Using the data, discuss the hypothesis that exercise lowers the percentage of patients experiencing depression six months post-treatment. [3]

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9. Hypokinetic diseases are a growing concern in modern society. Understanding effective strategies for their prevention and management is essential for promoting overall health.

(a) Define the term *hypokinetic disease*. [1]

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(b) State **two** hypokinetic diseases. [2]

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(c) Discuss the concept of energy balance as it relates to hypokinetic disease. [3]

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(Option C continues on page 13)

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(Option C, question 9 continued)

(d) Outline **three** aims of exercise for individuals with a hypokinetic disease. [3]

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(e) Outline potential barriers to physical activity. [3]

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(f) Explain **three** major societal changes that have led to an increase in hypokinetic disease. [3]

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End of Option C

Option D — Nutrition for sports, exercise and health

10. Researchers investigated how elite cyclists' bodies utilize carbohydrates during exercise by comparing carbohydrate oxidation rates from an energy bar, against an energy drink.

Cyclists were divided into two groups:

- Group 1: Energy bar
- Group 2: Energy drink

The graph shows the carbohydrate oxidation rate (g min^{-1}) for both bar and drink groups during exercise.

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(a) State the group with the highest carbohydrate oxidation rate (g min^{-1}) at 15 minutes of exercise. [1]

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(b) Calculate the difference in carbohydrate oxidation rates (g min^{-1}) between the energy bar group and energy drink group at 120 minutes. [1]

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(Option D continues on the following page)

(Option D, question 10 continued)

(c) Using the data, discuss the hypothesis that consuming an energy drink leads to a greater carbohydrate oxidation rate (g min^{-1}) than an energy bar. [3]

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11. (a) State **two** reasons why humans cannot live without water for a prolonged period of time. [2]

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(b) Explain how a negative feedback mechanism maintains water balance when a person is dehydrated. [4]

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(Option D continues on page 17)

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(Option D continued)

12. (a) Describe the function of enzymes in the context of macronutrient digestion. [2]

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(b) Outline the functions of pancreatic amylase and pancreatic lipase. [2]

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(c) State the typical pH range found in the small intestine. [1]

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13. Discuss dietary practices sometimes employed by athletes to increase muscle mass or lose body fat. [4]

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End of Option D

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References:

4. Kostrna, J., June 28, 2022. Effects of Time Constraints and Goal Setting on Basketball Shooting. *Frontiers in Psychology*, vol. 13. Available at: https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2022.923061/full [Accessed 1 December 2024]. Source adapted.

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