Diploma Programme
Programme du diplôme
Programa del Diploma

Sports, exercise and health science
Higher level
Paper 3

Friday 11 May 2018 (morning)

1 hour 15 minutes

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.
- 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 – 6
Option B — Psychology of sport	7 – 12
Option C — Physical activity and health	13 – 17
Option D — Nutrition for sport, exercise and health	18 – 24

2218 – 6603

20 pages

Option A — Optimizing physiological performance

1. A professional cyclist was tested prior to competing in the Tour de France. His results for body composition, maximal oxygen uptake, and peak power output in 2005 and 2013 are shown in the table.

	2005	**2013**
Body mass (kg)	76.6	71.3
Total body fat (kg)	12.9	6.9
Total body fat (% of mass)	16.9	9.8
VO_2 peak ($mL\,kg^{-1}min^{-1}$)	80.2	84.6
Peak power output (W)	547.0	529.3
Relative peak power output ($W\,kg^{-1}$)	7.1	7.5

(a) Identify the year in which the cyclist had a higher total body fat percentage. [1]

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(b) Calculate the difference between total body fat percentage in 2005 and 2013. [2]

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(c) The cyclist won the Tour de France for the second time in 2013. Using the data in the table, suggest why he won the race. [2]

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(Option A continues on the following page)

(Option A continued)

2. (a) Describe how an athlete forms sweat in order to maintain body temperature during exercise. [3]

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(b) Explain how humidity affects the evaporation of sweat. [2]

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(c) Discuss the relationship between the production of heat and the use of ATP during exercise. [2]

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(Option A continues on the following page)

(Option A continued)

3. Outline the muscular contractions involved in the plyometrics method of training. [1]

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4. Discuss why World Anti-Doping Agency (WADA) bans pharmacological substances. [2]

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5. (a) Identify **three** indicators of recovery from a high-intensity training session. [3]

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(b) Outline why athletes use compression clothing to facilitate recovery. [2]

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(Option A continues on the following page)

(Option A continued)

6. (a) Explain the adaptations to blood and muscle following chronic exposure to altitude hypoxia. [3]

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(b) Explain why a runner's 100 m sprint performance is not impaired at altitude. [2]

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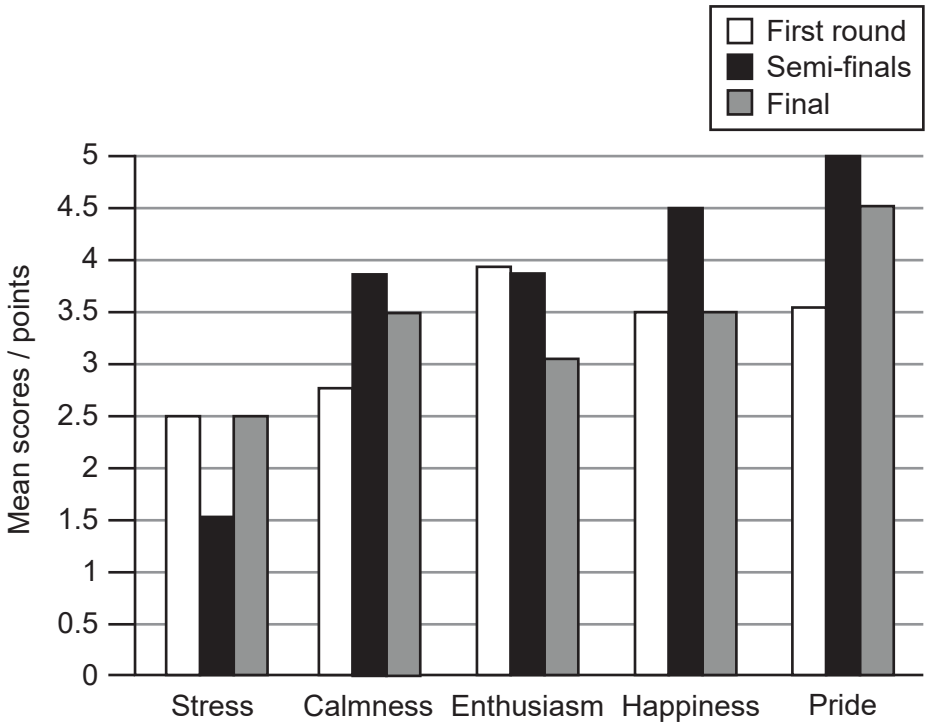
End of Option A

Option B — Psychology of sport

7. A study assessed the range and intensity of emotions experienced by referees during the World Lacrosse Championship. Their emotions were recorded on a 5-point rating scale ranging from 0 (no emotions) to 5 (extreme emotions) before the first round, semi-finals and final. The mean scores for different emotions are shown in the bar chart.



[Source: Adapted from Andrew P. Friesen, Tracey J. Devonport & Andrew M. Lane (2017) Beyond the technical: The role of emotion regulation in lacrosse officiating, *Journal of Sports Sciences*, 35:6, 579-586, DOI: 10.1080/02640414.2016.1180419. Reprinted by permission of the publisher Taylor & Francis Ltd, http://www.tandfonline.com.]

(a) Identify the emotion with the highest mean score in the final. [1]

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(b) Calculate the difference between semi-finals and final mean score for the emotion identified in part (a). [2]

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(Option B continues on the following page)

(Option B, question 7 continued)

(c) Using the data in the bar chart, compare and contrast the mean scores for stress and happiness. [2]

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8. (a) Outline intrinsic motivation as it relates to exercise. [2]

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(b) Explain how extrinsic motivators can positively impact a 400 m sprinter preparing for a competition. [2]

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(Option B continues on the following page)

(Option B continued)

9. Using the interactionist approach to personality, discuss why a basketball player performs well in training but underperforms in important competitive matches. [2]

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10. Describe the stress process in sport. [4]

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11. (a) State **two** psychological behaviours that can facilitate the evolution of talent. [2]

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(Option B continues on the following page)

(Option B, question 11 continued)

(b) Within the evolution of sporting talent, explain the transition from development stage to mastery stage. [3]

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12. (a) Using an example from exercise, describe the benefits of autonomy. [2]

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(b) Discuss the relationship between self-regulated learning and motivation in sport. [3]

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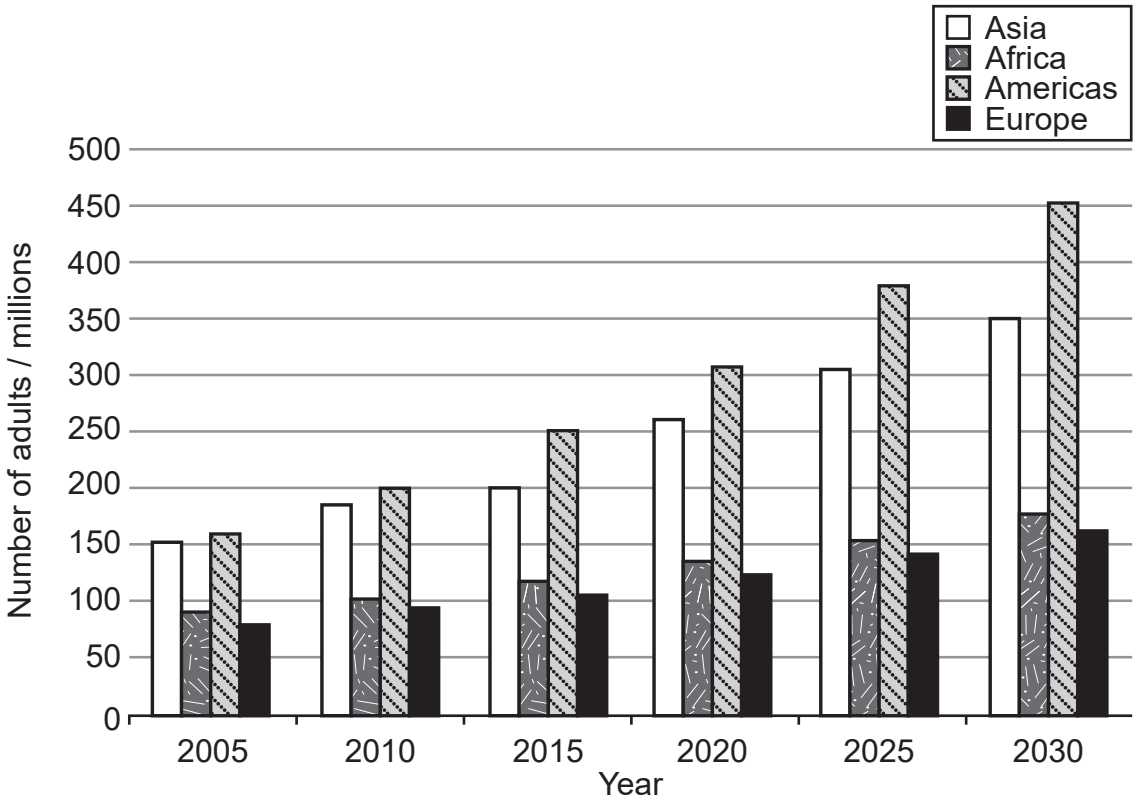
End of Option B

Option C — Physical activity and health

13. The numbers of adults with hypokinetic disease were recorded during 2005, 2010, and 2015 for four different regions. The information was used to estimate the numbers for 2020, 2025 and 2030. The results are shown in the bar chart.



[Source: © International Baccalaureate Organization 2018]

(a) Identify the region with the highest number of adults with hypokinetic disease in 2015. [1]

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(b) For the region identified in part (a), calculate the estimated increase in millions in the number of adults with hypokinetic disease from 2015 to 2030. [2]

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(Option C continues on the following page)

(Option C, question 13 continued)

(c) Suggest **two** possible reasons for the trend in the bar chart. [2]

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14. (a) Outline **two** recommended levels of aerobic physical activity for adults aged 65 and above. [2]

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(b) Identify long-term consequences of osteoporotic fractures. [2]

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(Option C continues on the following page)

(Option C, question 14 continued)

(c) Discuss physical health barriers to exercise for adults aged 65 and above. [3]

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15. (a) Outline characteristics of non-communicable diseases. [2]

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(b) Discuss why exercise is important for people with type 2 diabetes. [3]

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(Option C continues on the following page)

(Option C continued)

16. (a) Using an example, outline what is meant by an acute injury. [2]

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(b) State **two** common causes of running-related injuries. [2]

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17. Explain the relationship between walking and health. [4]

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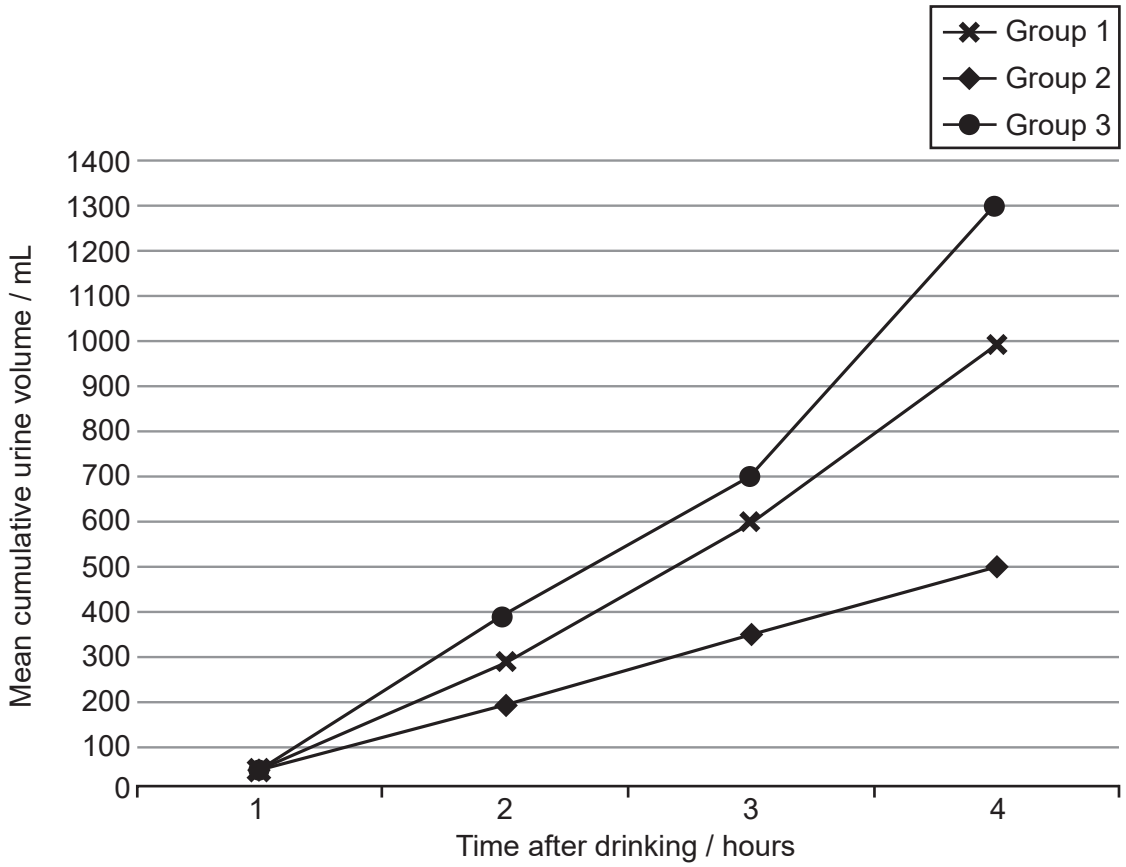
End of Option C

Option D — Nutrition for sport, exercise and health

18. A group of runners was involved in a study on post-exercise rehydration. Participants were randomly assigned to one of three groups according to the type of drink they were given:

- Group 1: Carbohydrate-electrolyte
- Group 2: Carbohydrate-electrolyte plus whey protein
- Group 3: Carbohydrate-electrolyte plus casein protein.

The graph shows the mean cumulative volume of urine produced, measured every hour for four hours.



[Source: Adapted from *Journal of Exercise Science and Fitness*, Vol 13 issue 1, L Liang *et al*. Effects of protein addition to carbohydrate–electrolyte solutions on postexercise rehydration, pp 8-15. Copyright 2015, with permission from Elsevier.]

(a) Identify the group with the smallest mean cumulative volume of urine produced at three hours after drinking. [1]

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(Option D continues on the following page)

(Option D, question 18 continued)

(b) Calculate the difference between the mean cumulative volume of urine produced for groups 1 and 3 after three hours. [2]

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(c) Using the data on the graph, deduce why the carbohydrate electrolyte drink with whey protein is the most effective hydration method. [2]

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19. (a) Define *basal metabolic rate*. [1]

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(b) Outline **two** features of the stomach. [2]

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(Option D continues on the following page)

(Option D, question 19 continued)

(c) Outline **two** conditions that are required for enzymes to work efficiently. [2]

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20. Describe **three** effects of water loss during prolonged exercise. [3]

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21. Outline the changes in body weight and body composition when energy expenditure is greater than energy intake. [2]

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(Option D continues on the following page)

(Option D continued)

22. Explain the transportation of glucose across the cell membrane when at rest and during physical activity. [4]

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23. Discuss the effects of alcohol on gluconeogenesis and endurance performance. [3]

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(Option D continues on the following page)

(Option D continued)

24. Explain the harmful effects of free radicals at the cellular level. [3]

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End of Option D

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