Diploma Programme
Programme du diplôme
Programa del Diploma

Sports, exercise and health science
Higher level
Paper 3

Monday 20 May 2019 (morning)

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 – 6
Option B — Psychology of sports	7 – 11
Option C — Physical activity and health	12 – 17
Option D — Nutrition for sports, exercise and health	18 – 22

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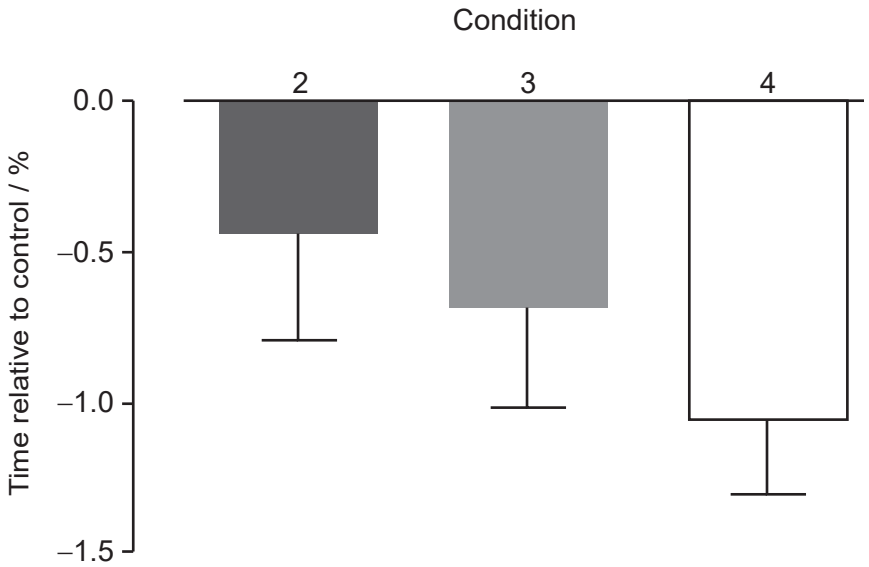
Option A — Optimizing physiological performance

1. Swimmers may wait for up to 30 minutes (transition time) between warming up in the pool and competing in a race. A study compared four conditions for swimmers during the transition time:

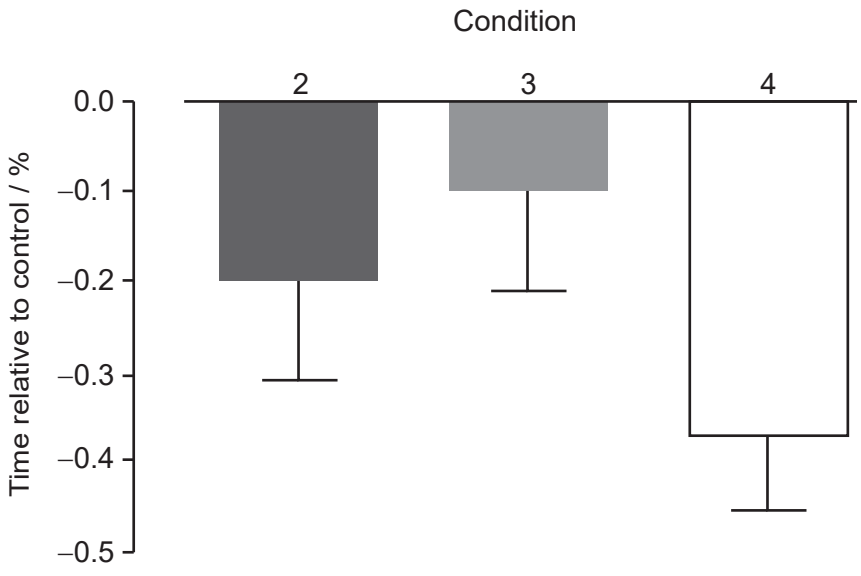
- Condition 1: control (sitting and wearing a tracksuit)
- Condition 2: sitting and wearing a heated jacket
- Condition 3: continuing warm-up on land
- Condition 4: continuing warm-up on land and wearing a heated jacket.

The three graphs show the results of the different conditions on 100 m and 15 m swim times and change in core body temperature.

100 m swim time relative to control



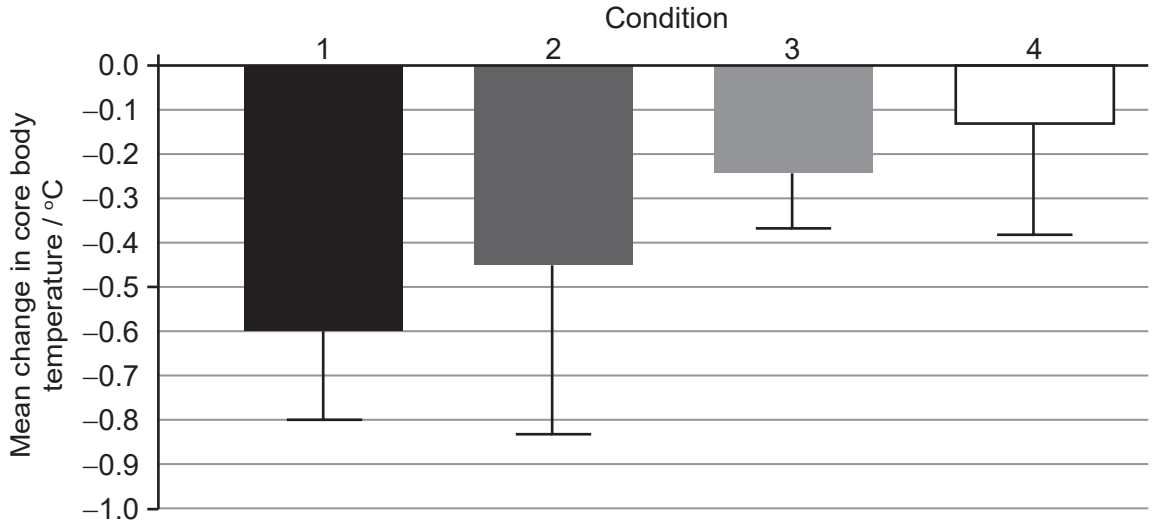
15 m swim time relative to control



(Option A continues on the following page)

(Option A, question 1 continued)

Mean change in core body temperature during the 30-minute transition time



[Source: adapted from *Journal of Science and Medicine in Sport*, **19**, CJ McGowan, *et al.*, Heated jackets and dryland-based activation exercises used as additional warm-ups during transition enhance sprint swimming performance, pages 354–358, Copyright 2016, with permission from Elsevier.]

(a) Identify the condition that showed the least improvement in 100 m swim time in comparison to the control. [1]

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(b) Calculate the difference in the mean change in core body temperature, in °C, between conditions 1 and 2. [2]

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(Option A continues on the following page)

(Option A, question 1 continued)

(c) Using the data from this study, deduce which warm-up condition a competitive swimmer should use to maximise their performance. [3]

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2. (a) Outline how the body maintains a stable core temperature when the external environment cools. [2]

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(b) Explain why swimming in cold water is a challenge to the thermoregulation process. [2]

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3. Using an example, distinguish between circuit training and continuous training. [2]

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(Option A continues on the following page)

(Option A continued)

4. Evaluate the use of caffeine by an athlete. [4]

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5. (a) Define *active recovery*. [1]

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(b) Outline **two** reasons for an athlete completing active recovery immediately after training. [2]

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(Option A continues on page 7)

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will not be marked.

(Option A continued)

6. (a) Describe the effects of altitude on fluid loss. [2]

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(b) Discuss the possible benefits of the live high, train low (LHTL) approach to altitude training. [2]

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(c) Explain how altitude can impact the performance of an athlete competing in long jump. [2]

[Source: Inspiring / Shutterstock]

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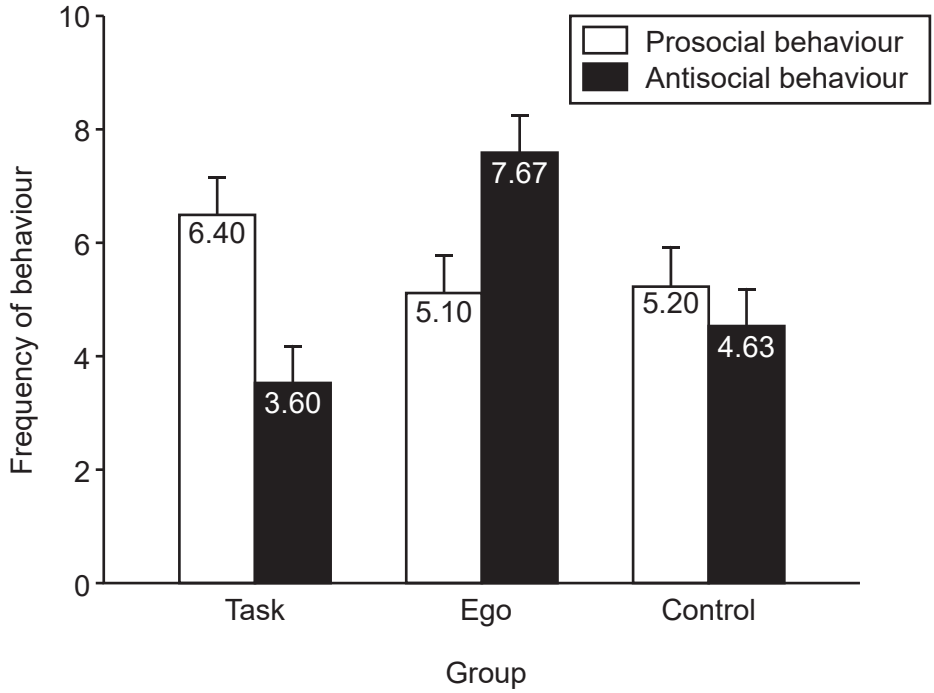
End of Option A

Option B — Psychology of sports

7. A study assessed the effect of task and ego motivations on behaviour of 90 participants during soccer games. They were divided into three groups and were told:

- Group 1 (Task): prizes would be awarded based on improvement
- Group 2 (Ego): prizes would be awarded based on goals scored
- Group 3 (Control): no prizes would be awarded.

Prosocial and antisocial behaviour was observed during games; the mean results (and standard deviation) are shown in the graph.



[Source: adapted, with permission, from Luke Sage and Maria Kavussanu (2007), The Effects of Goal Involvement on Moral Behavior in an Experimentally Manipulated Competitive Setting, *Journal of Sport*, April 2007, volume **29**, issue 2, pp. 190–207 http://dx.doi.org/10.1123/jsep.29.2.190.]

(a) Identify the group that demonstrated the most antisocial behaviour. [1]

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(b) Calculate the difference in prosocial behaviour between the task and ego groups. [2]

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(Option B continues on the following page)

(Option B, question 7 continued)

(c) Using the data, discuss the effect of the different motivating conditions on behaviour. [2]

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

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(b) Distinguish between intrinsic and extrinsic motivation in exercise. [1]

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(c) Evaluate the effect of using extrinsic rewards to influence motivation. [3]

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(Option B continues on the following page)

(Option B continued)

9. (a) Outline the **two** talent identification processes in sport. [2]

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(b) Discuss the **four** stages of development through which an athlete is likely to progress as their talent evolves. [4]

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(Option B continues on the following page)

(Option B continued)

10. (a) Describe the catastrophe theory of arousal. [3]

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(b) Discuss how positive emotions may influence an athlete's performance. [2]

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11. (a) Outline self-regulated learning. [2]

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(b) Analyse how motivation levels can influence an athlete's engagement in a self-regulated learning programme. [2]

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End of Option B

Option C — Physical activity and health

12. A study looked at the relationship between the level of physical activity, inactive behaviour, and the risk of cardiovascular disease in adults. The mean results are shown in the table.

	Couch potatoes (Inactive)	**Potterers** (Lightly active)	**Techno-actives** (Moderately active)	**Busy exercisers** (Active)
Cardiovascular disease risk	18.6	14	10	8.5
Time inactive (min day^{-1})	640	433	604	408
Time in moderate to vigorous physical activity (min day^{-1})	2.7	4.4	25.4	33.1
Proportion time inactive (%)	72.9	51.6	67.2	47.1
Proportion time in moderate to vigorous physical activity (%)	0.3	0.5	2.8	3.8

[Source: adapted from *Journal of Science and Medicine in Sport*, **19**, R Maddison, *et al.*, The association between the activity profile and cardiovascular risk, pages 605–610, Copyright 2016, with permission from Elsevier.]

(a) Identify the group that had the highest risk of developing cardiovascular disease. [1]

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(b) Calculate the difference in time inactive, in min day^{-1}, between the group that was the most inactive and the most active. [2]

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(Option C continues on the following page)

(Option C, question 12 continued)

(c) Discuss how an inactive lifestyle increases the risk of cardiovascular disease. [3]

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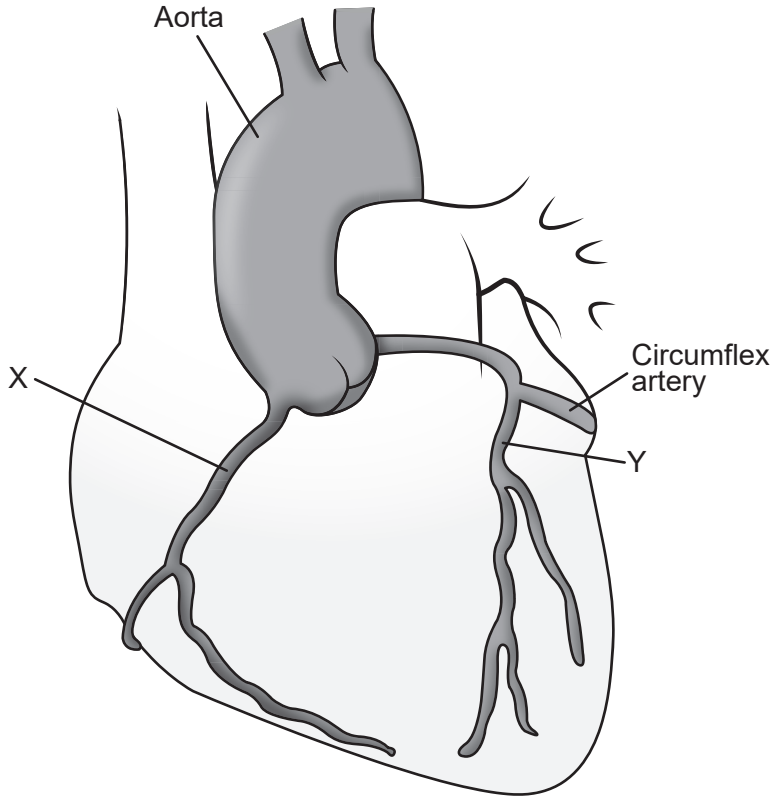
(d) Identify the arteries labelled X and Y on the diagram. [2]



[Source: Peter Lamb / 123rf.com]

X: . . . . . .

Y: . . . . . .

(Option C continues on the following page)

(Option C continued)

13. Outline habitual physical activity and exercise. [2]

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14. Discuss energy balance. [4]

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15. Discuss how physical activity can affect bone health. [3]

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(Option C continues on the following page)

(Option C continued)

16. Describe **two** causes of sudden cardiac death (SCD) in athletes. [2]

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17. (a) Outline compression, shearing and tension injuries. [3]

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(b) Explain **three** ways that risks and hazards of exercise can be reduced. [3]

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End of Option C

Option D — Nutrition for sports, exercise and health

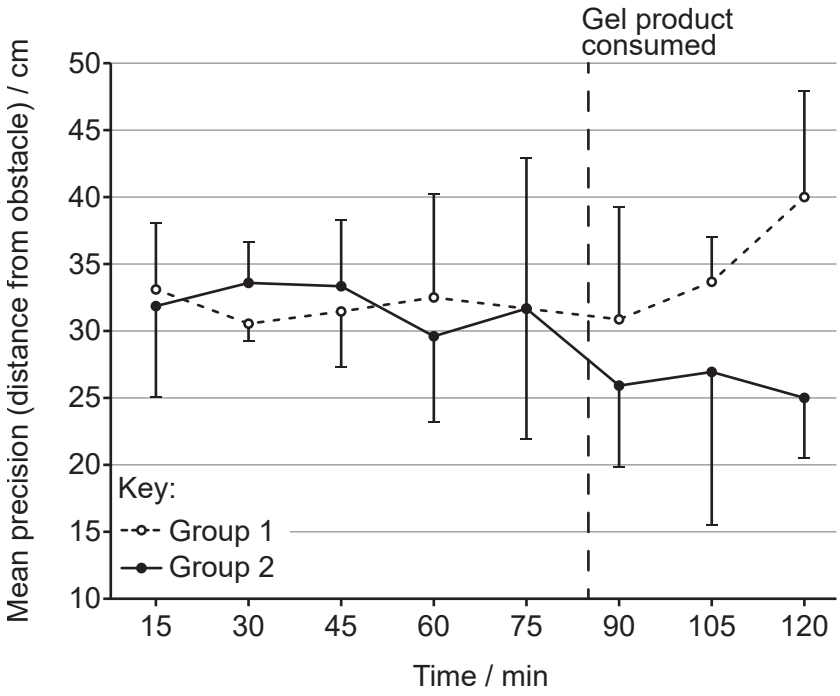
18. A study was conducted during a practice soccer game in which participants completed a dribbling test every 15 minutes. The participants were randomly allocated to two groups and consumed a gel product after 85 minutes:

- Group 1: placebo gel
- Group 2: carbohydrate gel.

Participants then continued playing for an extra 35 minutes, and testing continued.

The dribbling test required participants to dribble a ball around a series of obstacles; their precision (distance from obstacle), speed, and success (avoiding the obstacles) were measured. The mean results are shown in the graphs.

Graph showing the mean precision (distance from obstacle) of participants in the dribbling test.

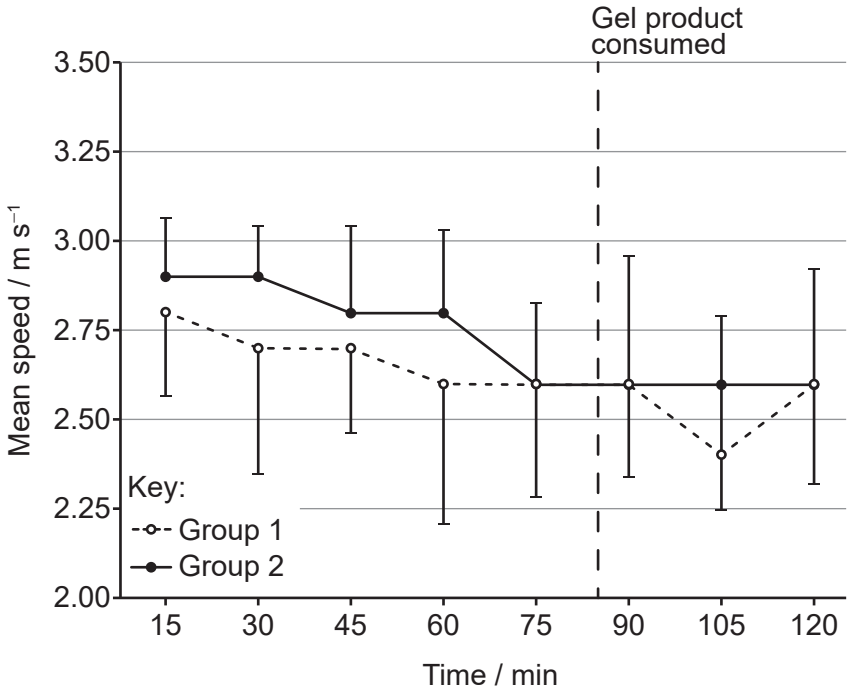


[Source: © International Baccalaureate Organization 2019]

(Option D continues on the following page)

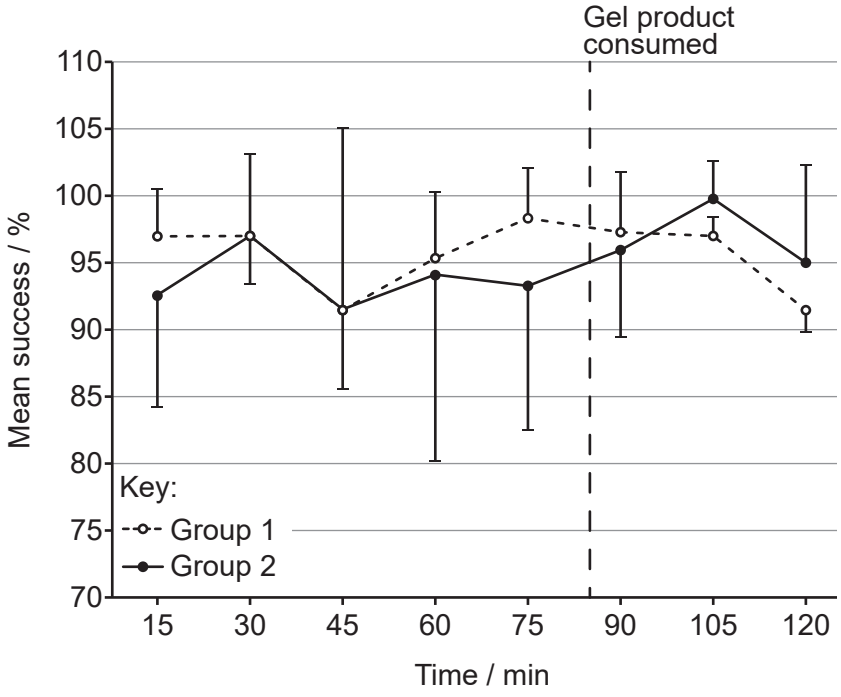
(Option D, question 18 continued)

Graph showing the mean speed of participants in the dribbling test.



[Source: © International Baccalaureate Organization 2019]

Graph showing the mean success (avoiding the obstacles) of participants in the dribbling test.



[Source: © International Baccalaureate Organization 2019]

(Option D continues on the following page)

(Option D, question 18 continued)

(a) State what happened to the speed of participants between 90 and 105 minutes for the group who consumed the carbohydrate gel. [1]

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(b) Calculate the difference in precision between the carbohydrate gel and placebo gel conditions at 120 minutes. [2]

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(c) Evaluate the consumption of carbohydrate gel during the soccer match. [3]

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(d) Define *glycemic index*. [1]

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(Option D continues on the following page)

(Option D, question 18 continued)

(e) Discuss how an athlete can adjust carbohydrate intake and training load in the week prior to an event in order to maximise endurance performance. [4]

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19. (a) List the enzymes that are responsible for the digestion of carbohydrates in the mouth and small intestine. [2]

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

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(Option D continues on the following page)

(Option D continued)

20. (a) State the normal range, in mmol L^{-1}, of blood glucose at rest. [1]

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(b) Describe hypoglycemia and its causes. [2]

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21. Outline the acute effects of an excess level of alcohol on the body. [2]

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22. (a) Discuss the harmful effects of free radicals on cells. [2]

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(Option D continues on the following page)

(Option D, question 22 continued)

(b) Evaluate the consumption of antioxidants by an athlete. [3]

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End of Option D

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