Diploma Programme
Programme du diplôme
Programa del Diploma

Sports, exercise and health science
Standard level
Paper 3

Monday 20 May 2019 (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.
- 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 – 4
Option B — Psychology of sports	5 – 8
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Option D — Nutrition for sports, exercise and health	13 – 16

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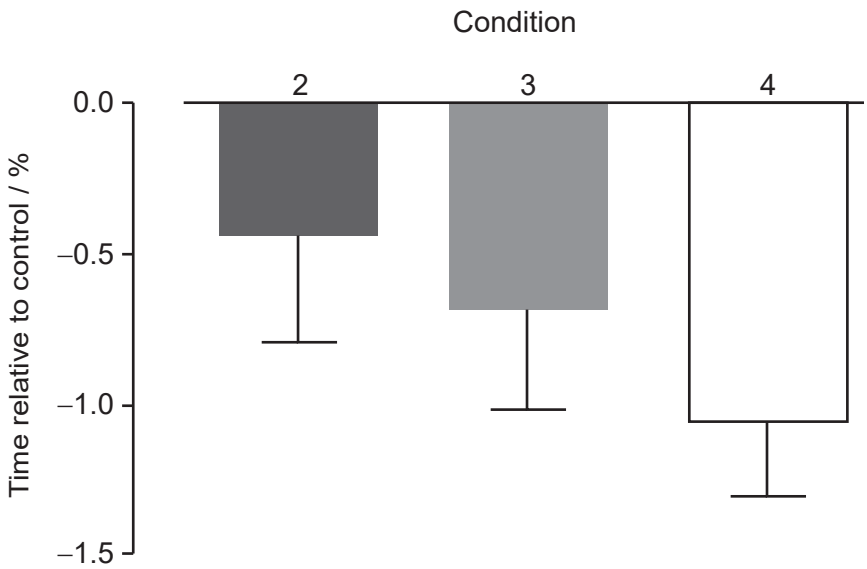
Option A — Optimizing physiological performance

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:

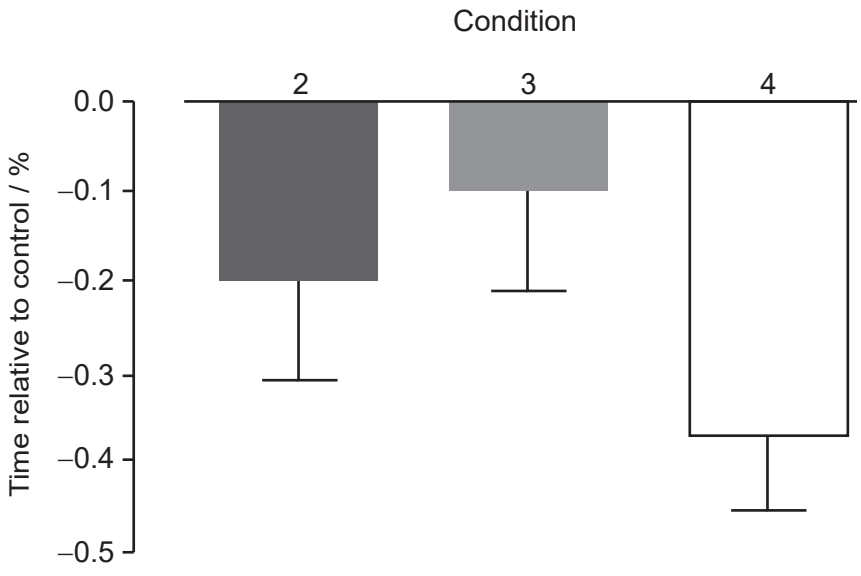
- Condition 1: control (sitting and wearing a tracksuit)
- Condition 2: sitting and wearing a heated jacket
- Condition 3: continuing warm-up on land
- Condition 4: continuing warm-up on land and wearing a heated jacket.

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



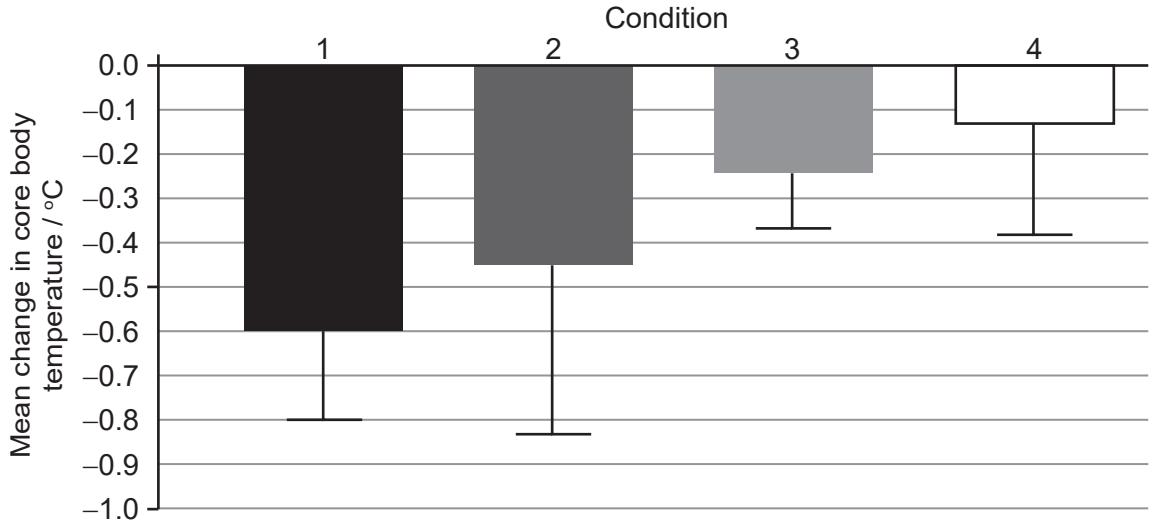
15 m swim time relative to control



(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. (a) State **two** classes of non-nutritional ergogenic aids currently banned by the International Olympic Committee (IOC). [2]

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(Option A continues on the following page)

(Option A, question 3 continued)

(b) Evaluate the use of beta blockers by an archer to positively influence their performance. [4]

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4. (a) Outline overreaching and overtraining. [2]

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(b) Suggest ways an athlete can avoid overtraining. [2]

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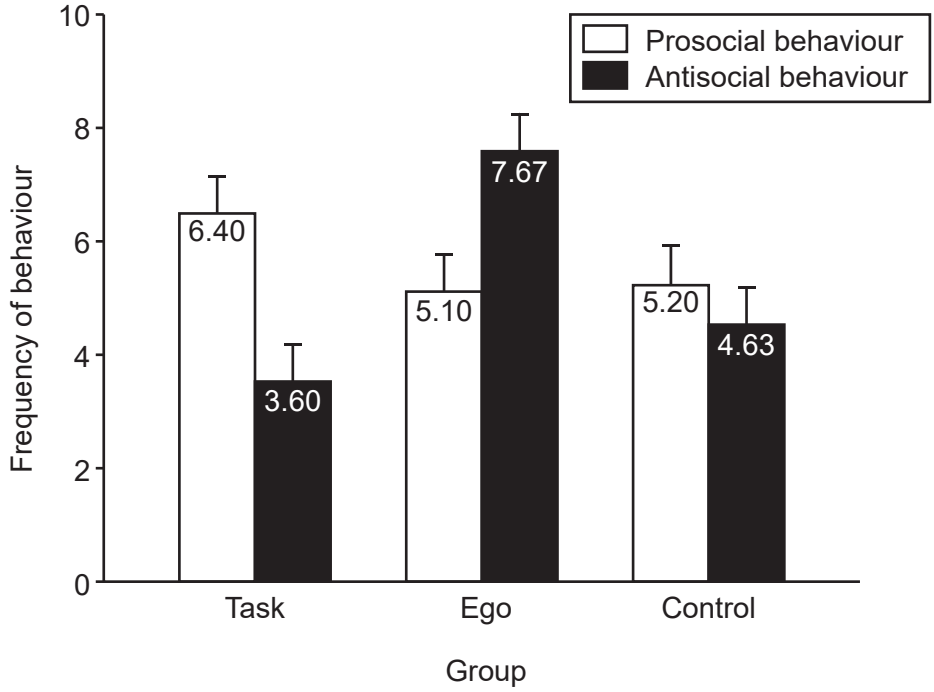
End of Option A

Option B — Psychology of sports

5. 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 5 continued)

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

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6. (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)

7. (a) Describe the relationship between arousal and sporting performance for a weightlifter according to the inverted-U hypothesis. [2]

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(b) Discuss the effect of specific positive and negative emotions on a cyclist's performance during an endurance race. [3]

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8. (a) Outline ethical issues associated with the measurement of personality. [2]

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(Option B continues on the following page)

(Option B, question 8 continued)

(b) Explain the interactionist approach to personality using a sporting example. [3]

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End of Option B

Option C — Physical activity and health

9. 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 continued)

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

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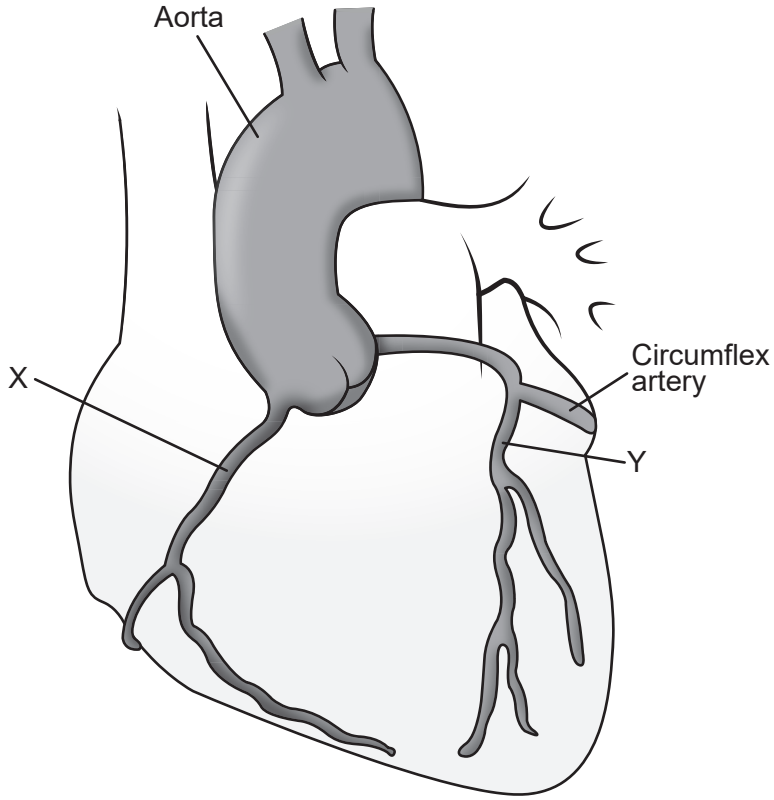
(b) Identify the arteries labelled X and Y on the diagram. [2]



[Source: Peter Lamb / 123rf.com]

X: . . . . . .

Y: . . . . . .

(Option C continues on the following page)

(Option C continued)

11. (a) Outline habitual physical activity and exercise. [2]

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(b) Define *hypokinetic disease*. [1]

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(c) Using examples, discuss the relationship between major societal changes and hypokinetic disease. [4]

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12. (a) Outline how social support from others can enhance adherence to exercise. [2]

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(Option C continues on the following page)

(Option C, question 12 continued)

(b) Explain features of an exercise programme that can help to reduce the effects of depression and anxiety. [3]

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End of Option C

Option D — Nutrition for sports, exercise and health

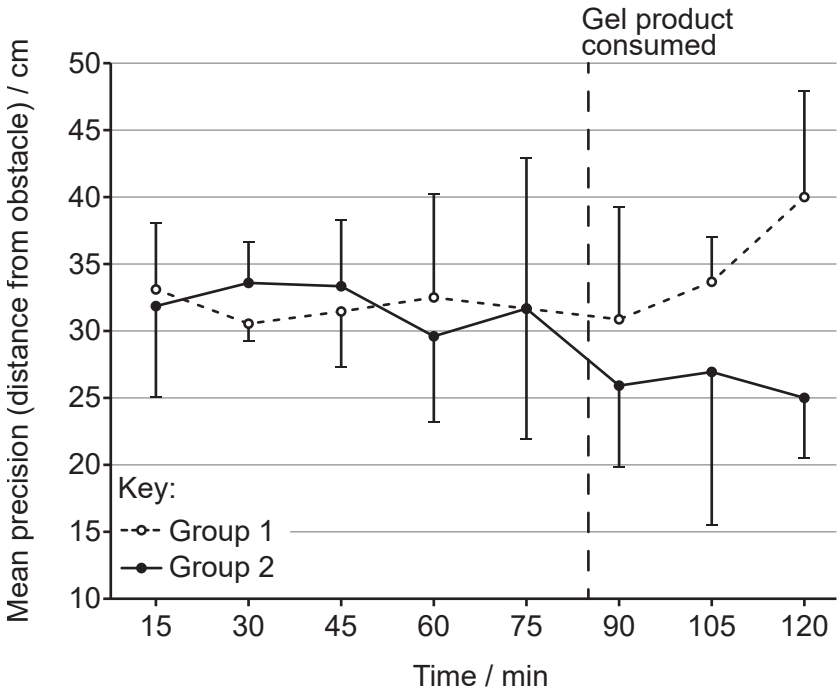
13. A study was conducted during a practice soccer game in which participants completed a dribbling test every 15 minutes. The participants were randomly allocated to two groups and consumed a gel product after 85 minutes:

- 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.

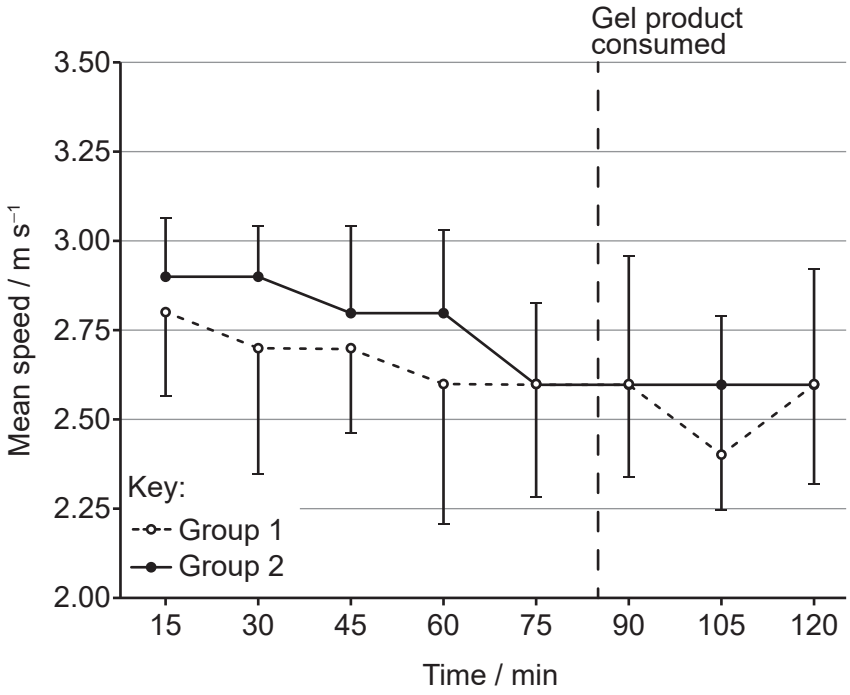


[Source: © International Baccalaureate Organization 2019]

(Option D continues on the following page)

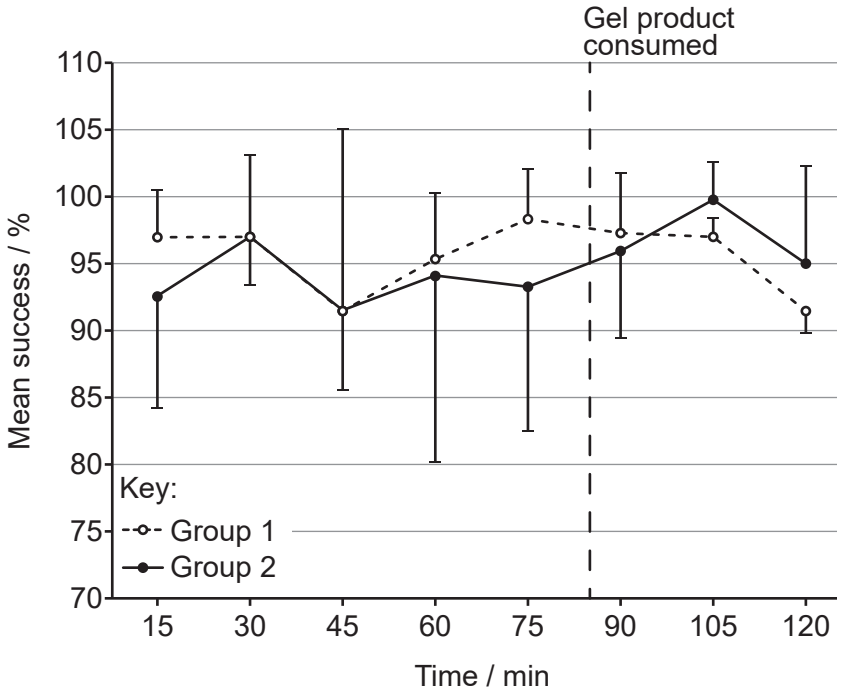
(Option D, question 13 continued)

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 13 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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14. (a) Define *glycemic index*. [1]

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(Option D continues on the following page)

(Option D, question 14 continued)

(b) 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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15. (a) Outline the **two** forms of digestion that take place inside the mouth. [2]

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(b) State the enzymes responsible for the digestion of fats and proteins. [2]

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(Option D continues on the following page)

(Option D continued)

16. (a) List **two** components of daily energy expenditure. [2]

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(b) Using a sporting example, discuss body composition and how it affects performance. [3]

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End of Option D

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