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**Sports, exercise and health science**  
**Higher level**  
**Paper 3**

29 April 2025

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

Candidate session number

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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 – 3
Option B — Psychology of sports	4 – 8
Option C — Physical activity and health	9 – 11
Option D — Nutrition for sports, exercise and health	12 – 16



**Option A — Optimizing physiological performance**

1. A study evaluated the effects of heat acclimatization on exercise tolerance. Participants completed a time-to-exhaustion test in a hot-dry environment. The following data was recorded to establish baseline:
- rectal temperature
  - heart rate.

This test was then repeated after each of the following interventions:

- an 11-week aerobic training programme
- an 8-day heat acclimatization programme.

The graphs show rectal temperature and heart rate during the time-to-exhaustion tests.

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- (a) Identify the training intervention for which the lower heart rate during the time-to-exhaustion test was recorded.

[1]

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**(Option A continues on the following page)**



**(Option A, question 1 continued)**

(b) Calculate the difference in rectal temperature at the end of the two interventions. [1]

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(c) Compare and contrast the effects of the 11-week aerobic training programme and the 8-day heat acclimatization programme. [2]

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(d) Analyse adaptations in sweat response associated with heat acclimatization. [2]

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**(Option A continues on the following page)**



**(Option A continued)**

2. An athlete is preparing for a marathon in a cold environment.

(a) Outline the precautions that should be taken when exercising in cold environments. [3]

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(b) Describe the importance of the preparation phase in marathon training. [2]

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**(Option A continues on the following page)**



**(Option A, question 2 continued)**

- (c) Evaluate the benefits and risks associated with the use of erythropoietin (EPO) as an ergogenic aid in marathon running.

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- (d) Outline **two** reasons for active recovery immediately after a marathon.

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- (e) Evaluate the use of cryotherapy for recovery after a marathon.

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**(Option A continues on page 7)**



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**(Option A continued)**

3. A runner is preparing for high-altitude training with the goal of enhancing performance in a marathon at sea level.

(a) List **three** physiological changes the runner may experience during their first week of high-altitude training. [3]

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(b) Explain the impact of **two** muscular adaptations from high-altitude training on the runner's performance at sea level. [2]

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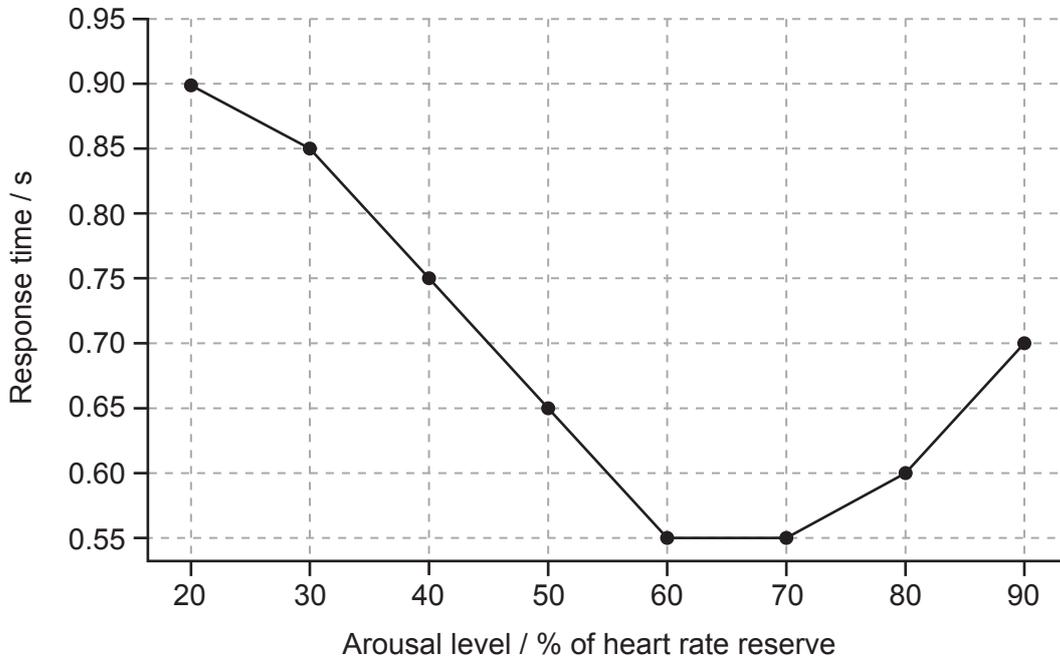
**End of Option A**



**Option B — Psychology of sports**

- 4. Participants performed a response time task to measure performance on a bicycle ergometer at various arousal levels, from 20% to 90% of heart rate reserve.

Response times for each arousal level are presented in the graph.



- (a) Identify which arousal level(s) had the fastest response time. [1]

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- (b) Calculate the difference in response time (in s) between the 20% arousal level and the 80% arousal level. [1]

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**(Option B continues on the following page)**



**(Option B, question 4 continued)**

- (c) Using the data, discuss the association between arousal and performance. [4]

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5. (a) Using examples, analyse **two** ways social learning theory can help a soccer (football) coach improve team performance. [2]

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- (b) The coach introduces new coaching methods. Describe how Atkinson's model of achievement motivation may influence the soccer (football) team's response to coaching. [3]

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**(Option B continues on the following page)**



**(Option B continued)**

6. (a) Distinguish between cognitive and somatic anxiety. [2]

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(b) Suggest how to implement techniques aimed at reducing somatic anxiety during the acquisition phase of psychological skills training (PST). [2]

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7. A country is focused on identifying top athletic talent to be invited to a centre of excellence.

(a) Define the term *talent*. [1]

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(b) Outline a talent identification (TI) process that the country might use to select athletes for the centre of excellence. [2]

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**(Option B continues on the following page)**



**(Option B, question 7 continued)**

- (c) Outline **two** reasons why an athlete might transfer to a different sport or training programme.

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- 8. Explain the importance of motivation in the self-regulated learning framework.

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**End of Option B**



**Option C — Physical activity and health**

9. A study examined the prevalence of type 2 diabetes across various population groups. The age-adjusted percentages of affected males and females are presented in the graph.

**Prevalence of Type 2 Diabetes by Population Group**

*Numbers are Age-adjusted % for population groups*

Population Group	Males (%)	Females (%)
A	14.3	14.8
B	10.2	8.6
C	12.2	12.1
D	11.5	12.0
E	8.0	6.9

- (a) Identify the group with the highest age-adjusted percentage of type 2 diabetes. [1]

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- (b) Calculate the difference in the percentage of type 2 diabetes between males and females in group E. [1]

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**(Option C continues on the following page)**



**(Option C, question 9 continued)**

- (c) Based on the data, evaluate the claim that males in population group B have a higher age-adjusted percentage of type 2 diabetes compared to females. [2]

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- (d) Discuss **two** major risk factors for type 2 diabetes. [2]

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**(Option C continues on the following page)**



**(Option C continued)**

10. In a public health campaign aimed at reducing the risk of coronary heart disease, educational materials are being developed to inform the public of:
- the importance of physical activity
  - the risks of physical inactivity
  - strategies for maintaining a healthy lifestyle.

(a) Define *coronary heart disease*. [1]

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(b) Analyse how physical inactivity can lead to cardiovascular disease. [3]

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(c) Outline the physical activity recommendations for healthy adults to avoid developing coronary heart disease. [2]

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**(Option C continues on the following page)**



**(Option C, question 10 continued)**

- (d) Discuss the relationship between moderate exercise and health in relation to cardiovascular disease.

[3]

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- (e) Outline the use of population attributable risk (PAR) for prioritizing public health initiatives in relation to coronary heart disease.

[2]

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- (f) Outline environmental approaches for enhancing adherence to exercise for adults at risk of cardiovascular disease.

[2]

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**(Option C continues on page 17)**



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**(Option C continued)**

11. (a) List **three** common soft-tissue injuries that occur in soccer (football) players. [3]

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(b) Explain injury prevention strategies that could be used by a swimming coach. [3]

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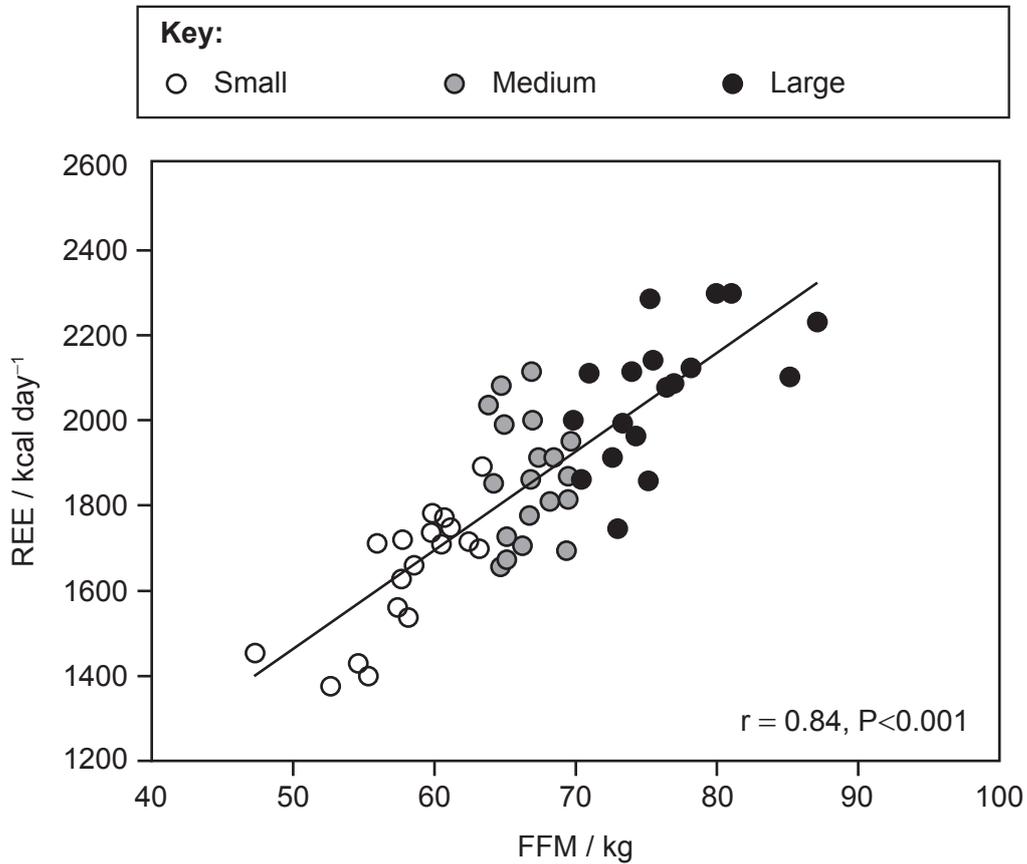
**End of Option C**



**Option D — Nutrition for sports, exercise and health**

12. Researchers examined the relationship between fat-free mass (FFM) and resting energy expenditure (REE).

Athletes were grouped into three categories according to their FFM: small, medium, and large. The graph displays the relationship between FFM and REE across these groups.



- (a) Identify which group has the highest REE. [1]

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- (b) Estimate the REE for an athlete with a FFM of 65 kg. [1]

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(Option D continues on the following page)



**(Option D, question 12 continued)**

(c) Comment on the relationship between FFM and REE as shown in the graph. [2]

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(d) Suggest how higher levels of FFM affect athletic performance. [2]

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**(Option D continues on page 21)**



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**(Option D continued)**

**13.** An athlete is preparing for a 20 kilometre swim.

- (a) Explain the importance of selecting low glycemic index (GI) carbohydrates for a pre-competition meal. [2]

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- (b) Compare and contrast the transportation of glucose across the cell membrane by GLUT4 transporters at rest and during the swim. [2]

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- (c) Describe how the athlete regulates electrolyte balance as they lose water and sodium during the swim. [2]

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**(Option D continues on the following page)**



**(Option D continued)**

**14.** (a) Identify the type of muscle fibre associated with each level of glycogen content. [3]

Low: .....

Medium: .....

High: .....

(b) Alcohol consumption has been reported to decrease muscle glycogen storage. List **three** other potential effects of excessive chronic alcohol consumption on the body. [3]

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**15.** (a) Outline the production of free radicals during exercise. [2]

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(b) Discuss the recommendation that athletes should increase their intake of antioxidants to counteract the effects of free radicals. [3]

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**(Option D continues on the following page)**



**(Option D continued)**

**16.** Analyse the role of enzymes in digestion.

**[2]**

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**End of Option D**

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**References:**

12. Oshima, S., et al, 2011. Fat-Free Mass Can Be Utilized to Assess Resting Energy Expenditure for Male Athletes of Different Body Size. *Journal of Nutritional Science and Vitaminology*, 57, pp. 394–400. Source adapted.

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24EP24