

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

Wednesday 1 November 2017 (morning)

Candidate session number

1 hour

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**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 sport	5 – 9
Option C — Physical activity and health	10 – 14
Option D — Nutrition for sport, exercise and health	15 – 18



**Option A — Optimizing physiological performance**

- 1. Participants completed a standard 20-minute exercise in hot (40°C) and temperate (22°C) conditions, before and after a 5-day heat acclimatization at 40°C. The table below shows the mean core and skin temperature for hot and temperate conditions at rest and during exercise.

	Temperature (°C)			
	Hot condition (40°C)		Temperate condition (22°C)	
	before acclimatization	after acclimatization	before acclimatization	after acclimatization
Core temperature at rest (°C)	37.29	37.05	37.47	37.27
Core temperature during exercise (°C)	37.95	37.77	37.57	37.41
Skin temperature at rest (°C)	36.22	36.16	32.34	31.83
Skin temperature during exercise (°C)	37.30	37.19	30.09	29.65

[Source: R. A. Neal et al. (2016) *Scandinavian Journal of Medicine & Science in Sports*, 26 (Wiley), pp. 875–884.]

- (a) Identify the lowest skin temperature. [1]

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- (b) Calculate the difference in core temperature during exercise between hot and temperate conditions after acclimatization. [2]

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



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

- (c) Compare and contrast the core and skin temperatures at rest shown in the table on page 2.

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- 2. (a) Outline how convection and evaporation transfer heat from the skin to the environment.

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- (b) Explain the effects of **three** physiological adaptations that occur with heat acclimatization.

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**(Option A continues on page 5)**



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**Turn over**

Please **do not** write on this page.

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will not be marked.



**(Option A continued)**

3. (a) Define *overreaching*. [1]

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(b) Explain how a macrocycle training structure can avoid overtraining and injury. [3]

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4. (a) Using an example, describe the placebo effect. [3]

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(b) Discuss why banned pharmacological substances should not be used by Olympic athletes. [2]

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**End of Option A**

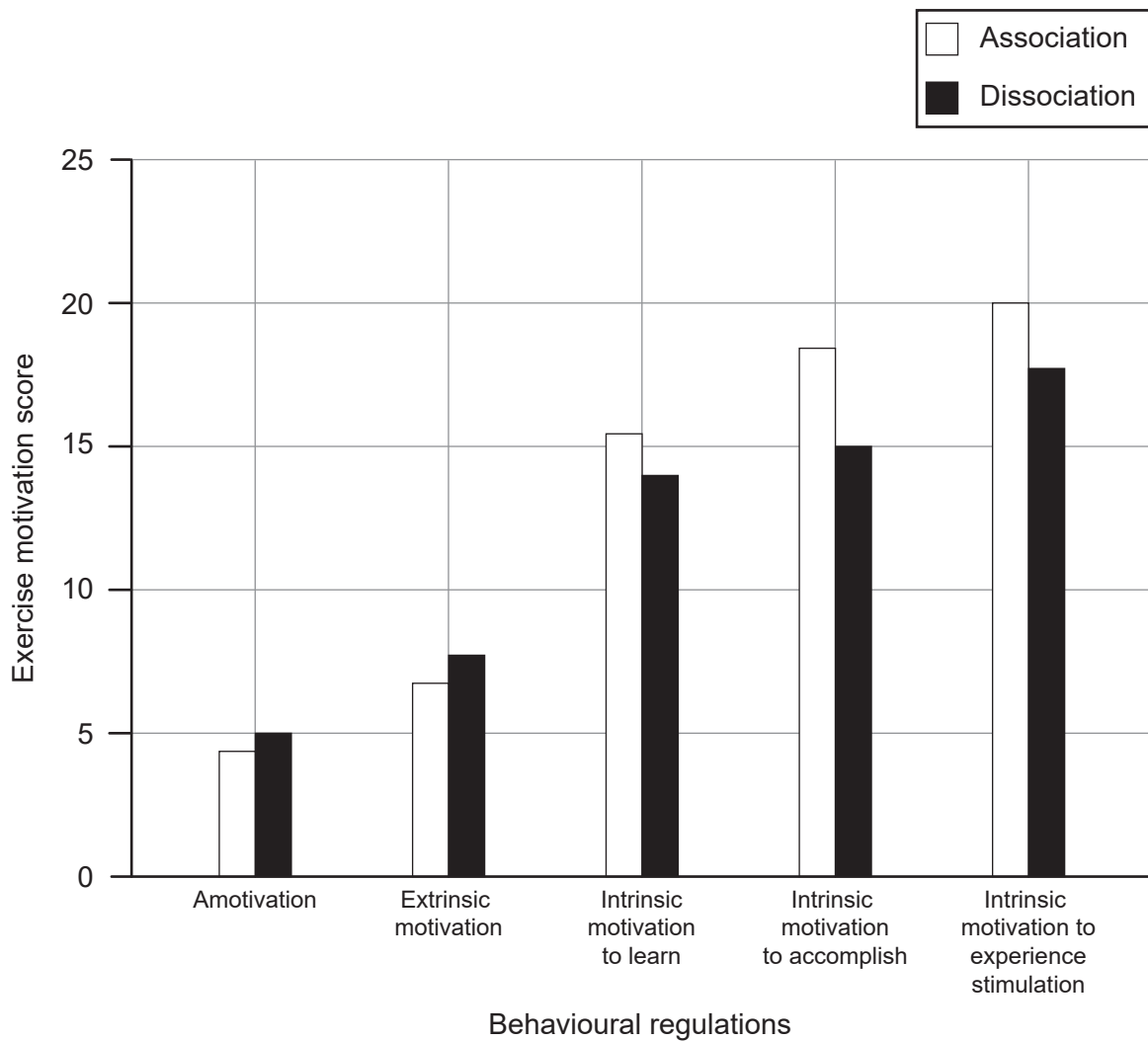


**Option B — Psychology of sport**

5. Motivation can be affected by association and dissociation.

- Association is a focus on internal body cues such as breathing rate.
- Dissociation is blocking out body sensations related to physical effort.

A researcher investigated the effects of association and dissociation on types of motivation during an exercise class. Participants completed an exercise motivation questionnaire after the exercise class. The mean scores for association and dissociation are shown in the figure below.



[Source: L. Jones *et al.* (2017) *Scandinavian Journal of Medicine & Science in Sports*, 27, John Wiley and Sons, pp. 124–135.]

(a) Identify which type of motivation has the lowest mean association score.

[1]

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(Option B continues on the following page)



**(Option B, question 5 continued)**

- (b) Calculate the difference for the dissociation score between amotivation and intrinsic motivation to accomplish. [2]

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- (c) Using the data on page 6, discuss the effect of the exercise class on intrinsic motivation. [3]

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- 6. Describe locus of stability and locus of causality, using examples from a sport or exercise of your choice. [3]

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



**(Option B continued)**

7. (a) Outline ethical issues associated with the measurement of an athlete's personality. [2]

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(b) Explain the relationship between personality and success in sport. [3]

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8. (a) State **one** symptom of a sportsperson's somatic anxiety. [1]

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(b) Discuss how emotions experienced during sports competition can influence performance. [2]

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





**(Option B continued)**

9. Discuss **three** uses of mental imagery with examples from sport.

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**End of Option B**



**Option C — Physical activity and health**

10. An eight-week study investigated physical activity and health in office workers. Participants were assigned to either an intervention group (with an adjustable sit–stand workstation), or a control group (sitting at a desk). The table below shows the mean data for both groups before and after the study.

	Control group		Intervention group	
	before	after	before	after
Sitting time (minutes)	387.0	402.2	385.9	322.0
Standing time (minutes)	42.5	43.7	41.1	115.4
Systolic BP (mmHg)	118	117	119	117
Diastolic BP (mmHg)	72	71	74	69
Cholesterol (mmolL)	3.94	3.78	4.45	3.79
Back pain (0 = no pain, 10 = extreme pain)	1.2	1.6	1.9	1.1
Neck pain (0 = no pain, 10 = extreme pain)	2.1	2.2	2.6	1.9

[Source: Lee E. F. Graves, Rebecca C. Murphy, Sam O. Shepherd, Josephine Cabot and Nicola D. Hopkins (2005) 'Evaluation of sit-stand workstations in an office setting: a randomised controlled trial.' *BMC Public Health*, 15, pages 1145–1159. <https://doi.org/10.1186/s12889-015-2469-8>]

- (a) Identify the group that has more back pain after the study.

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- (b) Calculate the difference in mean sitting time between the control and intervention groups after the study.

[2]

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(Option C continues on the following page)



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

- (c) Using the data from cholesterol, blood pressure, and neck pain, deduce why the adjustable sit-stand workstations can lead to health benefits. [3]

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11. (a) Define *hypokinetic disease*. [1]

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- (b) Explain the relationship between major societal changes and hypokinetic disease. [2]

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12. (a) Outline how appetite is regulated after eating. [3]

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



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

(b) Analyse type 2 diabetes.

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**13.** Outline the World Health Organization recommended levels of aerobic physical activity for adults aged 18–64 years.

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



**(Option C continued)**

**14.** Explain why lack of dietary calcium is a major risk factor for osteoporosis. [3]

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**End of Option C**



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**Turn over**

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

15. The table below shows body composition and physiological data for a marathon runner in 2009 and in 2014.

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(a) Identify the year in which the runner had the lowest percentage of total body fat. [1]

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(b) Calculate the change in total body fat (kg) from 2009 to 2014. [2]

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(c) Explain how changes in body composition impact the physiological data and may affect performance in a marathon. [3]

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(Option D continues on the following page)



**(Option D continued)**

**16.** Describe the absorption of amino acids from the intestinal lumen to the capillary network. [2]

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**17. (a)** List **three** places where extracellular fluid is located in the body. [2]

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**(b)** Compare and contrast water distribution in Olympic sprinters and inactive individuals. [4]

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



**(Option D, question 17 continued)**

- (c) Explain how an antidiuretic hormone helps conserve water when sweating during muscular activity.

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- 18. Describe **one** strategy to increase muscle glycogen for an endurance runner preparing for a marathon.

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**End of Option D**

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