

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

Friday 22 May 2015 (morning)

Candidate session number

1 hour

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**Instructions to candidates**

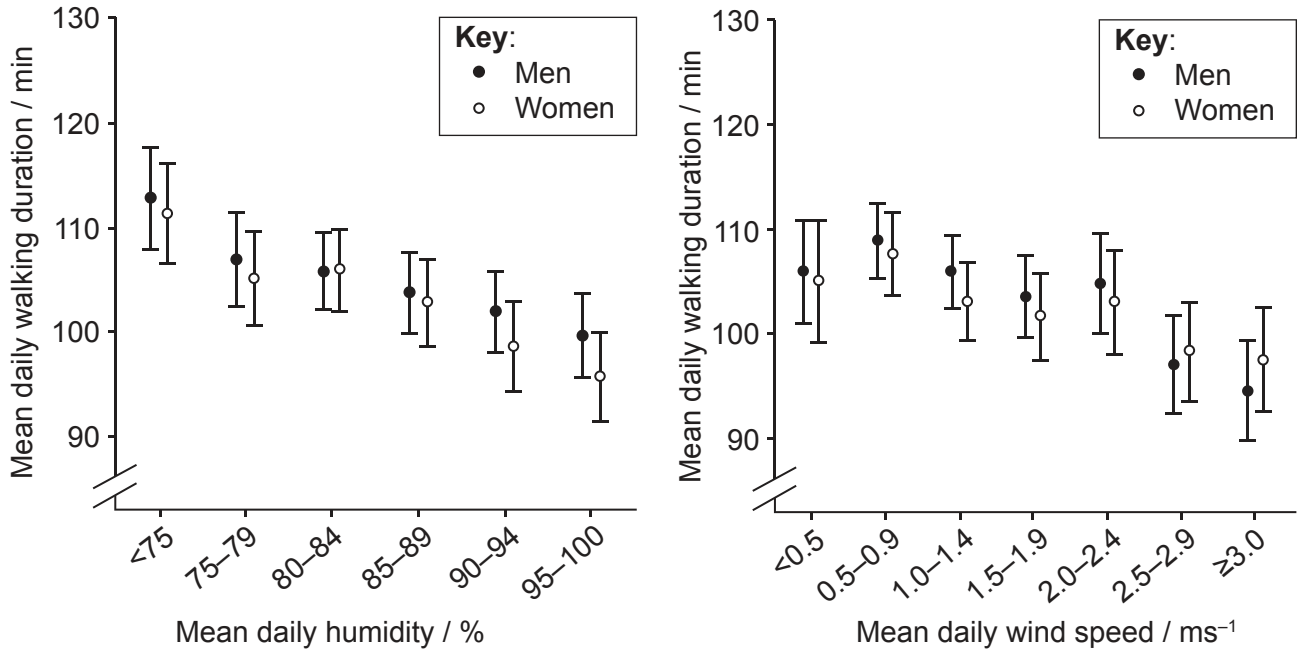
- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Answer all of the questions from two of the Options.
- Write your answers in the boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[40 marks]**.

Option	Questions
Option A — Optimizing physiological performance	1 – 4
Option B — Psychology of sport	5 – 8
Option C — Physical activity and health	9 – 12
Option D — Nutrition for sport, exercise and health	13 – 16



**Option A — Optimizing physiological performance**

- 1. A study investigated the influence of weather conditions on physical activity in men and women aged 65 years or older. The effects of mean ( $\pm$ SD) daily humidity and wind speed on mean daily walking duration are shown in the graphs below.



[Source: Klenk *et al.*, (2012), *Journal of Epidemiology & Community Health*, **66**, pages 474–476]

- (a) Identify the mean daily humidity range that shows the least difference in mean daily walking duration between men and women. State appropriate units for your answer. [1]

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- (b) Calculate the difference in mean daily walking duration for men in daily wind speed <0.5 ms<sup>-1</sup> versus 95%–100% humidity. [2]

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(Option A continues on the following page)



16EP02

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

- (c) Compare the effects of mean daily wind speed on mean daily walking duration for men and women. [2]

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- (d) Outline how high humidity influences body heat loss during exercise. [2]

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



16EP03

Turn over

**(Option A continued)**

2. (a) List **two** classes of non-nutritional ergogenic aids that are currently banned by the International Olympic Committee (IOC) and the World Anti-Doping Agency (WADA). [1]

1. ....

2. ....

- (b) Discuss the moral implications of using banned pharmacological substances in sport. [3]

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- (c) Describe why the placebo effect needs to be considered when designing an exercise science experiment. [2]

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



**(Option A continued)**

3. (a) List **two** types of stretching techniques to improve flexibility. [1]

1. ....

2. ....

- (b) Distinguish between a macrocycle and a mesocycle when planning periodization of training. [2]

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4. (a) Discuss how cold can affect muscle function responses to exercise. [2]

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- (b) Explain why the body surface area-to-body mass ratio is important for heat preservation during exercise in cold environments. [2]

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**End of Option A**



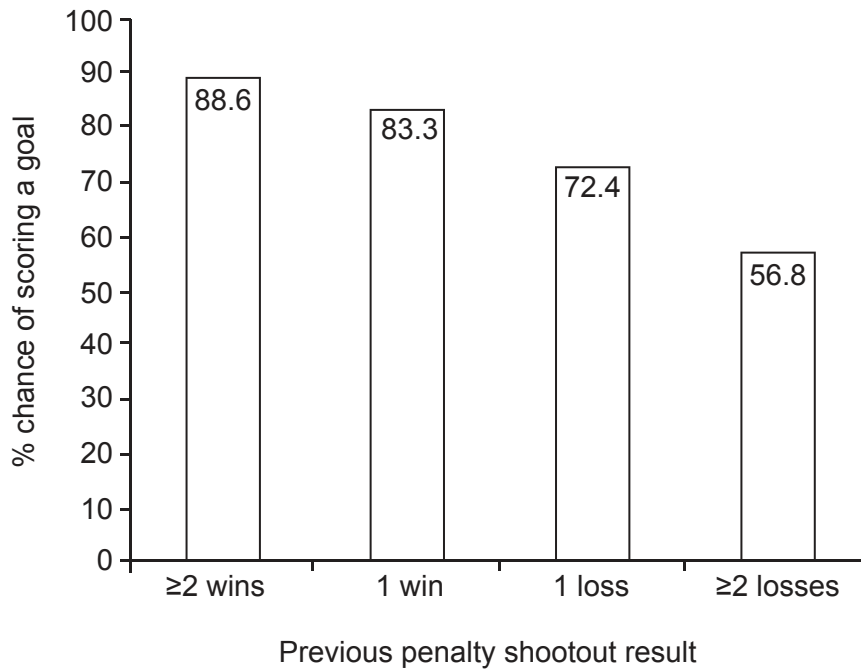
16EP05

Turn over

**Option B — Psychology of sport**

5. A study investigated whether a soccer team’s success or failure of previous penalty shootouts is linked to the next penalty shootout result. The result is defined as the team winning or losing the penalty shootout.

The chart below shows the percentage chance of scoring a goal in a soccer World Cup penalty shootout in relation to the team’s previous penalty shootout result.



[Source: Jordet *et al.*, (2012), *British Journal of Psychology*, **103**, pages 268–283]

- (a) State which previous penalty shootout result had the lowest percentage chance of scoring a goal. [1]

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- (b) Calculate the difference in the percentage of goals scored when the outcome of the previous penalty shootout was 1 win versus 1 loss. State appropriate units for your answer. [1]

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(Option B continues on the following page)



16EP06

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

- (c) Discuss the emotions that may influence a player during a penalty shootout in the soccer World Cup final.

[3]

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- 6. (a) With reference to either Sage (1974) or Weinberg (2009), define the term *motivation*.

[1]

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- (b) Outline **three** components of Atkinson’s model of Achievement Motivation.

[3]

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



(Option B, question 6 continued)

(c) Discuss how extrinsic rewards can influence intrinsic motivation to continue to exercise. [3]

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7. (a) State **two** relaxation techniques used to reduce somatic anxiety in an athlete. [1]

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(b) Personal trainers set goals to improve fitness. Distinguish between a performance goal and a process goal. [2]

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(c) Explain the education and practice phases of a psychological skills training (PST) programme to improve performance in competition. [3]

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(Option B continues on the following page)



16EP08



**(Option B continued)**

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

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**End of Option B**



16EP09

Turn over

**Option C — Physical activity and health**

- 9. A study compared the health benefits of using a bicycle to a car for short trips in the Netherlands. The table below shows the numbers of accidents per billion passenger kilometers traveled by bicycle and by car, for different age categories. The ratio represents the number of bicycle accidents divided by the number of car accidents.

Age category / years	Bicycle	Car	Ratio
<15	4.9	0.6	8.6
15–19	5.4	7.4	0.7
20–29	4.2	4.6	0.9
30–39	3.9	2.0	2.0
40–49	6.6	1.0	6.9
50–59	9.6	1.2	X
60–69	18.6	1.6	11.7
70–79	117.6	7.6	15.4
>80	139.6	8.1	17.1

[Source: adapted from de Hartog *et al.*, (2011), *Ciência & Saúde Coletiva*, **16** (2), available from <http://www.scielo.br/>, [Accessed March 2014]]

- (a) State the age category and mode of transport with the highest number of accidents. [1]

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- (b) X is the ratio for the age category 50–59 years. Calculate the value of X to one decimal place. [1]

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



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

(c) Discuss barriers to physical activity. [3]

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10. (a) Distinguish between the terms exercise and sport. [2]

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(b) Discuss the role of exercise in reducing the effects of depression. [3]

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



16EP11

Turn over

**(Option C continued)**

11. (a) Outline atherosclerosis. [2]

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(b) Diabetes is one of the most common non-communicable diseases in the world. Explain type 1 and type 2 diabetes. [3]

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12. (a) Outline how bone density changes from birth to old age. [2]

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(b) Describe how an osteoporotic fracture can impact long-term on an individual. [3]

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**End of Option C**



16EP12

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

13. A nutrition study involved power-based athletes from events of 1 to 10 minutes duration. The events included middle distance running, track cycling, rowing, canoeing/kayaking and swimming. The table below shows the energy contribution for the three energy systems that provide ATP during competition in these events.

Event time range / min	Event	% VO <sub>2</sub> max	% Energy contribution		
			ATP-CP	Anaerobic glycolysis	Aerobic
0.5–1	400 m running; individual cycling time-trial (500 m or 1 km); 100 m swimming disciplines	150	10	47–60	30–43
1.5–2	800 m running; 200 m swimming disciplines; 500 m canoe/kayak disciplines	113–130	5	29–45	50–66
3–5	1500 m running; cycling pursuit; 400 m swimming disciplines; 1000 m canoe/kayak disciplines	103–115	2	14–28	70–84
5–8	3000 m running; 2000 m rowing	98–102	<1	10–12	88–90

[Source: Stellingwerff *et al.*, (2011), *Journal of Sports Sciences*, 29 (S1): S79–S89]

(a) Identify which cycling event has the lowest range for the anaerobic energy contribution. [1]

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(b) Outline the effect of increasing event time on the percentage energy contribution for the aerobic energy system. [1]

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(Option D continues on the following page)



16EP13

Turn over

(Option D, question 13 continued)

- (c) Discuss the interaction of carbohydrate loading and training programme modification prior to competition. [3]

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- 14. (a) List **two** functions of the mouth as part of the digestive system. [1]

1. ....  
2. ....

- (b) Outline how the hydration status of athletes can be monitored. [2]

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- (c) Explain the role of ADH in maintaining the water balance of the blood during heavy sweating while exercising. [3]

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(Option D continues on the following page)



16EP14

**(Option D continued)**

15. (a) Define the term *basal metabolic rate (BMR)*. [1]

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(b) Describe **two** dietary practices used by athletes to decrease body fat. [2]

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



16EP15

Turn over

**(Option D continued)**

16. (a) State **two** reasons for adding sodium to water for marathon runners. [2]

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(b) List **one** low and **one** high glycemic index (GI) food. [1]

Low GI: .....

High GI: .....

(c) Explain the relevance of GI with regard to pre-competition carbohydrate consumption by athletes. [3]

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**End of Option D**



16EP16