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SPORTS, EXERCISE AND HEALTH SCIENCE
STANDARD LEVEL
PAPER 3

Candidate session number

Friday 7 November 2014 (afternoon)

1 hour

Examination code

8	8	1	4	–	6	6	0	3

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]*.

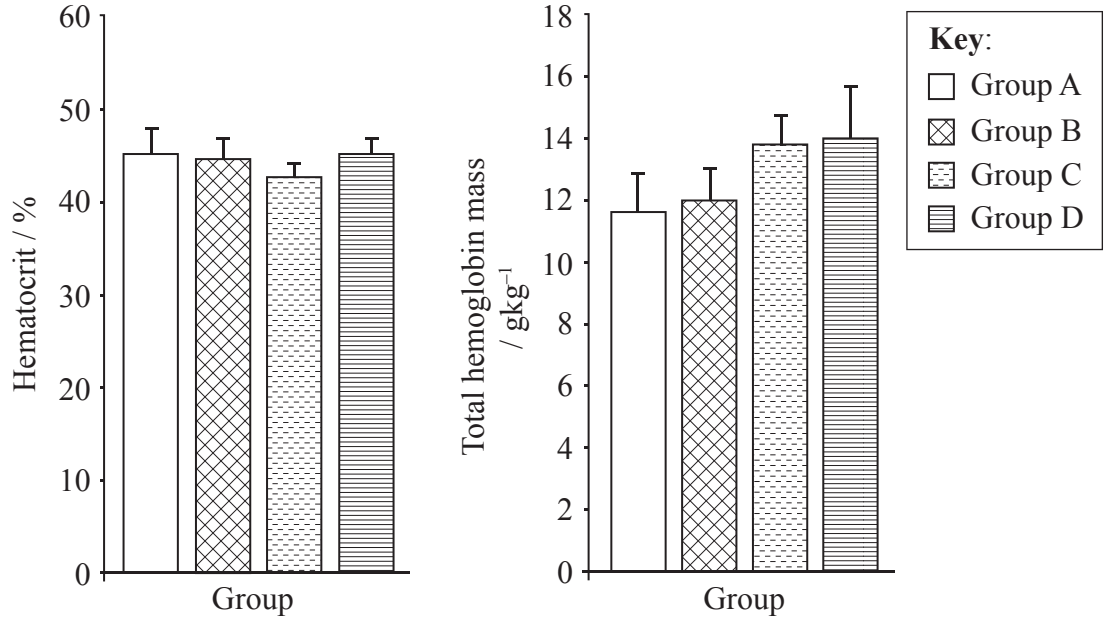
Option	Questions
Option A — Optimizing physiological performance	1 – 4
Option B — Psychology of sport	5 – 8
Option C — Physical activity and health	9 – 11
Option D — Nutrition for sport, exercise and health	12 – 15

Option A — Optimizing physiological performance

1. A study investigated blood doping in young adult males from Denmark. The investigation compared the volume percentage of red blood cells (the hematocrit) and the total hemoglobin mass. The subjects were divided into four groups:

- group A: Recreational joggers
- group B: Trained distance runners
- group C: Highly-trained cyclists
- group D: Olympic cross-country skiers

The mean values (±SD) of hematocrit and total hemoglobin mass for the four groups are shown below.



[Source: W Jelkmann, C Lundby, (2011), *Blood*, **118** (9), page 2395–2404]

(a) Identify which group has the lowest percentage of hematocrit. *[1]*

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(b) Calculate the difference in the mean total hemoglobin mass for the highly-trained cyclists versus the trained distance runners. State appropriate units for your answer. *[2]*

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(Option A continues on the following page)

(Option A, question 1 continued)

(c) Discuss the potential benefits that some cross-country skiers would hope to gain by using erythropoietin (EPO). *[3]*

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2. (a) Define the term *ergogenic aid*. *[1]*

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(b) Outline the possible physiological risks of using beta blockers for cyclists preparing to compete in the Tour de France. *[2]*

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(Option A continues on the following page)

(Option A continued)

3. (a) Describe how to use plyometric training as a method to help young basketball players jump higher. *[2]*

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(b) Outline **two** possible indicators of overtraining. *[2]*

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(Option A continues on the following page)

(Option A continued)

4. (a) Explain why it is difficult to thermoregulate when swimming in cold water. *[3]*

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(b) Discuss the physiological adaptations that occur with heat acclimatization. *[4]*

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End of Option A

Option B — Psychology of sport

5. A study identified the psychological factors that predict why some soccer players became professional players (Group A) and some do not (Group B). The three main psychological factors identified were:

- Goal commitment: the individual's determination to achieve their goals
- Problem-focused behaviour: the individual's psychological ability to cope with mental stress
- Self-esteem: the individual's self worth or personal value

The mean (±SD) scores are shown below. A higher score indicates a greater amount of the psychological factor.

Psychological factor	Group A Professional soccer players	Group B Non-professional soccer players
Goal commitment	4.53 (±0.41)	4.17 (±0.42)
Problem-focused behaviour	3.94 (±0.80)	3.70 (±0.80)
Self-esteem	3.33 (±0.78)	2.87 (±0.77)

[Source: N Van Yperen, (2009), *The Sport Psychologist*, **23**, pages 317–329]

(a) Calculate the difference in the mean self-esteem score for the professional soccer players versus the **non-**professional soccer players. *[2]*

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(b) Identify which group has less psychological ability to cope with mental stress. *[1]*

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(Option B continues on the following page)

(Option B, question 5 continued)

(c) Evaluate how a soccer player can use mental imagery to improve their own performance. *[3]*

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6. (a) Define the term *personality*. *[1]*

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(b) Discuss **two** personality theories associated with how personal and social factors affect the reactions of players in competitive sports. *[4]*

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(Option B continues on the following page)

(Option B continued)

7. Apply Weiner's attribution theory of motivation to understand an individual dropping out of an exercise programme. *[2]*

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8. (a) Distinguish between drive reduction theory and catastrophe theory of arousal on performance in sport. *[2]*

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(b) Evaluate how anxiety is measured using the competitive state anxiety inventory–2 (CSAI-2R). *[3]*

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(Option B continues on the following page)

(Option B, question 8 continued)

(c) Outline how progressive muscular relaxation (PMR) can reduce somatic anxiety. *[2]*

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End of Option B

Option C — Physical activity and health

9. A study examined the effects of physical activity on the bone mineral density (BMD) of Portuguese children. The BMD for the proximal and distal ends of the femur were measured. The mean percentage increase in BMD for moderate or vigorous levels of physical activity are shown below.

Level of physical activity	**Girls femur**		**Boys femur**	
	proximal end	distal end	proximal end	distal end
Moderate	0.0%	0.4%	0.2%	0.3%
Vigorous	0.0%	1.9%	1.0%	1.1%

[Source: adapted from G Cardadeiro *et al*., (2012), *PLOS ONE*, [Online] **7**(11). Available from www.plosone.org (Accessed 2012)]

(a) Identify which sex and physical activity group has the highest percentage change in BMD. *[1]*

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(b) Calculate the difference in the mean percentage change at the distal end of the femur from moderate to vigorous physical activity for boys. *[2]*

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(c) Outline recommendations for the amount of physical activity for healthy adults aged 18–64 years. *[2]*

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(Option C continues on the following page)

(Option C, question 9 continued)

(d) Discuss the major risk factors for osteoporosis. *[3]*

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10. (a) Outline hypertension. *[2]*

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(b) Compare type 1 and type 2 diabetes. *[4]*

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(Option C continued)

11. (a) Describe how exercise enhances psychological well-being. *[3]*

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(b) Discuss potential environmental barriers to physical activity. *[3]*

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End of Option C

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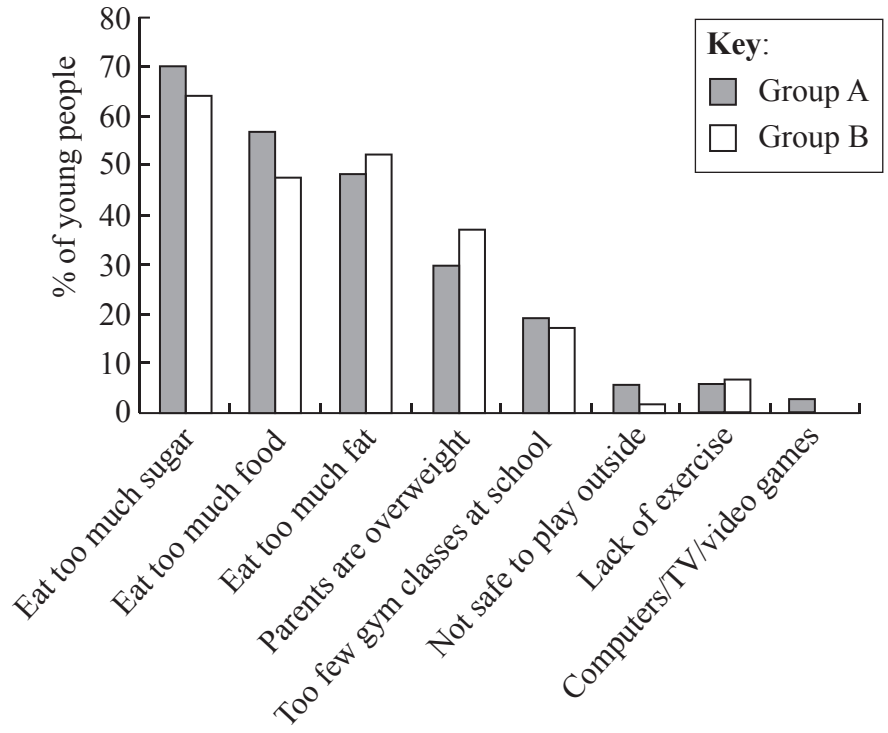
Option D — Nutrition for sport, exercise and health

12. An online survey was conducted in the United States to investigate reasons why some young people are overweight. Subjects were separated according to age into either group A (aged 8–12 years) or group B (aged 13–18 years).

The bar chart below shows percentage responses from both groups.



[Source: CD Economos *et al.*, (2012), *Public Health Nutrition*, [Online], pages 1–9. Available from http://journals.cambridge.org (Accessed 2012)]

(a) State the main reason for being overweight given by 13–18 year olds. *[1]*

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(b) Calculate the percentage difference in group A for those who "eat too much sugar" versus "parents are overweight". *[2]*

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(Option D continues on the following page)

(Option D, question 12 continued)

(c) Discuss dietary practices used by athletes to control their own body composition. *[3]*

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13. (a) State the organ responsible for the production of bile within the digestive system. *[1]*

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(b) Outline the absorption of fatty acids from the intestinal lumen to the capillary network. *[3]*

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(Option D continues on the following page)

(Option D continued)

14. (a) Identify **one** way in which an athlete can monitor their own hydration status when competing in a hot climate. *[1]*

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(b) Discuss the regulation of electrolyte balance for a participant who takes over one hour to complete a skiing biathlon at the Winter Olympic Games. *[4]*

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(Option D continues on the following page)

(Option D continued)

15. (a) Evaluate the use of bicarbonate loading as an ergogenic aid. *[3]*

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(b) Outline the possible harmful effects of excessive protein intake in athletes. *[2]*

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End of Option D

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