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Sports, exercise and health science
Higher level
Paper 2

8 November 2024

Zone A morning | **Zone B** morning | **Zone C** morning

Candidate session number

2 hours 15 minutes

Instructions to candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all questions.
- Section B: answer two questions.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[90 marks]**.

19 pages

8824 – 6802

Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

1. A study monitored the physical fitness of elite basketball players at three assessment points throughout a year. The assessments took place:

Before preparation: At the beginning of the fitness training (preparation) programme.
After preparation: At the end of the fitness training (preparation) programme at the start of the competitive season.
Mid-competitive season: Halfway through the competitive season.

Blood lactate values during a 5-minute high-intensity intermittent test (m.mol.L^{-1}), vertical jump height (cm) and body fat percentage were collected at the three assessment points. The data is presented in the table below.

	Before preparation	**After preparation**	**Mid-competitive season**
Test	Mean (SD +/–)	Mean (SD +/–)	Mean (SD +/–)
High-intensity intermittent test (blood lactate m.mol.L^{-1})	5.3 (2.6)	3.9 (1.4)	3.3 (1.5)
Vertical jump (cm)	46.9 (4.4)	46.1 (5.6)	47.2 (5.6)
Body fat (%)	13.3 (4.1)	12.3 (4.1)	12.1 (3.7)

(a) Identify the assessment point with the highest mean vertical jump (cm). [1]

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(b) Calculate the change in body fat (%) from before preparation to mid-competitive season. [1]

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(Question 1 continued)

(c) Explain why the vertical jump test is specific to a basketball player. [3]

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(d) Identify **two** further performance-related components of fitness that investigators could use to assess the fitness of the basketball players. [2]

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(e) Distinguish between the use of oxygen for energy production for high-intensity and endurance activities. [1]

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(f) Discuss the potential causes of fatigue during the high-intensity intermittent test. [2]

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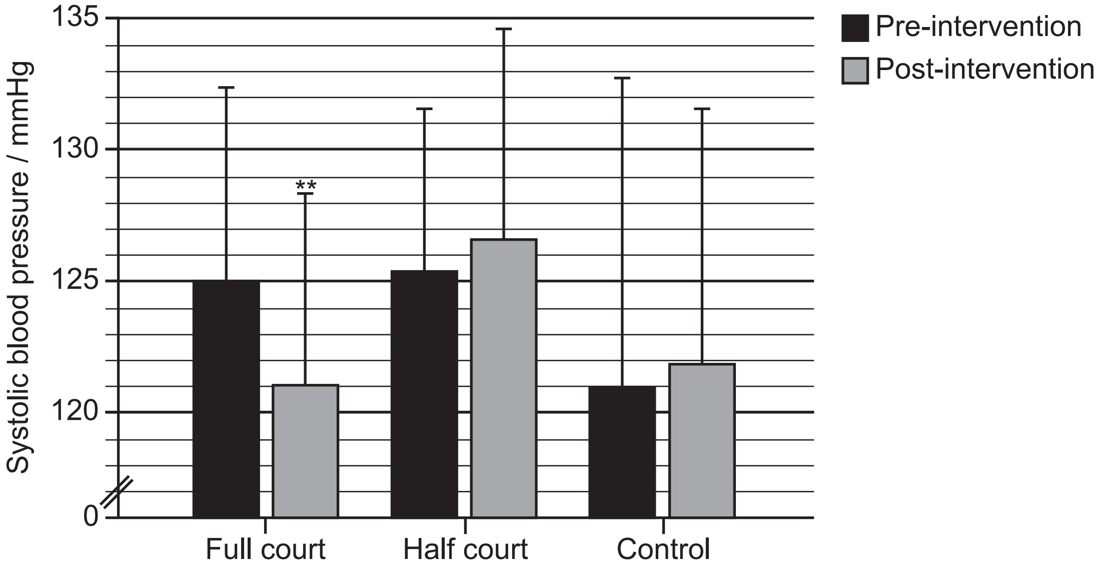
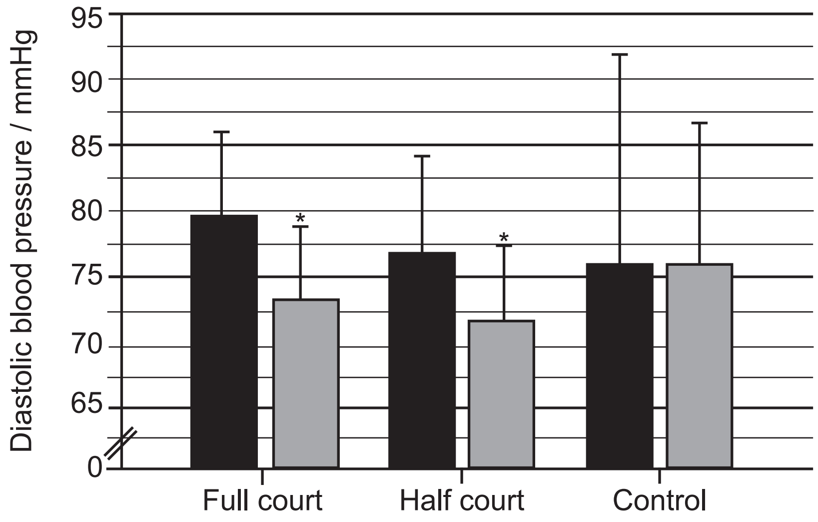
2. A second study explored the effects of different basketball practice intensities on the blood pressure of untrained individuals.

Participants' systolic and diastolic blood pressures were recorded both at the beginning (pre-intervention) and after 12 weeks (post-intervention) of engaging in one of three conditions: full-court practice, half-court practice, or no practice (control).

Graph A



Graph B



* p<0.05 in comparison with pre-intervention

** p<0.05 in comparison with change to the control

(a) Identify the condition and intervention with the largest systolic blood pressure. [1]

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(This question continues on the following page)

(Question 2 continued)

(b) State what error bars represent on the graphs. [1]

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(c) Distinguish between the error bars in Graph A and Graph B. [1]

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(d) Discuss the effect of the 12-week practice on blood pressure. [3]

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(e) Predict the effect of static exercise on systolic and diastolic blood pressure. [2]

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(This question continues on page 7)

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

Answers written on this page
will not be marked.

(Question 2 continued)

(f) The study modified the playing area as a constraint within the investigation. Using examples, outline **two** task constraints that a coach can use when teaching basketball. [2]

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(g) Explain progressive part presentation when introducing a new skill to an athlete. [2]

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3. (a) Using examples, outline **two** notation systems a coach may use during a basketball match. [4]

(b) Using a sporting example, explain how an athlete exploits the psychological refractory period to gain an advantage over an opponent. [4]

(This question continues on the following page)

(Question 3 continued)

(c) An athlete has fallen off their bicycle during a training ride and grazed their leg. Outline **three** mechanisms of the immune response to the grazed leg. [3]

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(d) Synovial fluid and bursae provide lubrication and a cushion between bones and tendons. Outline the function of **three** other components of a synovial joint. [3]

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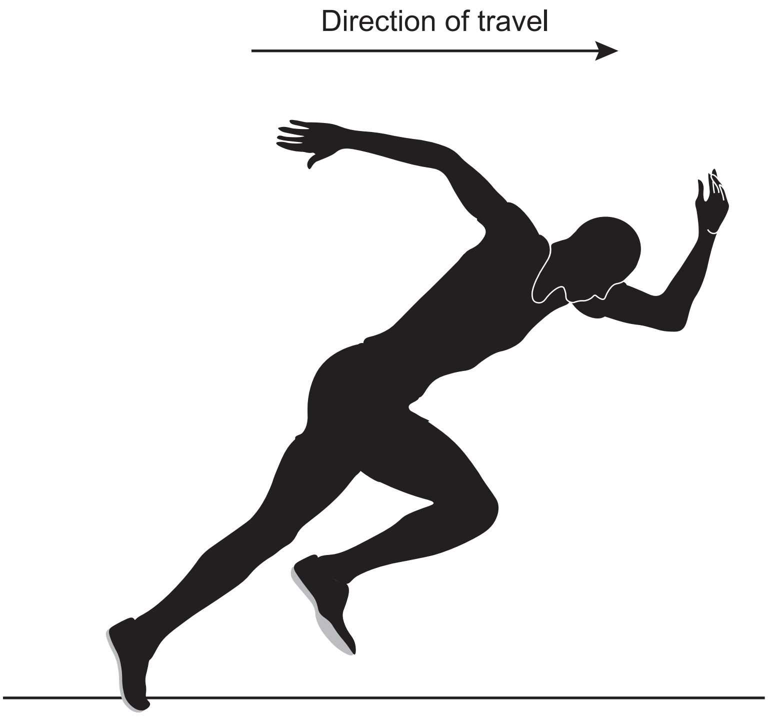
4. (a) Annotate the diagram of a sprinter showing the four relevant forces acting. [4]



(b) Discuss **three** factors that influence the amount of drag on a 100 m sprinter. [3]

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(This question continues on the following page)

(Question 4 continued)

(c) Outline the production of adenosine triphosphate (ATP) by the predominant energy system during an elite 100 m race. [3]

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(d) Compare and contrast recovery from fatigue between a 100 m sprinter and a 10 km runner. [4]

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Section B

Answer **two** questions. Answers must be written within the answer boxes provided.

5. (a) Outline the pathway of blood as it leaves the lungs and arrives at the capillaries of skeletal muscle. [5]

(b) Distinguish between a tennis ball struck with top spin and a ball struck with back spin, referring to local airflow velocity around the ball, local airflow pressure and the flight path of the ball. [4]

(c) Explain rehearsal and chunking as methods to improve memory. [4]

(d) Using examples, explain **one** function of the cerebrum during a team sport. [3]

(e) Evaluate the implications of genetic screening for a young athlete. [4]

6. (a) Outline how high levels of training can affect susceptibility to infection. [3]

(b) Compare and contrast the optimum macronutrient intake of a marathon runner to a sedentary individual of the same age. [5]

(c) Explain how contraction of the diaphragm and external intercostal muscles leads to inhalation of the lungs during exercise. [5]

(d) Using examples, outline **two** methods by which the pituitary gland is regulated by the hypothalamus. [4]

(e) Using an example from sport describe the cognitive phase of learning. [3]

7. (a) Describe how oxygen efficiently enters the blood stream from the lungs. [4]

(b) Using an example, explain how an athlete can generate and conserve angular momentum. [6]

(c) Explain how an athlete can change their body position to become more stable. [3]

(d) Outline the importance of a continuous supply of glucose to the brain. [3]

(e) Discuss the contribution of genetic and environmental factors on sports performance. [4]

8. (a) Muscle tissue is controlled by nerve stimuli and fed by capillaries. Outline **four** characteristics common to muscle tissue. [4]

(b) Using examples, explain how circulating hormones are regulated. [4]

(c) Using examples, discuss the relative production of adenosine triphosphate (ATP) from the three energy systems during a team game of your choice. [6]

(d) Apply Newton's three laws of motion to a 100 m sprinter in the blocks at the start of a race. [3]

(e) Using examples, outline **three** uses of digital technology for analysis in sport and exercise. [3]

References:

2. Randers, M.B. et al., 2018. Effects of 3 months of full-court and half-court street basketball training on health profile in untrained men. *Journal of Sport and Health Science*, [online] 7(2), pp. 132–138. Available at: https://www.sciencedirect.com/science/article/pii/S209525461730114X#fig0020 [Accessed 5 February 2024]. Source adapted.