



Oxford Cambridge and RSA

# AS Level Physical Education

**H155/01** Physiological factors affecting performance

**Tuesday 23 May 2017 – Morning**

**Time allowed: 1 hour 15 minutes**



**You may use:**

- A scientific or graphical calculator



First name										
Last name										
Centre number						Candidate number				

## INSTRUCTIONS

- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Complete the boxes above with your name, centre number and candidate number.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. If additional space is required, use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the barcodes.

## INFORMATION

- The total mark for this paper is **70**.
- The marks for each question are shown in brackets [ ].
- Quality of extended response will be assessed in the question marked with an asterisk (\*).
- This document consists of **16** pages.

**2**  
**SECTION A**

Answer **all** the questions.

- 1 (a)** Fig. 1.1 shows an acrobatic movement in gymnastics.



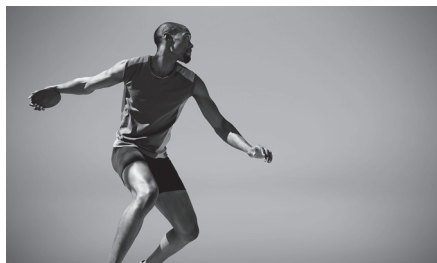
**Fig. 1.1**

- (i)** Complete the table below to identify the movement and agonist muscle at the left and right hip during this skill.

	<b>Movement</b>	<b>Agonist</b>
<b>Left hip</b>		
<b>Right hip</b>		

**[4]**

- (ii)** Fig. 1.2 shows a discus thrower in action.



**Fig. 1.2**

Identify the predominant muscle fibre type used by the discus thrower to achieve maximum distance.

..... **[1]**

- (iii) Explain how the function of this fibre type suits the performance of a discus throw.

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..... [2]

- (b) (i) Describe the nervous stimulation of a motor unit.

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..... [2]

- (ii) Describe the frontal and sagittal planes of movement and give a sporting example for each.

Frontal .....

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Sagittal .....

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..... [4]

(c) Explain the cardiac cycle of the heart using the following key terms:

- Atrial systole
- Ventricular systole
- Diastole

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..... [3]

(d) An athlete has a tidal volume of 0.5 litres and a breathing frequency of 12 breaths per minute.

(i) Calculate the athlete's minute ventilation using these values. Show your workings.

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..... [2]

(ii) During a 5000 metre race, the athlete's tidal volume increases. Explain how neural control of breathing causes this to happen.

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..... [2]

- 2 (a) Describe intermittent hypoxic training (IHT). Outline **one** benefit and **one** risk of intermittent hypoxic training.

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..... [4]

- (b) An elite marathon runner will have a very high  $\text{VO}_2$  max.

- (i) Describe how age and gender can affect  $\text{VO}_2$  max.

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..... [2]

- (ii) Evaluate the importance of a high  $\text{VO}_2$  max for an elite footballer.

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..... [3]

(c) A gymnast is encouraged to follow a healthy, balanced diet by his coach.

- (i) Explain how carbohydrates, vitamins and fibre in the gymnast's diet support training and performance.

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..... [3]

- (ii) Assess the possible long term effects on the gymnast if he regularly follows a diet that is high in fat and low in proteins.

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..... [2]

- (d) The three phases of training are named below. Outline what is meant by each phase, and, using sporting examples, describe a specific objective for each phase.

Preparatory .....

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Competitive .....

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Transition .....

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..... [6]

3 Fig. 3.1 shows a diagram of a middle distance runner in motion.

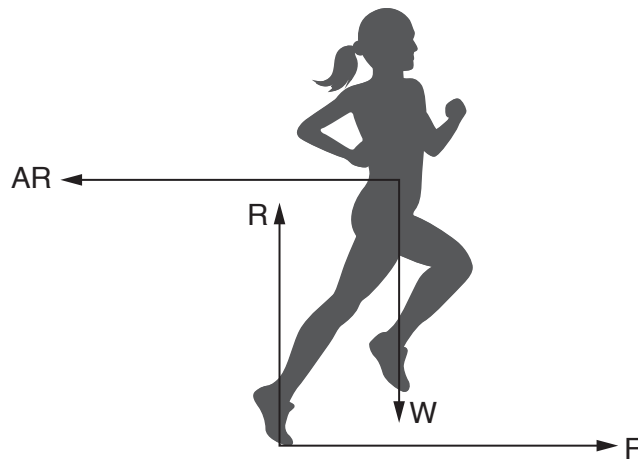


Fig. 3.1

(a) (i) Which one of the following is true?

Put a tick (✓) in the box next to the correct answer.

- A. The sprinter is accelerating. ☐
- B. The sprinter is at constant velocity. ☐
- C. The sprinter is decelerating. ☐
- D. The motion of the sprinter cannot be identified. ☐

[1]

(ii) Give **one** reason for your answer in (i).

.....

..... [1]

(b) State which of Newton's laws of motion is most applicable to each of the following statements.

(i) The long jumper who produces the greatest muscular force will have the greatest change in momentum.

..... [1]

(ii) A sprinter at rest in the blocks must apply a large enough force to the blocks to overcome their weight.

..... [1]

(iii) A speed skater achieves constant velocity as they travel round the track.

..... [1]



(c) A sprinter generates momentum. They have a mass of 70 kg and run at a velocity of 10 m/s.

(i) Define and calculate the sprinter's momentum, showing your workings.

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..... [3]

(ii) At what velocity must a 100 kg athlete run to have the same momentum as calculated above?

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..... [1]

(d) Describe how the force of weight acts on a sporting body. Using examples from sport explain **three** factors affecting air resistance.

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..... [5]

- (e) (i) Sketch a second class lever system in the box below, and identify the effort arm and load arm.



[3]

- (ii) Describe a sporting example of a second class lever system in the human body.

..... [1]

- (iii) Explain why a second class lever has a mechanical advantage.

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.....  
.....  
..... [2]

Explain the immediate effects of jogging on the vascular system, and evaluate the impact of regular training on lifestyle diseases of the cardiovascular system. **[10]**

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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This image shows a blank sheet of white paper designed for writing. It features a series of evenly spaced horizontal blue lines across its entire width. A single vertical red line runs down the left side of the page, creating a narrow margin. The paper is otherwise completely empty, with no text or markings.





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