



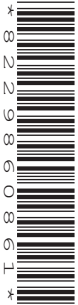
Oxford Cambridge and RSA

# Friday 15 May 2020 – Morning

## AS Level Physical Education

### H155/01 Physiological factors affecting performance

Time allowed: 1 hour 15 minutes



**You can use:**

- a calculator



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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First name(s) \_\_\_\_\_

Last name \_\_\_\_\_

### INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.

### 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 questions marked with an asterisk (\*).
- This document has **16** pages.

### ADVICE

- Read each question carefully before you start your answer.

2

## Section A

Answer **all** the questions.

- 1 (a) Fig. 1.1 shows a rugby player preparing to perform a drop-kick.



Fig. 1.1

- (i) Complete the table to analyse the movements at the named joints as he prepares to kick the ball.

Joint	Joint type	Movement produced	Agonist
Right shoulder			
Left hip			

[5]

(ii) Define the terms 'agonist' and 'fixator' with reference to the roles of muscles during sporting movement.

Agonist:

.....  
.....

Fixator:

.....  
.....

[2]

(b) Slow oxidative and fast glycolytic muscle fibres have different structural and functional characteristics.

Compare the following characteristics of slow oxidative muscle fibres with fast glycolytic muscle fibres.

Capillary density:

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Myoglobin content:

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.....

Fatigue resistance:

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[3]

- (c) (i) Heart rate changes during exercise and during recovery. Explain the reason for the following changes in heart rate:

Immediately before exercise, heart rate increases:

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During the first minute of intense exercise, heart rate rapidly increases:

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During sub-maximal exercise, heart rate is at a steady-state plateau:

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During the first minute of recovery, heart rate decreases:

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[4]

- (ii) Describe intrinsic factors that control heart rate during exercise.

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[2]



- 2 (a) Nutritionists monitor the energy intake and expenditure of elite athletes to maximise their performance.

Explain the effects of changing the balance between energy intake and energy expenditure on the performance of a marathon runner.

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..... [3]

- (b) Compare the potential benefits and risks of using blood doping and erythropoietin (EPO) as aids to sporting performance.

Benefits: .....  
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Risks: .....  
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[5]

(c) Aerobic training is used to increase aerobic capacity.

(i) Outline a continuous training session to increase aerobic capacity.

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(ii) Explain the use of target heart rates as a training intensity guide.

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(ii) Describe how the grip strength dynamometer test is performed.

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3 (a) (i) Apply Newton's third law of motion to a footballer heading a ball.

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(ii) A rugby player with a mass of 90 kg accelerates at a rate of  $2 \text{ m/s/s}$  ( $2 \text{ ms}^{-2}$ ).

Calculate the force the rugby player has generated to achieve this rate of acceleration.  
Show your workings.

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..... [2]

(b) (i) Define the term 'centre of mass'.

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..... [1]

(ii) Explain, using sporting examples, the relationship between centre of mass and stability.

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(c) (i) Describe the lever system at the elbow during the upward phase of a biceps curl.

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..... [3]

(ii) Evaluate the effectiveness of the lever system at the elbow during the upward phase of a biceps curl.

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(d) Evaluate the use of limb kinematics to enhance performance in sport.

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..... [4]

## Section B

- 4\* **Fig. 4.1a** shows a sprinter driving out of the blocks and **Fig. 4.1b** shows the sprinter as they approach the finishing line.



Fig. 4.1a



Fig. 4.1b

Sketch free body diagrams in the boxes on the following page to show the following vertical and horizontal forces acting on the sprinter at the two stages of the race:

- weight;
- reaction;
- air resistance;
- friction.

Explain the differences in the relationship between air resistance and friction at these two stages of the race.

Many sporting activities, such as sprinting, require explosive strength.

Discuss the physiological factors affecting explosive strength. Use a range of sporting examples to support your answer. [10]

Sprinter driving out of the blocks

Sprinter approaching the finish line

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**END OF QUESTION PAPER**

**ADDITIONAL ANSWER SPACE**

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).

A large rectangular area with a vertical solid line on the left side and horizontal dotted lines across the rest of the page, providing space for writing answers.



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