Oxford Cambridge and RSA

Tuesday 13 May 2025 – 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 | | | | | | Candidate number | | | | |

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.

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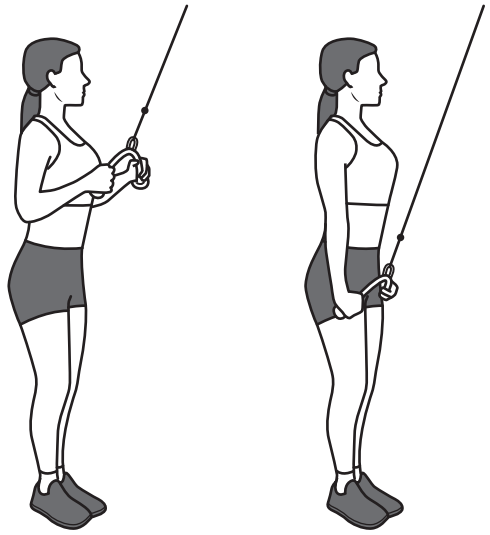
Section A

1

(a) The images show an athlete performing a cable push-down exercise.



A B

(i) Complete the table to analyse the movement at the right elbow joint from position A to position B.

Joint	Movement	Plane of movement	Agonist muscle	Type of muscle contraction
Elbow				

[4]

(ii) Describe the structure and role of a motor unit in skeletal muscle contraction.

Structure .....

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Role .....

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[2]

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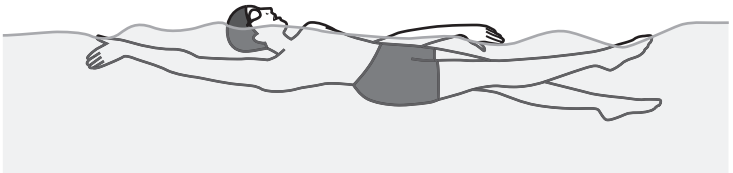
(b) The image shows a swimmer using backstroke technique.



Describe **four** mechanisms of venous return that assist the flow of blood back to the heart when swimming using backstroke technique.

1 .....

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2 .....

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3 .....

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4 .....

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[4]

(c) Describe the mechanics of inspiration at rest.

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..... **[5]**

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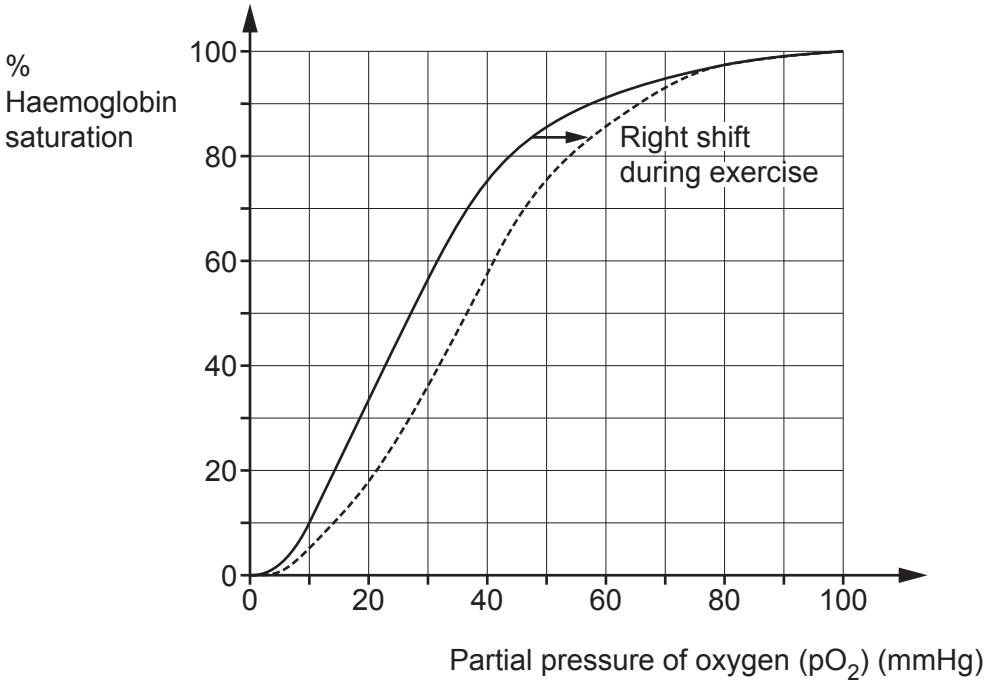
(d) The graph shows an oxyhaemoglobin dissociation curve at rest and shifted to the right during exercise.



(i) Draw a vertical line and a horizontal line onto the graph to show the percentage haemoglobin saturation at rest when the pO_2 in the muscle is 40 mmHg. **[1]**

(ii) Use the graph to calculate the percentage of oxygen released from the haemoglobin at rest when the pO_2 in the muscle is 40 mmHg.

Show your workings.

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

(iii) Describe the effect of the right shift on the dissociation of oxygen from haemoglobin at the working muscles during exercise.

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

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2

(a)

(i) Define VO_2 max.

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

(ii) Individual physiological make-up is a factor affecting VO_2 max.

Describe **three other** factors affecting VO_2 max.

1 .....

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2 .....

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3 .....

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[3]

(b)

(i) Describe proprioceptive neuromuscular facilitation (PNF) stretching.

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..... **[4]**

(ii) Compare dynamic stretching with ballistic stretching.

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

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(c) Justify why static strength and dynamic strength are important in a sports activity of your choice.

Each part of your answer should include a practical example showing the use of the type of strength in your chosen sports activity.

Sports activity .....

Static strength

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Dynamic strength

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[6]

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(d)

(i) Describe the lifestyle disease called a stroke.

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

(ii) Give **two** reasons why regular exercise might prevent a stroke.

1 .....

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2 .....

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[2]

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3

(a)

(i) Define force.

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

(ii) Outline the effects of balanced forces and unbalanced forces on motion.

Balanced forces .....

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Unbalanced forces .....

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[2]

(iii) Identify the main force measured by each of the following:

Force plate .....

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Wind tunnel .....

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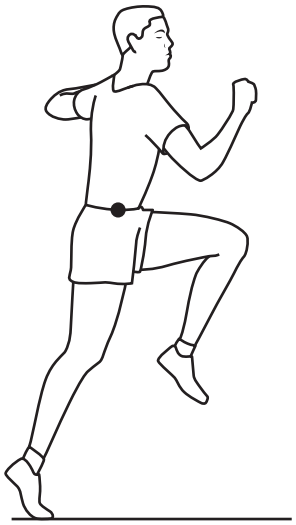
[2]

(b) The image shows an athlete at take-off for a long jump. A dot marks their centre of mass.



(i) On the image, draw and label arrows to show the vertical and horizontal forces acting on the athlete. **[4]**

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(ii) The athlete has a mass of 78 kg.

Calculate their weight, assuming gravity = 10 m/s^2.

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

(c) The image shows rugby players preparing for a scrum.

Use your knowledge of centre of mass and stability to explain how a rugby player can remain stable as they prepare for the scrum.

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..... **[4]**

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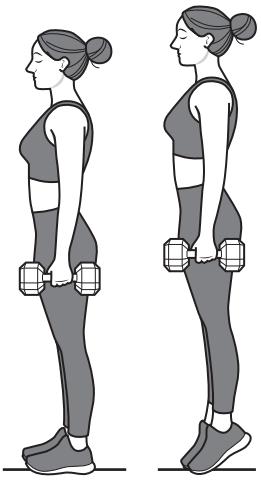
(d) The images show plantar flexion at the ankle during the upward phase of a calf raise from position A to position B.



A B

Explain why the calf raise is an example of a 2nd class lever.

Explain why this class of lever has mechanical advantage.

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..... **[6]**

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Section B

4* Explain how **neural** factors regulate a runner's heart rate during a marathon.

Evaluate the composition and timing of meals on the day of the race to aid performance in a marathon.

Use examples from a marathon race to support your answer. **[10]**

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END OF QUESTION PAPER

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EXTRA ANSWER SPACE

If you need extra space use these lined pages. You must write the question numbers clearly in the margin.

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