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OCR
Oxford Cambridge and RSA

Wednesday 24 May 2023 – Afternoon

A Level Physical Education

H555/01 Physiological factors affecting performance

Time allowed: 2 hours

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 **90**.
- 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 **20** pages.

ADVICE
- Read each question carefully before you start your answer.

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SECTION A

1 Outline the main function of the following components of a healthy diet:

Fibre .....

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The essential mineral iron .....

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[2]

2 Explain how joint type and length of surrounding connective tissue affect flexibility.

Joint type .....

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Length of connective tissue .....

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[2]

3 Which **two** treatments will reduce pain from exercise-induced muscle damage?

Put a tick (✓) in the box next to **two** correct answers.

A Cold therapy ☐

B Immobilisation, using a splint ☐

C Massage ☐

D Surgery ☐

[2]

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4 The ATP-PC energy system can be used to resynthesise ATP.

Identify the ATP yield of the ATP-PC system.
Give a practical example from sport in which the ATP-PC system is predominantly used.

ATP yield .....

Example .....
[2]

5 Describe how the speed of release and the height of release (if angle and speed of release are constant) affect the horizontal distance travelled by a projectile.

Speed of release .....

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Height of release (if angle and speed of release are constant) .....

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[2]

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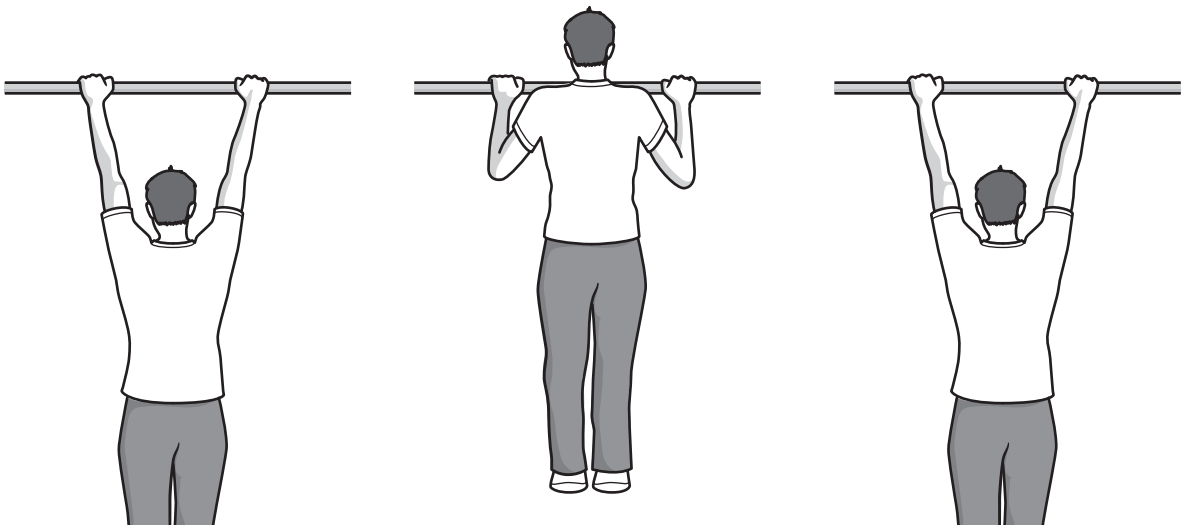
SECTION B

6 The images show the performance of a pull up.



(a) Complete the table to analyse the action of the latissimus dorsi in the upward and downward phases of the pull up.

Phase of pull up	Joint movement	Role of latissimus dorsi	Type of contraction
Upward phase	.....	Agonist	.....
Downward phase	.....	.....	.....

[5]

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(b) Explain the roles of the sternocleidomastoid and the internal intercostal muscles in the mechanics of breathing.

Sternocleidomastoid muscle .....

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Internal intercostal muscle .....

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[6]

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(c) Describe the following stages of the aerobic energy system:

Krebs cycle (also known as the citric acid cycle) .....

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Electron transport chain .....

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[6]

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(d) Two performers run one lap of a 400 m track. One performer jogs around the track; the other performer sprints around the track.

Using knowledge of the recovery process, explain why it takes longer for the performer who sprints to recover.

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..... **[3]**

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7 **(a)** Continuous training is one way of developing aerobic capacity.

(i) Describe **one** typical continuous training session.

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

(ii) Identify **three** muscular adaptations from aerobic training.

1 .....

.....

2 .....

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3 .....

.....

[3]

(b) State **one** type of strength that is important for a cross-country skier. State a different type of strength that is important for a ski jumper. Justify your answers.

Cross-country skier

Type of strength .....

Justification .....

.....

.....

Ski jumper

Type of strength .....

Justification .....

.....

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[4]

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(c) Identify **two** lifestyle diseases of the respiratory system and analyse the impact of training on these lifestyle diseases.

1 .....

2 .....

Impact of training .....

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[5]

(d) Name and describe **two** chronic sports injuries.
Use a sporting example to describe a possible cause of each chronic sports injury.

Chronic injury 1 .....

Description .....

.....

Possible cause .....

.....

Chronic injury 2 .....

Description .....

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Possible cause .....

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[6]

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8 **(a)** Michael Phelps broke the 400-metre individual medley swimming world record in 2008. The table shows the order of each swimming stroke and his split times for each length of the 50 m pool.

Stroke	Distance (m)	Split time (s)
Butterfly	0–50	25.73
	50–100	29.19
Backstroke	100–150	31.37
	150–200	30.20
Breaststroke	200–250	34.77
	250–300	35.79
Freestyle (Front crawl)	300–350	28.94
	350–400	27.85

(i) Calculate the displacement of the swimmer after one length of backstroke.

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

(ii) Calculate the average velocity of the swimmer over the first length of backstroke. Show your working.

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

(iii) Calculate the difference between the average speed for the freestyle 100 m and the average speed for the breaststroke 100 m. Give your answer to 2 decimal places. Show your working.

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..... **[3]**

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(b) Explain **four** factors affecting the stability of a sports performer.

1 .....

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2 .....

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3 .....

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4 .....

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[4]

(c) **(i)** Identify the **two** factors affecting the size of the moment of inertia of a rotating body.

1 .....

2 .....

[2]

(ii) Use an example of a sports performer with angular motion to describe the relationship between moment of inertia and angular velocity.

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

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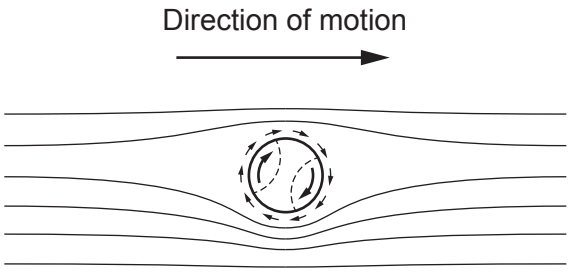
(d) The air flow diagram shows a side view of a tennis ball with topspin.



(i) Use the airflow diagram to explain how the use of topspin in tennis causes the flight path of the ball to deviate.

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

(ii) Describe **one** benefit of using topspin in a tennis match.

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

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SECTION C

9* Define the terms heart rate, stroke volume, cardiac output, vascular shunt mechanism and venous return.

Explain how blood flow to the working muscles and back to the heart is increased during a badminton match.

Describe 2nd class and 3rd class levers.

Evaluate the use of 2nd and 3rd class levers for a badminton player or a sports performer of your choice. **[20]**

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END OF QUESTION PAPER

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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).

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