

## Tuesday 16 May 2023 – 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.

## Section A

- 1 (a) (i) When the soleus muscle contracts it causes movement at which **one** of the following joints?

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

- A Ankle
- B Elbow
- C Knee
- D Shoulder

[1]

- (ii) Which **one** of the following muscles causes lateral rotation at the shoulder?

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

- A Latissimus dorsi
- B Pectoralis major
- C Teres minor
- D Trapezius

[1]

- (iii) Which **one** of the following muscles is **not** part of the hamstring group?

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

- A Biceps femoris
- B Rectus femoris
- C Semimembranosus
- D Semitendinosus

[1]







2 (a) Proteins and fats are components of a healthy diet.

(i) Outline a function of proteins and a different function of fats in a healthy diet.

Proteins .....

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Fats .....

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[2]

(ii) Explain why proteins and fats are important for a marathon runner's training programme.

Proteins .....

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Fats .....

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[2]

(b) Fill in the **five** missing parts of the table to identify and define types of strength.

Types of strength	Definition
.....	Force applied against a resistance with no movement or change in muscle length
.....	Force applied with movement and a change in muscle length
Strength endurance	..... ..... .....
Maximum strength	..... ..... .....
Explosive strength	..... ..... .....

[5]

(c) **Table 1** shows the results of fitness tests completed by a 17-year-old male performer.

**Table 1**

Test	Data	Score
Sit and reach test	Reach (m)	0.15 m
Queen's college step test	Heart beats measured over 15 seconds, 5 seconds after completion of the test	37 beats
Cooper 12-minute run	Number of laps run on 400 m track	6.5 laps
Vertical jump test	Reach height (m)	2.28 m
	Jump height (m)	2.67 m

**Table 2** shows the normative data for the tests.

**Table 2**

Test	Data	Rating				
		Excellent	Above average	Average	Below average	Poor
Sit and reach test	Reach (cm)	>14	14–11	10.9–7	6.9–4	<4
Queen's college step test	Heart rate (beats/min)	<121	148–121	156–149	162–157	>162
Cooper 12-minute run	Distance run on 400 m track	>3,000 m	2,700–3000 m	2,500–2,699 m	2,300–2,499 m	<2,300 m
Vertical jump test	Jump height (cm)	>65	50–65 cm	40–49	30–39 cm	<30 cm

Convert the result of each test from **Table 1** into data that matches the units in **Table 2**. State the correct rating for the performer for each test result.

Complete the table below with your answers. The sit and reach test has been done for you.

Test	Converted test scores	Performer's rating
Sit and reach test	15 cm	Excellent
Queen's college step test	.....	.....
Cooper 12-minute run	.....	.....
Vertical jump test	.....	.....

[6]





- 3 (a) Define Newton's laws of motion and apply each law to the example of a performer kicking a ball.

First law

Definition .....

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Application .....

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Second law

Definition .....

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Application 1 .....

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Application 2 .....

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Third law

Definition .....

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Application .....

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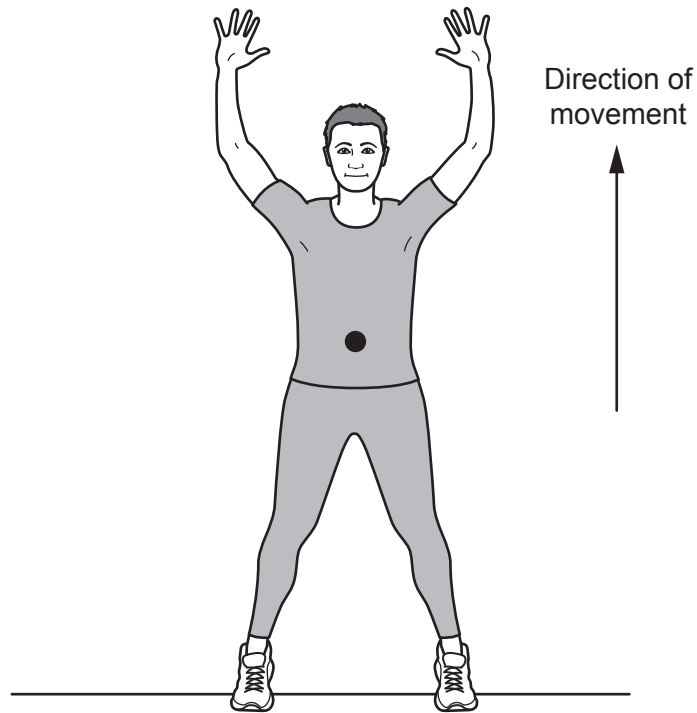
[7]

(b) Identify **four** factors affecting air resistance.

- 1 .....
- 2 .....
- 3 .....
- 4 .....

[4]

(c) Below is a figure of a performer in the execution phase of a vertical jump. Their centre of mass is marked with a dot.



(i) Draw and label the vertical forces acting on the performer.

[2]

(ii) Explain the effects of the vertical forces on the motion of the performer during the execution phase of the vertical jump.

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[3]

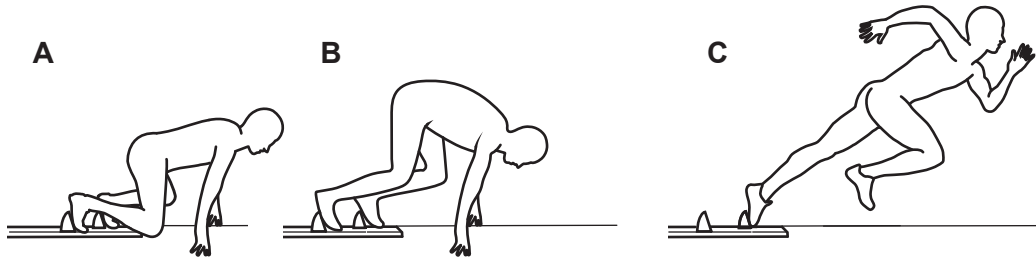
Turn over

(d) Describe the use of limb kinematics to analyse movement in sport.

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..... [4]

Section B

4\* Diagrams A, B and C show an athlete completing the stages of a sprint start.



Apply your knowledge of the concepts of centre of mass and stability to the performance of the sprint start.

Analyse the movements at the athlete's hip joints during the sprint start, with reference to the:

- joint type
- movements produced
- muscles involved
- types of muscle contraction.

[10]

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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).

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