Modified Enlarged 18pt

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Tuesday 16 May 2023 – Morning

AS Level Physical Education

H155/01 Physiological factors affecting performance

Time allowed: 1 hour 15 minutes
plus your additional time allowance

YOU CAN USE:
a calculator

Please write clearly in black ink.

Centre number | | | | | |

Candidate number | | | | |

First name(s) _____

Last name _____

READ INSTRUCTIONS OVERLEAF

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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 (*).

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. [1]

A Ankle ☐

B Elbow ☐

C Knee ☐

D Shoulder ☐

(ii) Which ONE of the following muscles causes lateral rotation at the shoulder?

Put a tick (✓) in the box next to the correct answer. [1]

A Latissimus dorsi ☐

B Pectoralis major ☐

C Teres minor ☐

D Trapezius ☐

(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. [1]

A Biceps femoris ☐

B Rectus femoris ☐

C Semimembranosus ☐

D Semitendinosus ☐

(iv) **Read the following statements:**

The wrist flexors are an antagonist muscle group during wrist flexion.

The deltoid is an agonist muscle during shoulder abduction.

Put a tick (✓) in the box next to the correct answer. [1]

A Both statements are true. ☐

B The first statement is true, the second is false. ☐

C The first statement is false, the second is true. ☐

D Both statements are false. ☐

(b) Explain the recruitment of muscle fibre types during exercise of differing intensities.

[6]

(c) The vascular shunt mechanism is used to redistribute cardiac output during exercise and recovery.

Describe the role of arterioles and pre-capillary sphincters during recovery from exercise. [5]

(d) Contrast the mechanics of expiration at rest with the mechanics of expiration during exercise. [5]

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 _____

_____

Fats _____

_____

[2]

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

Proteins _____

_____

_____

_____

Fats _____

_____

_____

_____

[2]

(b) Fill in the FIVE missing parts of the table to identify and define types of strength. [5]

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	

(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) Jump height (m)	2.28 m 2.67 m

TABLE 2 opposite 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. [6]

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		

(d) Critically evaluate proprioceptive neuromuscular facilitation (PNF) stretching to develop flexibility. [5]

3 (a) Define Newton's laws of motion and apply each law to the example of a performer kicking a ball. [7]

First law

Definition _____

_____

_____

Application _____

_____

_____

Second law

Definition _____

_____

_____

Application 1 _____

_____

_____

Application 2 _____

_____

_____

Third law

Definition _____

_____

_____

Application _____

_____

_____

(b) Identify FOUR factors affecting air resistance.

1 _____

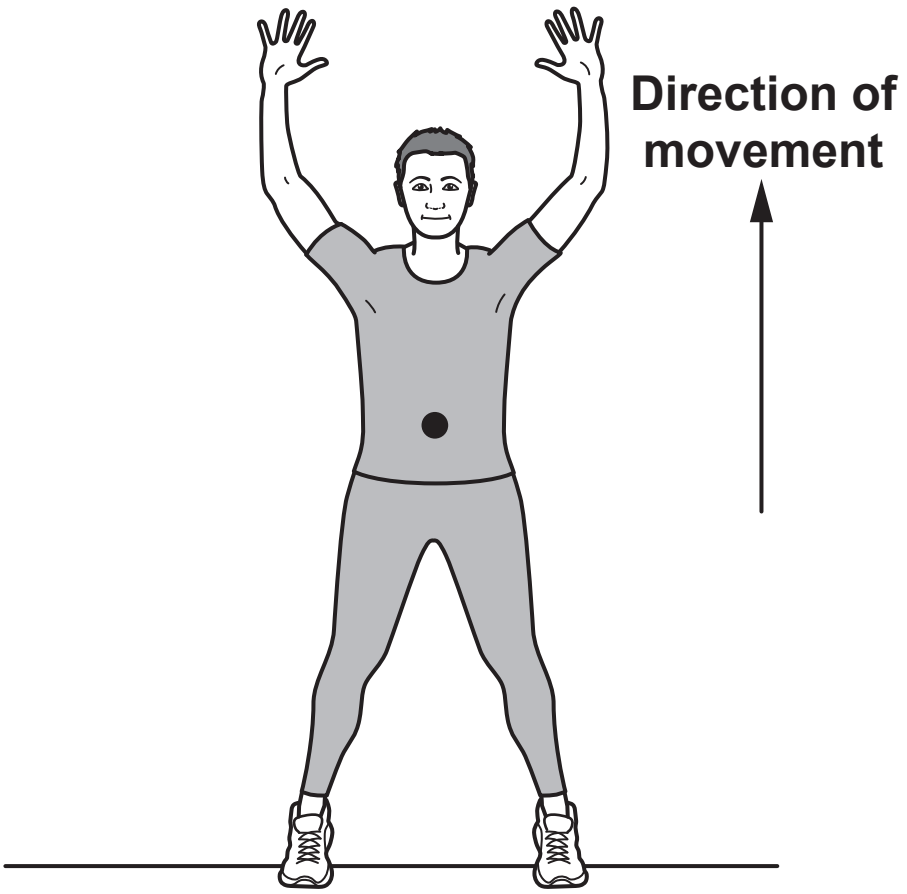
2 _____

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]

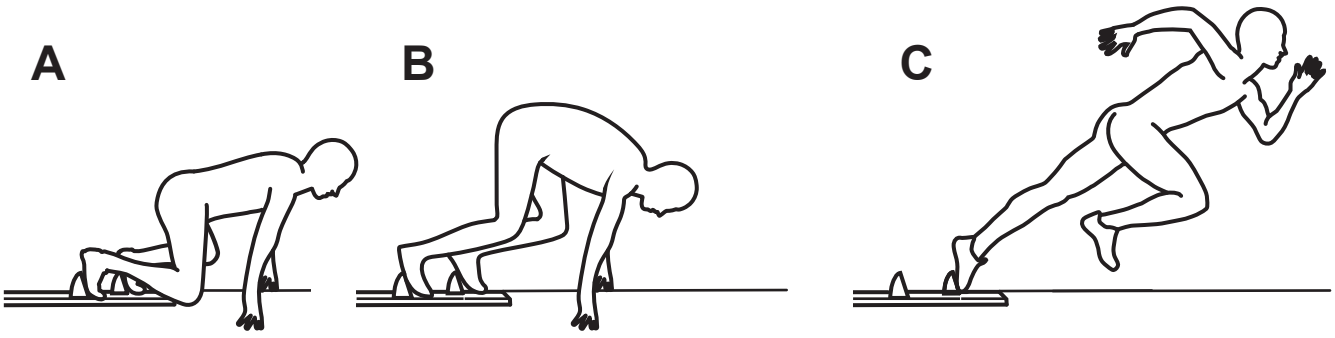
(ii) Explain the effects of the vertical forces on the motion of the performer during the execution phase of the vertical jump. [3]

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

[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]

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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