

AS LEVEL

Examiners' report

PHYSICAL EDUCATION

H155

For first teaching in 2016

H155/01 Summer 2023 series

Contents

Introduction3

Paper 1 series overview4

Section A overview5

 Question 1 (a) (i), (ii), (iii) and (iv).....5

 Question 1 (b)6

 Question 1 (c)8

 Question 1 (d)8

 Question 2 (a) (i)9

 Question 2 (a) (ii)9

 Question 2 (b)10

 Question 2 (c)11

 Question 2 (d)12

 Question 3 (a)14

 Question 3 (b)15

 Question 3 (c) (i)16

 Question 3 (c) (ii)16

 Question 3 (d)17

Section B overview18

 Question 4*18

Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. A selection of candidate answers is also provided. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

Where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.

A full copy of the question paper and the mark scheme can be downloaded from OCR.

Would you prefer a Word version?

Did you know that you can save this PDF as a Word file using Acrobat Professional?

Simply click on **File > Export to** and select **Microsoft Word**

(If you have opened this PDF in your browser you will need to save it first. Simply right click anywhere on the page and select **Save as . . .** to save the PDF. Then open the PDF in Acrobat Professional.)

If you do not have access to Acrobat Professional there are a number of **free** applications available that will also convert PDF to Word (search for PDF to Word converter).

Paper 1 series overview

There were some very good scripts offered in response to the Summer 2022 H155/01 examination paper yet performance overall, varied greatly. The focus on AO1, AO2 and AO3 in centres appears to have been embedded. Now that the specification is a few years old there is evidence that centres have a good understanding of what is required at AS Level. Candidates appear to understand what is required of them throughout all four sections and there was almost no evidence of them misinterpreting questions. Candidates clearly addressed the command words well in the majority of cases and followed the rubric of the paper accurately.

In response to the 10-mark question which required longer answers and different examination technique, candidates continue to show evidence of knowing the five generic criteria: 1. Knowledge and understanding, 2. Development of knowledge, 3. Examples, 4. Technical Vocabulary and 5. Good quality of written communication. The question asked for candidates to describe methods of measuring types of strength specific to a heptathlete and evaluate the use of force plates in helping a heptathlete's performance. Overall AO1 and AO2 were covered well, however the majority of candidates did not apply their responses in any depth to the heptathlete and the types of measurement which would best suit a heptathlete, so missed AO3 marks.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
<ul style="list-style-type: none"> • gave both structural and functional characteristics of muscle fibres when explaining recruitment during exercise • were specific in relating vascular shunt to the working muscles not muscles in general • compared rest and exercise mechanics of breathing using comparative wording to ensure clarification • related the importance of proteins and fats directly to the marathon runner • evaluated PNF stretching rather than giving a description • considered the vector of Newton's second law as well as the acceleration • labelled the forces diagram accurately • applied Newton's 3rd law accurately • related link stability and movement analysis to the three stages of the sprint start accurately and identified flexion and extension stages in the hip. 	<ul style="list-style-type: none"> • did not know lateral rotation of the shoulder • did not give examples of activity levels and muscle fibre recruitment • misread the question about mechanics of breathing and wrote about inspiration or both • did not differentiate the roles of the arterioles and pre-capillary sphincters in vascular shunt • gave vague definitions of types of strength • described, rather than evaluated, PNF • did not relate proteins and fats to marathon training – more just performing • did not apply Newton's 2nd and 3rd laws accurately • did not apply Newton's laws to kicking a ball • did not label the diagram of forces or explain the resultant force • did not relate link stability and movement analysis to the three stages of the sprint start but gave a general response.

Section A overview

Question 1 (a) (i), (ii), (iii) and (iv)

- 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 | <input type="checkbox"/> |
| B | Elbow | <input type="checkbox"/> |
| C | Knee | <input type="checkbox"/> |
| D | Shoulder | <input type="checkbox"/> |

[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 | <input type="checkbox"/> |
| B | Pectoralis major | <input type="checkbox"/> |
| C | Teres minor | <input type="checkbox"/> |
| D | Trapezius | <input type="checkbox"/> |

[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 | <input type="checkbox"/> |
| B | Rectus femoris | <input type="checkbox"/> |
| C | Semimembranosus | <input type="checkbox"/> |
| D | Semitendinosus | <input type="checkbox"/> |

[1]

(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.

- 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.

[1]

Questions (i) to (iv) were generally well answered. Less successful responses were unaware of the muscles involved in lateral rotation of the shoulder.

Question 1 (b)

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

.....

.....

.....

.....

.....

.....

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

Question 1(b) was generally well answered.

Exemplar 1

At sub-maximal intensities, type 1 slow oxidative muscle fibres are recruited. These fibres specialise in aerobic work since they have high amounts of mitochondria and myoglobin stores & hence they are used at sub-maximal intensities. They can contract continuously and resist fatigue however they only exert small forces. As intensity increases or as the performer gets tired, type 2a fast oxidative glycolytic fibres are recruited. These specialise in exactly large force and can also resist fatigue. As intensity increases further to maximal intensity, type 2b muscle fibres are recruited (fast glycolytic). These muscle fibres contain large stores of phosphocreatine and are specialised in producing large amounts of force for short durations. Type 2b muscle fibres are used for anaerobic work, for example a 100m sprinter. An elite endurance athlete, such as a marathon runner, would heavily rely on type 1 muscle fibres, however they would recruit type 2 fibres as they begin to fatigue. Type 2a fibres are used for long middle distance athletes, such as 5000m runners. [6]

This response is a good example of a candidate completing the question fully, with clear identification of the correct muscle fibre to the correct intensity. It includes some vague examples but still managed to hit all points.

Question 1 (c)

- (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]

Many candidates focused on maintaining blood flow to the muscles during recovery from exercise to remove lactic acid, when the question says during recovery, which would immediately begin the process of redistribution and would increase as recovery continues. Some candidates misread the question and wrote about vascular shunt during exercise. The mark scheme also required candidates to differentiate between the vaso-constriction and vaso-dilation occurring at arterioles and the relaxation/opening or contraction/closing of pre-capillary sphincters as the latter don't vaso-constrict or dilate.

Question 1 (d)

- (d) Contrast the mechanics of expiration at rest with the mechanics of expiration during exercise.

.....

.....

.....

.....

.....

.....

..... [5]

More successful responses made clear comparisons between rest and exercise and focused on the increase in pressure/volume in the thoracic cavity and the passive versus active nature of expiration. Less successful responses used correct terminology but were not clear as to whether they were describing rest or exercise.

Question 2 (a) (i)

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]

This question was answered well with almost all getting marks for proteins. Some did not refer to 'storage' in their responses for fats, which was a key point.

Question 2 (a) (ii)

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

Proteins

.....

.....

.....

Fats

.....

.....

.....

[2]

This question was not so well answered as few responses referred to the training programme but referred to general cardiovascular endurance for the marathon runner in an actual race.

Question 2 (b)

(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]

Almost all candidates accessed points 1 and 2. Examiners were quite strict on the definitions of the types of strength as this is simple AO1 recall.

Question 2 (c)

(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 400m 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]

This question was answered well.

Question 2 (d)

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

.....

.....

.....

.....

.....

.....

..... [5]

This was not a well answered question, as very few responses tried to critically evaluate PNF, choosing to give a description instead.

Assessment for learning



As the [mark scheme](#) shows there was a submax of 3 for advantages and disadvantages. Points 1 and 8 were accessed quite well however many referred to injury of the muscle not the connective tissue. (Use the link to access the mark scheme.)

Exemplar 2

PNF is ~~the~~ shown to increase flexibility the most out of all flexibility training types; through the isometric contraction^{stage}, it forces ~~spindle fibres~~^{muscle spindles} to adapt ~~to the~~^{and} change length, which ~~decreases~~^{increases} decreases the inhibition of the stretch reflex when the movement is performed. It is the most effective form of flexibility training, therefore, showing an increase in flexibility ~~but at~~ in a shorter span of time compared to the likes of ballistic stretching. However, ~~the~~ PNF must be administered by an individual who is trained in how to provide PNF: if done by an untrained ~~admin~~ administrator, then the effects of ~~the~~ PNF are diminished, and there is a higher potential for injury, as the ~~administrator~~ performer may resist the administrator too much and then strain the muscles being used, ~~and s~~

Overall, PNF is the best ~~type of training~~^{flexibility training} due to ~~its efficiency~~ ~~flexibit~~ way to develop flexibility, as it is more efficient in how it works compared to other training formats.

Exemplar 2 is a good example of a response which was written in depth but did not gain full marks on the PNF question. The response gives more of a description of, than critical evaluation of PNF.

Question 3 (a)

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

First law

Definition

.....

.....

Application

.....

.....

Second law

Definition

.....

.....

Application 1

.....

.....

Application 2

.....

.....

Third law

Definition

.....

.....

Application

.....

.....

[7]

A generally well answered question. More successful responses included the vector quantity to Newton's 2nd law. Less successful responses repeated a different example of application 1 and didn't read the part of the question about kicking a ball. Some responses mentioned golf shots, cricket shots and weight training.

Question 3 (b)

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

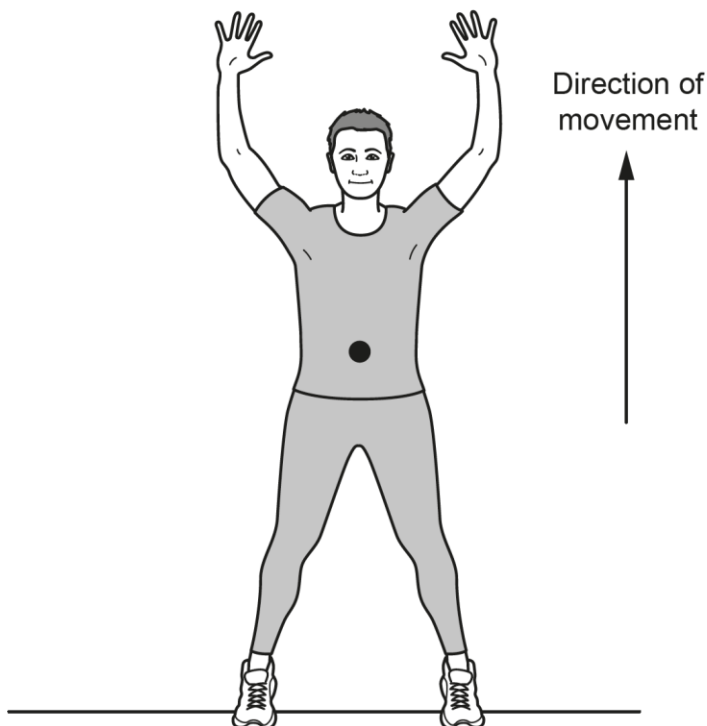
- 1
- 2
- 3
- 4

[4]

This question was generally answered well. Some responses were not specific about 'frontal' cross sectional area and so were marked TV.

Question 3 (c) (i)

(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]

Responses either demonstrated the knowledge to draw forces on a body or they didn't. Generally, responses were given 2 marks or zero.

Question 3 (c) (ii)

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

.....

.....

.....

.....

.....

.....

..... [3]

Most responses accessed points 1 and 4. Marking was specific about reference to forces acting upwards.

Question 3 (d)

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

.....

.....

.....

.....

.....

.....

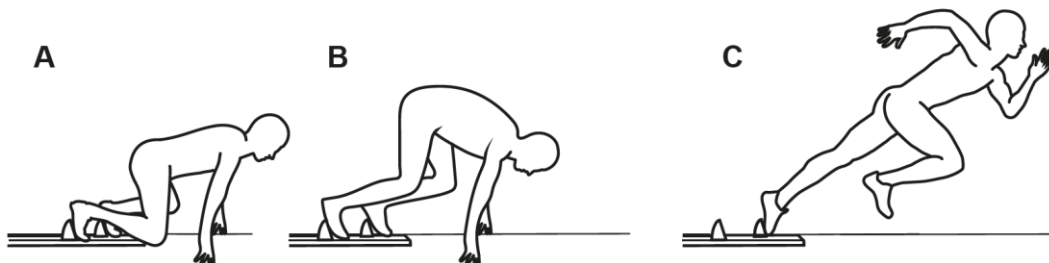
..... [4]

This question differentiated quite well between those responses that described what limb kinematics are used for, but not a description of how they are used. Some responses included descriptions of markers being placed on the body but not specifically where, and then did not describe how this becomes analysed on a computer.

Section B overview

Question 4*

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]

A straight forward question for those who knew stability and who could analyse the movement of the sprinter. Good responses were very specific about referring to each stage of the sprint start and using all factors affecting stability in their response. More successful responses were very clear how the antagonistic pair worked and gave the difference between isometric contractions and concentric contractions. Less successful responses only referred to a couple of stability points and confused the movement occurring or weren't specific with which hip was in flexion and which in extension in stage C.

Exemplar 3

Centre of mass is the point in the body where mass is evenly distributed in all directions, or the point from which weight acts. Stability is the body's resistance to external forces in order to remain balanced. There are many ways to maximise stability:

- lower centre of mass
- increase area of base of support (or number of limbs touching the ground to increase this)
- increasing mass, therefore increasing inertia
- ensuring line of gravity (vertical line from centre of mass downwards) is ~~above~~^{inside} base of support.

We can see that in diagram A, performer is most stable, as centre of mass is low to the ground, there is the largest base of support, and line of gravity is within base of support. It is good to have high stability here to remain balanced and not fall, so ~~is~~ is perfect for this phase (~~the~~ take your marks) of the sprint start. Diagram B is less stable due to centre of mass being further away to the ground, however this is desired^(in set phase), as the performer wants to move quickly in order to get out of the blocks. However, they are still stable due to large base of support and line of gravity centre to base of support, so have correct balance to be able to takeoff, whilst being able to quickly escape their position into an upright sprint stance. In the go stage of the sprint start^(diagram C), performer

has low stability due to high centre of mass, low area of base of support and line of gravity not being within the base of support. However, this is wanted due to the performer needing to quickly change body position constantly, in order to sprint quickly.

The hip joint is a ball and socket joint, with the articulating bones for movement being the pelvis and femur. During the sprint start, in the preparation phase (~~diagram~~ ^{between diagrams} A and B), there is flexion of the hip, as it reduces angle of the joint. Here, the agonist of the iliopsoas concentrically contracts, whereas the antagonist of the gluteus maximus is mostly relaxed to allow the movement, but does eccentrically contract too. ~~eccentrically~~

During the execution phase, ^(diagram C) there is flexion at the hip in the right leg, with the iliopsoas concentrically contracting as the agonist, and the gluteus maximus eccentrically contracting/relaxing as the antagonist.

However, there is extension at the hip in the left leg, with the gluteus maximus concentrically contracting (contracting and muscle length shortens) as it is the agonist, and the iliopsoas eccentrically contracting (contracting and muscle length lengthens) /relaxing as it is the antagonist.

It is important to note that ^{before and} ~~after~~ the flexion at the hip ~~to increase~~ ^{in diagrams} between ~~diagrams~~ A and B ~~to~~, with this movement done to create the 'set' phase of the ~~sprint start~~, that the muscles are isometrically contracting, because they contract and the muscle length doesn't change due to them holding the position ~~to~~. Therefore iliopsoas and gluteus maximus are concentrically contracting. This is done during the preparation phase as they hold the position of the 'on your marks' and 'set'. This movement is still flexion at the hip, with the agonist the iliopsoas ~~isometrically~~ isometrically contracting and the antagonist the gluteus maximus isometrically contracting.

This is an example of a response which answered the question fully. There is specific reference to each stage of the sprint start and the response references all factors affecting stability. The analysis of the movement of the sprinter is good and the response is clear on how the antagonistic pair worked.

Supporting you

Teach Cambridge

Make sure you visit our secure website [Teach Cambridge](#) to find the full range of resources and support for the subjects you teach. This includes secure materials such as set assignments and exemplars, online and on-demand training.

Don't have access? If your school or college teaches any OCR qualifications, please contact your exams officer. You can [forward them this link](#) to help get you started.

Reviews of marking

If any of your students' results are not as expected, you may wish to consider one of our post-results services. For full information about the options available visit the [OCR website](#).

Access to Scripts

For the June 2023 series, Exams Officers will be able to download copies of your candidates' completed papers or 'scripts' for all of our General Qualifications including Entry Level, GCSE and AS/A Level. Your centre can use these scripts to decide whether to request a review of marking and to support teaching and learning.

Our free, on-demand service, Access to Scripts is available via our single sign-on service, My Cambridge. Step-by-step instructions are on our [website](#).

Keep up-to-date

We send a monthly bulletin to tell you about important updates. You can also sign up for your subject specific updates. If you haven't already, [sign up here](#).

OCR Professional Development

Attend one of our popular CPD courses to hear directly from a senior assessor or drop in to a Q&A session. Most of our courses are delivered live via an online platform, so you can attend from any location.

Please find details for all our courses for your subject on **Teach Cambridge**. You'll also find links to our online courses on NEA marking and support.

Signed up for ExamBuilder?

ExamBuilder is the question builder platform for a range of our GCSE, A Level, Cambridge Nationals and Cambridge Technicals qualifications. [Find out more](#).

ExamBuilder is **free for all OCR centres** with an Interchange account and gives you unlimited users per centre. We need an [Interchange](#) username to validate the identity of your centre's first user account for ExamBuilder.

If you do not have an Interchange account please contact your centre administrator (usually the Exams Officer) to request a username, or nominate an existing Interchange user in your department.

Active Results

Review students' exam performance with our free online results analysis tool. It is available for all GCSEs, AS and A Levels and Cambridge Nationals.

[Find out more](#).

Need to get in touch?

If you ever have any questions about OCR qualifications or services (including administration, logistics and teaching) please feel free to get in touch with our customer support centre.

Call us on
01223 553998

Alternatively, you can email us on
support@ocr.org.uk

For more information visit

 **ocr.org.uk/qualifications/resource-finder**

 **ocr.org.uk**

 **facebook.com/ocrexams**

 **twitter.com/ocrexams**

 **instagram.com/ocrexaminations**

 **linkedin.com/company/ocr**

 **youtube.com/ocrexams**

We really value your feedback

Click to send us an autogenerated email about this resource. Add comments if you want to. Let us know how we can improve this resource or what else you need. Your email address will not be used or shared for any marketing purposes.



I like this



I dislike this

Please note – web links are correct at date of publication but other websites may change over time. If you have any problems with a link you may want to navigate to that organisation's website for a direct search.



OCR is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored. © OCR 2023 Oxford Cambridge and RSA Examinations is a Company Limited by Guarantee. Registered in England. Registered office The Triangle Building, Shaftesbury Road, Cambridge, CB2 8EA. Registered company number 3484466. OCR is an exempt charity.

OCR operates academic and vocational qualifications regulated by Ofqual, Qualifications Wales and CCEA as listed in their qualifications registers including A Levels, GCSEs, Cambridge Technicals and Cambridge Nationals.

OCR provides resources to help you deliver our qualifications. These resources do not represent any particular teaching method we expect you to use. We update our resources regularly and aim to make sure content is accurate but please check the OCR website so that you have the most up to date version. OCR cannot be held responsible for any errors or omissions in these resources.

Though we make every effort to check our resources, there may be contradictions between published support and the specification, so it is important that you always use information in the latest specification. We indicate any specification changes within the document itself, change the version number and provide a summary of the changes. If you do notice a discrepancy between the specification and a resource, please [contact us](#).

You can copy and distribute this resource freely if you keep the OCR logo and this small print intact and you acknowledge OCR as the originator of the resource.

OCR acknowledges the use of the following content: N/A

Whether you already offer OCR qualifications, are new to OCR or are thinking about switching, you can request more information using our [Expression of Interest form](#).

Please [get in touch](#) if you want to discuss the accessibility of resources we offer to support you in delivering our qualifications.