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Examiners' report

PHYSICAL EDUCATION

H555

For first teaching in 2016

H555/01 Summer 2022 series

Contents

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 are 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.

Advance Information for Summer 2022 assessments

To support student revision, advance information was published about the focus of exams for Summer 2022 assessments. Advance information was available for most GCSE, AS and A Level subjects, Core Maths, FSMQ, and Cambridge Nationals Information Technologies. You can find more information on our website.

Paper 1 series overview

H555/01 is one of three examined components for GCE Physical Education. This component examines the topic areas of anatomy and physiology, exercise physiology and biomechanics. To do well on this paper candidates need to apply knowledge and understanding using examples from sports and practical activities. H555/01 includes one extended response question which requires candidates to show knowledge, understanding, practical application, evaluation and analysis.

Candidate performance overview:

Candidates were generally well prepared, managed their time well and showed good use of subject-specific vocabulary. Candidate's answers reflected good understanding of the question asked, and clear and concise responses which reflected the space provided in the question booklet and number of marks available.

Candidates who did well on this paper generally did the following:	Candidates who did less well on this paper generally did the following:
• produced clear and concise responses • read and understood the demands of the question • correctly interpreted the practical context of the question and made appropriate practical applications when required (Questions 5, 7 (b) (ii), 7 (c) (i) and 8 (a) (ii)) • communicated a depth of knowledge and understanding (Questions 6 (b), 6 (c)) • were able to evaluate aspects to access full marks (Question 7(c) (ii)). Questions that were answered well: • Questions 2, 4, 6 (a) (i), 6 (a) (ii), 7 (a) (i), 7(a) (ii), 7 (d) (i), 8 (a) (i), 8 (b), 8 (c): clear and concise knowledge.	• confused key concepts, misunderstood or misread the questions (Questions 6 (d) (ii),7 (c) (ii), 9) • produced responses that lacked a depth of insight (Questions 6 (c), 7 (c) (ii), 7(d) (ii)) • found it difficult to express definitions and/or use the correct units of measurement (Questions 7 (b) (i), 8 (c)) • struggled to apply theoretical knowledge to the practical context required (Questions 7 (b) (ii), 7 (c) (i), 8 (a) (ii)). Questions that were not answered well: • Question 3: lack of knowledge and understanding. • Question 6 (d) (ii): misunderstanding of the term acclimatisation. • Question 7 (b) (ii): lack of application to the marathon runner's performance. • Question 9: confused factors affecting the interplay of energy systems with describe methods of energy production or characteristics of energy systems.

Section A overview

Section A consists of five questions all equally weighted, totalling 10 marks.

A generally well answered section by many candidates who provided clear and concise short statements. Most candidates identified appropriate point in Question 2 and protocol points in Question 4, however a lack of knowledge and understanding limited some in Question 3. Most candidates achieved in Questions 1 and 5 however full breadth of responses limited others.

Question 1

1 Explain how the conduction system of the heart controls diastole.

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

Candidates generally scored well although some lacked precision in their responses talking about the heart rather than the specific chambers. Others performed less well discussing the process of conduction and systole rather than diastole. Few candidates considered the absence of the cardiac impulse.

Exemplar 1

SA node stimulates a signal to the AV node, ~~the~~ which goes to the bundle of his, bundle of branches and purkinje fibres. This causes this chamber of the heart to relax and start to fill up with blood again. **[2]**

This candidate has described the conduction system pathway which is not required for an explanation of diastole. The second sentence does not link directly to the first and lacks clarity in terms of the stage of conduction and chamber they are referring to. The response is too vague in the response to the control of diastole.

Question 2

2 Identify the processes that occur during the fast component of excess post exercise oxygen consumption (EPOC).

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

A well answered question with clear and succinct responses by most. A few weaker and unsuccessful responses answered with the slow component of EPOC, e.g. lactic acid removal.

Question 3

3 Performers compare energy expenditure to energy intake to manage body weight.

Describe **two** factors that performers use to work out their (daily) energy expenditure.

1 .....

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2 .....

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[2]

Candidates had a relatively weak understanding of energy expenditure and this resulted in less successful responses generally. Many focused responses on energy intake and 'calorie counting' which does not satisfy the demand of the question and others stated key terms, 'BMR' or 'TEF' without a description. Those who made attempts to describe factors used to estimate energy expenditure often accessed marks through linking the specific activities to a 'calorie count' or MET value.

Question 4

4 If a sports performer is suspected of suffering a concussion, the IRB's "Recognise and Remove" 6 R's protocol should be followed.

Complete the table to name and describe the missing stages of the 6 R's.

1	Recognise	Coaches should be aware of the symptoms of concussion.
2	Remove	Player with suspected concussion must be removed from the field of play.
3		
4	Rest	Player must rest until free of symptoms.
5		
6	Return	Player must have written authorisation and complete the 'graduated return to play' protocol before returning to play.

[2]

A well answered question with the majority of candidates correctly identifying the two missing stages and giving correct descriptions. Few candidates gave the correct stages without accessing marks for the descriptions although this happened more commonly with 'recover' rather than 'refer'. Few candidates did not access the mark scheme, those who did not gave incorrect names of the missing stages.

Question 5

5 Describe how the use of a wind tunnel could help an elite track cyclist to enhance their performance.

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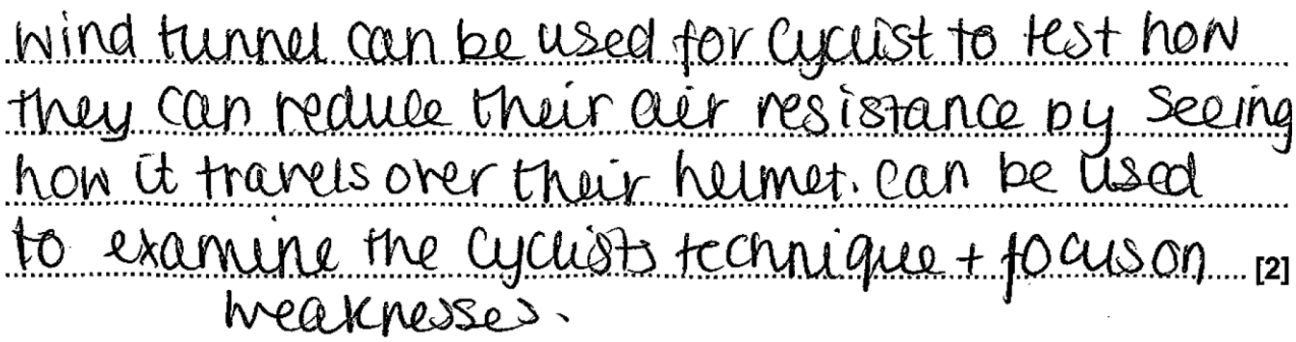
..... **[2]**

A generally well answered question with most candidates accessing the mark scheme. An application of knowledge question required candidates to link to the cyclist's performance and most candidates did this well. All three elements were considered equally and the key term 'aerodynamic' was commonly used. Those candidates who did not access the mark scheme commonly describe the use of a wind tunnel as a training tool.

Exemplar 2



This candidate has responded well with a clear and concise description of how a wind tunnel can enhance a cyclist's performance. They have identified the purpose of a wind tunnel and linked air resistance to the cyclist – in this case the equipment: helmet. They gained the marks for point 1 the measurement of air resistance on the cyclist's equipment (helmet) and examination of the cyclist's technique, and point 3 through the application of knowledge, in this case the enhancement of performance – 'reducing' the air resistance of the cyclist's equipment (helmet).

Section B overview

Section B consists of three questions split into sub-sections of short-answer questions. Questions covered topics of anatomy and physiology, exercise physiology and biomechanics, and ranged in size from 1 to 6 marks.

Candidates typically performed well in Questions 6 (a) (i), 6 (a) (ii), 7 (a) (i), and 7 (a) (ii) where knowledge and understanding were assessed. Candidates' performance was variable where a greater depth of understanding/ more marks/longer answers were required in Questions 6 (b) and 6 (c). It is clear candidates performed less well where an application of knowledge and understanding to sporting situations was required in Questions 7 (b) (ii), 7 (c) (i), and 8 (a) (ii). Candidates' performance on Question 8 and its sub-sections was less secure whereby some candidates performed well in all sections and some candidates performed less well. The examination of biomechanical content again was relatively binary in nature.

Question 6 (a) (i)

6 (a) **Fig. 6.1** shows the performance of the upward phase of a leg curl when moving from position A to position B.

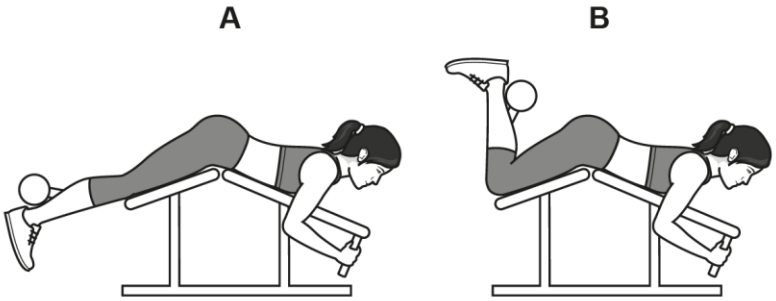


Fig. 6.1

(i) Complete the table below to analyse the movement at the knee joint in **Fig. 6.1** when performing the leg curl.

	Movement	Agonist muscle	Plane of movement
Knee joint			

[3]

Most candidates scored well on this question, correctly identifying the movement and plane. Most candidates also correctly identified the agonist muscle with very few not scoring due to the muscle group being stated rather than the specific muscle.

Question 6 (a) (ii)

(ii) Describe the role of **two** respiratory muscles during expiration at rest.

1 .....

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2 .....

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[2]

Most candidates gained the 2 marks available with correct knowledge and understanding demonstrated.

Question 6 (b)

(b) Explain how neural factors control heart rate at the start of exercise and during recovery.

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

Generally, candidates demonstrated good knowledge and understanding in both the exercise and recovery phase, commonly securing points 2, 3, 6, 7 and 11. Some candidates showed a depth of insight with knowledge of the specific nervous system and nerve in operation in each phase, whereas others mistakenly used the VCC or only covered exercise or recovery rather than both.

Question 6 (c)

(c) During exercise the working muscles have an increased need for oxygen.

Assess how changes in the pressure gradient and the dissociation of oxyhaemoglobin affect oxygen diffusion at the working muscles during exercise.

Changes in the pressure gradient .....

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Changes in dissociation of oxyhaemoglobin .....

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[6]

Some candidates successfully accessed the full mark scheme. A good proportion of candidates noted the increase in diffusion gradient and were able to explain why and how this impacts on diffusion, although few candidates noted the decrease in ppO2 in the muscle cell during exercise. Many candidates identified the increased dissociation of O2 from haemoglobin and some candidates gave details of the Bohr shift.

Question 6 (d) (ii)

(ii) Describe the physiological processes of acclimatisation to altitude.

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

Generally, well answered by most candidates commonly citing increased EPO release and RBC production. Few candidates noted the stabilisation of ventilation and a proportion of candidates incorrectly considered acute responses to arriving at altitude.

Question 7 (b) (i)

(b) An elite marathon runner is using a multi-gym to develop their strength endurance.

(i) Use your knowledge of strength training guidelines to complete the table with appropriate values.

Strength endurance training guidelines		
Resistance	Repetitions	Sets

[3]

Generally well answered by most candidates. Common mistakes included a lack of units for resistance (%1RM), too big a range outside the accepted norm for repetitions and sets.

Assessment for learning

Guidance for future teaching and learning: advise candidates to state one number rather than a range.

Exemplar 3

Strength endurance training guidelines		
Resistance	Repetitions	Sets
70%	5-20	1-3

This candidate has made two common mistakes: 1) no units of measurement on resistance – 70% of 1RM is required, and 2) large ranges that fall outside the accepted norms – 5-20 repetitions lower end falls below the accepted range of 15-30 (and the same for sets). It may be advisable to suggest candidates select a single number which falls in the middle of their range.

Question 7 (b) (ii)

(ii) Explain how the physiological adaptations from strength training may benefit the marathon runner.

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

Candidates answered this question less well. AO2 marks were required for practical application to the marathon runner which many candidates did not do correctly. Most candidates were able to identify physiological adaptations but fewer candidates applied them to benefit the marathon runner's performance. Some candidates equally considered the marathon runner's performance to superficially without stating specific physiological adaptations.

Question 7 (c) (i)

(c) **Fig. 7.1** shows a swimmer performing front crawl.

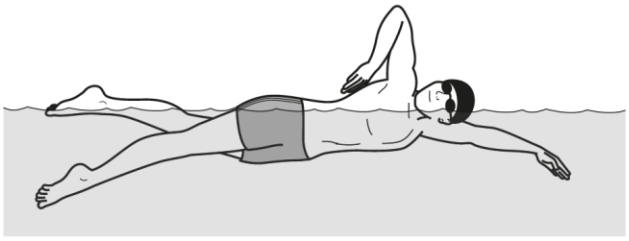

Fig. 7.1

(i) Explain why good shoulder flexibility is a key fitness component for a swimmer.

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

Most candidates were able to identify the need for good shoulder flexibility, however few candidates explained why this was important for a swimmer limiting success.

Question 7 (c) (ii)

(ii) Evaluate isometric stretching as a method to improve flexibility.

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

Few candidates demonstrated the depth of insight to fully achieve success in this question. Many candidates focused on the isometric stretching protocol and the practical or logistic strengths and weaknesses rather than evaluating its success and a method to improve flexibility. Most candidates achieved point 1 'increase range of motion' although many stated 'more or less injury risk' which was deemed too vague as a response without further clarification.

Question 7 (d) (i)

(d) (i) Explain why a simple fracture is an example of an acute, hard tissue injury.

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

A very well answered question by the majority of candidates. Those who did not achieve the mark focused on either acute or hard tissue where the question demanded the knowledge of both.

Question 7 (d) (ii)

(ii) Describe the use of surgery to treat acute, hard tissue injuries.

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

Most candidates demonstrated enough knowledge and understanding to achieve credit for this question although few could fully achieve all the marks available. Responses tended to be generic or steer away from the question focus 'use of surgery' rather describing recovery or rehabilitation aspects. Point two 'realignment' and point three 'use of pins to stabilise' were commonly used.

Question 8 (a) (ii)

(ii) Using examples from sport, explain how performers increase friction.

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

Many candidates were able to give good practical examples from sport however showed low levels of underlying theoretical knowledge and understanding, for example 'a sprinter wears spikes' without the required 'increasing the roughness of the contact surface will increase friction'.

Question 8 (b)

(b) A basketball player jumps upwards from one foot to reach a rebound.

Draw a free body diagram to show the vertical forces acting at take off and explain the resulting motion of the basketball player.

Free body diagram

Explanation .....

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.....

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

Most candidates drew appropriate free body diagrams showing both weight and reaction force from the correct origins with the correct length of arrows. Many candidates explained the resultant force well considering the relationship between the two forces, the unbalanced nature of the forces and the resulting acceleration off the ground.

Assessment for learning

Guidance for future teaching and learning: draw a dot on the centre of mass and point of contact - the weight arrow must come from the dot representing the centre of mass downwards, and the reaction force must come from the dot representing the point of contact upwards. If the arrows are not in contact with the body they are not affecting the body therefore cannot be credited.

Question 8 (c)

(c) A rugby player of mass 96 kg takes 2.5 seconds to accelerate from a standing start to 8 m/s.

Calculate the weight of the player, their acceleration between 0 s and 2.5 s and their momentum at maximum velocity.

(Assume g = 10 m/s^2)

Weight of rugby player:

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.....

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Acceleration between 0 s and 2.5 s:

.....

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Momentum at maximum velocity:

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.....

.....

[5]

Many candidates showed good knowledge and understanding with many achieving full marks. Common errors included a lack of units or correct units of measurement, and use of weight instead of mass in part three.

Question 8 (d)

(d) Complete the **four** missing parts of the table below in relation to the quantities of angular motion and describe the factors affecting the size of the moment of inertia of a rotating body.

Angular motion quantity	**Definition**	**Unit of measurement**
Angular momentum		$kg\,m^2 rad/s$
	The rate of change in angular displacement	rad/s
Moment of Inertia		

Description .....

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.....

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

Most candidates correctly identified 'angular velocity' from the description and units provided, although less candidates could correctly describe angular momentum or moment of inertia. Most candidates described the factors affecting the size of moment of inertia well, while some candidates identified the factors affecting but did not describe them.

Section C overview

Section C consists of a single extended response question. A 20-mark question considering the topics of biomechanics and exercise physiology. Answers were assessed using a levels mark scheme based on knowledge and understanding (AO1), practical application (AO2), and evaluation and analysis (AO3).

Question 9*

9* **Fig. 9.1** is a velocity/time graph showing the motion of a hockey ball that is hit at the goal and rebounds off the post.

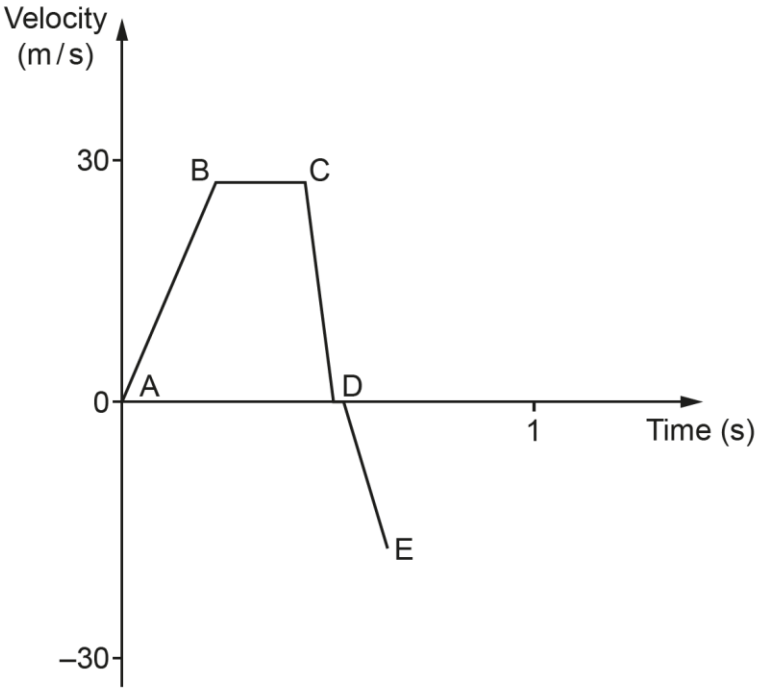

Fig. 9.1

Use the graph in **Fig. 9.1** to explain the motion of the ball.

Hockey is a team game that involves intermittent exercise of differing intensities and durations.

Analyse the interplay of the energy systems during intermittent exercise and the factors that affect this interplay. Use examples from a team game of your choice to support your analysis. **[20]**

Most candidates gained access to the mark scheme, however this question differentiated between those who had a basic knowledge and understanding and those who showed a depth of insight and could apply their knowledge and understanding to hockey and other team games.

Most candidates could describe the stages of the graph (A-B, B-C and C-D), although some struggled with phase D-E not appreciating the increase in velocity away from the horizontal axis. Most candidates made a good attempt applying the phases of motion to the ball in hockey showing good application from A-B and B-C, although the number of candidates who could correctly identify when the ball hit the post and rapidly decelerated reduced. A fair proportion of candidates accessed the mark scheme fully by developing their knowledge to analyse the forces involved referencing Newton's Laws of motion.

Most candidates described the intensity and duration of each energy system within a team game and gave an applied example of their use, however a large proportion of candidates then focused on the characteristics of energy production via the three pathways rather than focusing on the factors which affect the interplay between the energy systems. Few candidates considered the energy continuum or thresholds between the systems.

Candidates rarely considered the factors, beyond intensity and duration, that affect the energy system interplay. Candidates who considered a broader range of factors, such as playing position, tactics, recovery strategies and fitness achieved higher levels within this mark scheme. Candidates who also considered development knowledge of the velocity time graph gained potential access to the top of the mark scheme.

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