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Examiners' report

PHYSICAL EDUCATION

H555

For first teaching in 2016

H555/01 Summer 2023 series

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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.

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. Candidates' answers reflected good understanding of the questions asked, and the clear and concise responses reflected the space provided in the question booklet and number of marks available.

Clear and concise knowledge was demonstrated in responses to Questions 1, 3, 4, 5, 6(c), and 8(b). A lack of knowledge and understanding was demonstrated in responses to Questions 2, 6(d), 7(a)(ii), 7(c), 8(c)(ii), 8(d)(i) and 8(d)(ii).

A successful response to Question 9 included a balance between knowledge and understanding in both parts of the question, the ability to relate to a practical context, and to analyse both positive and negative factors affecting both 2nd and 3rd class levers. A less successful response to Question 9 included a lack of knowledge and understanding or significant imbalance between both parts of the question – typically weaker on lever systems, and a lack of application to a practical context.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
• produced clear and concise responses • read and understood the demands of the questions • correctly interpreted the practical context of the question and made appropriate practical applications when required (Questions 4, 6(a), 6(d), 7(b) and 7(d)) • communicated a depth of knowledge and understanding (Questions 7(c), 8(d)(ii) and (9)) • were able to evaluate aspects to access full marks (Question 9).	• confused key concepts, misunderstood or misread the questions • produced responses that lacked a depth of insight (Questions 2, 6(b), 7(a)(i) and 7(c)) • found it difficult to express definitions and/or use the correct units of measurement (Questions 8(a)(i), 8(a)(ii), 8(c)(i) and 8(c)(ii)) • struggled to apply theoretical knowledge to the practical context required (Questions 6(d) and 8(d)(ii)).

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 points in Questions 1, 3, and 4. A lack of explanation limited responses to Question 2 focusing only on the relationship with flexibility rather than providing any explanation. Most candidates achieved in Questions 1, 3 and 4 however, a limited breadth of response limited others.

Question 1

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

Fibre .....

.....

The essential mineral iron .....

.....

[2]

A well answered question with clear and succinct responses by most. A few unsuccessful responses answered with unrelated biological processes especially for iron.

Question 2

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

Joint type .....

.....

.....

Length of connective tissue .....

.....

.....

[2]

Not a well answered question showing that most candidates could state the relationship between joint type/length of connective tissues and flexibility, however, very few could offer explanations of the relationship as required in the question.

Exemplar 1

Joint type - a ball and socket joint is more flexible than a hinge joint because it can rotate futher than just back up and down.

Length of connective tissue means that a longer connective tissue can be stretched futher / to cover a longer distance - increasing the flexibility.

The response in Exemplar 1 describes how joint type and length of connective tissue affects flexibility but does not respond to the command word 'explain'. There is no reason offered as to why the joint type or length of connective tissue affects flexibility.

Question 4

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]

The majority of candidates provided correct and well considered responses. Less successful responses usually only stated '1' as an answer for ATP yield whereas the ratio was required of ATP to fuel, however these candidates still managed to identify a correct sporting example.

Question 5

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 .....

.....

.....

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

.....

.....

[2]

The majority of candidates correctly described how speed of release affects horizontal distance. Fewer candidates correctly described how height of release affects horizontal distance, with candidates confusing angle of release or incorporating the landing height incorrectly.

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 performed well in Question 6(b), Question 6(c), and Question 8(c) where knowledge and understanding were assessed. Candidates' performance was variable where a greater depth of understanding, more marks or longer responses were required in Question 7(a)(ii), Question 7(c), and Question 8(d)(i). It is clear candidates performed less well where an application of knowledge and understanding to sporting situations was required in Questions 6(d), Question 7(d), and Question 8(d)(ii). Candidates' performance on Question 8(a) and its sub-sections was variable, depending on whether candidates had a secure knowledge and the ability to apply equations, units and calculate answers. The examination of biomechanical content saw overall pleasing results in comparison to other series and was less binary in nature.

Question 6 (b)

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

Sternocleidomastoid muscle .....

.....

.....

Internal intercostal muscle .....

.....

.....

[6]

Successful responses identified these muscles to only be active during exercise to create greater volumes of air inspired and expired respectively when compared to rest/passive breathing. Some responses described the movement, volume and pressure changes but without reference to the larger changes when compared to resting conditions, so did not secure marks. A common mistake was to refer to the inspiration of oxygen/expiration of carbon dioxide rather than air.

Question 6 (c)

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

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

.....

.....

.....

Electron transport chain .....

.....

.....

[6]

Where candidates had a secure knowledge and understanding of the aerobic system they successfully communicated this with clear and concise responses. Some candidates required a greater depth of knowledge, for example the specific area of the mitochondria rather than mitochondria alone for both stages. Full marks were often secured by candidates without detailed knowledge of the fuel for the krebs cycle or roles of NAD/FAD in the ETC where the site, yield and by-products of the stages were correctly provided.

Question 6 (d)

(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.

.....

.....

.....

.....

.....

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

Successful responses considered why the performer who sprinted round the track took longer to recover, this included a description of the increased demand of anaerobic work and implication on EPOC. Less successful responses described the two phases of EPOC, however did not explain this factual information in relation to the performer's higher demands.

Question 7 (a) (i)

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

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

.....

.....

.....

.....

.....

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

Some candidates showed secure knowledge and understanding and gave specific descriptions of intensity, duration and type of training. Less successful responses included descriptions of continuous training as a training method rather than application to one specific training session.

Assessment for learning

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

Question 7 (a) (ii)

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

1 .....

.....

2 .....

.....

3 .....

.....

[3]

Responses correctly followed the command of the question and identified factors clearly and concisely. Successful responses commonly identified structural components of muscular adaptations such as increased mitochondrial density, myoglobin and glycogen stores. Less successful responses included indirect functional adaptations such as increased endurance capacity and VO2max.

Exemplar 2

1 increased muscle hypertropny

2 - increased muscle elasticity

3 increased red blood cell count in muscles.

[3]

The response in Exemplar 2 gave three identifications however point 1 was not specific to aerobic training and needed to be directed to the SO muscle fibres or the aerobic energy production of FOG muscle fibres. Point 2 is not specific to aerobic training and point 3 is incorrect for a muscle adaptation but relates to a vascular adaptation of the bloodstream.

Question 7 (b)

(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 .....

.....

[4]

The majority of candidates answered the question correctly by identifying two different types of strength and justified their choice well in relation to the endurance and explosive nature of the events.

Question 7 (c)

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

1 .....

2 .....

Impact of training .....

.....

.....

.....

[5]

Some candidates could identify two lifestyle diseases of the respiratory system. Many candidates could identify respiratory adaptations to training however, few candidates linked the impact of training to the lifestyle disease as required by the question.

Question 7 (d)

(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 .....

Possible cause .....

.....

[6]

Most candidates identified two chronic injuries however few responses provided correct descriptions of these injuries. Some candidates could use a sporting example to describe the possible cause although many either gave an example without the cause or vice versa. Both possible cause and sporting example were required, e.g. the excessive loading stress **from** marathon training on hard surfaces.

Question 8 (a) (ii)

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

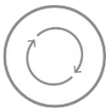
.....

.....

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

Many candidates were successful in gaining both marks for this question. Some responses however didn't include their workings and provided the answer alone. Other responses did not include units of measurement which are essential.

Assessment for learning



Guidance for future teaching and learning: always include the equation, workings, units and the answer to two decimal places unless instructed not to.

Always make sure a candidate has a calculator.

Question 8 (b)

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

1 .....

.....

2 .....

.....

3 .....

.....

4 .....

.....

[4]

Most candidates explained factors that affect stability although some only identified factors and didn't state how they affected stability. Some candidates stated the number of points of contact however this does not directly affect stability and candidates should have explained the size of the base of support instead. Point 3 on the mark scheme was often misunderstood by candidates whereby the line of gravity will always fall from the centre of mass directly to the ground, if the line of gravity falls in the centre of the base of support stability is increased.

Question 8 (c) (ii)

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

.....

.....

.....

.....

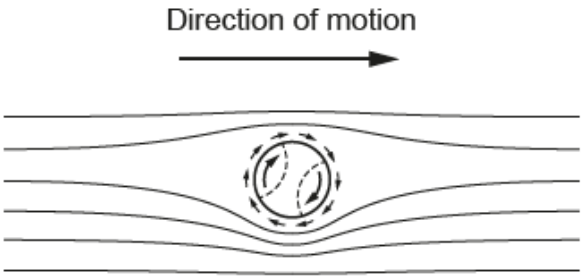
.....

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

Many responses were given full marks for this question accessing the 2 marks available in different ways. Some responses explained the relationship through a sporting example, often an ice skater tucking their mass into the axis of rotation with a low moment of inertia and high angular velocity (and opposite). Whereas some other responses accessed the mark scheme through part example and singly 'inverse relationship'. Most candidates had good knowledge and understanding in this area although some struggled to use the correct biomechanical terminology as stated in the question.

Question 8 (d) (i)

(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.

.....

.....

.....

.....

.....

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

A mixed response question with most candidates showing some knowledge and understanding of the topic in question. However many candidates struggled to apply the correct knowledge and understanding for the type of spin required. Successful responses showed, logically, structures considering the direction, velocity and pressure of airflow both above and below the rotating ball, followed by the additional force created and effect on flight path. Some responses incorrectly explained backspin and some confused Bernoulli and Magnus principles.

Exemplar 3

The air on the underside of the ball will be moving faster along the surface as it is going with the direction of spin. This means it exerts lower pressure on the ball. The air on the top of the ball is travelling against the spin, so will be slower. This means it is ~~exerts~~ less greater pressure. The Air moves from high to low pressure, causing the ball to move downwards, shortening the flight path.

This response is well structured focusing on the airflow underneath and on top of the ball comparing the direction of spin and air flow, velocity and pressure in turn. Although there could be an improvement in subject specific vocabulary with the velocity of airflow rather than 'faster' and 'slower', the knowledge base is evident. This response ends with the correct effect on the flight path directly answering the question. A well formulated, concise response.

Question 8 (d) (ii)

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

.....

.....

.....

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

A less successfully answered question where candidates struggled to apply a benefit of topspin to the game of tennis. Successful responses tended to focus on either hitting the ball harder and still landing within the court, either on serve or full court play or accelerating on bounce, making it harder to return.

Section C overview

Section C consists of a single extended response question. A 20-mark question considering the topics of biomechanics and anatomy and 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* 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]**

Overall most responses showed good knowledge and understanding, most candidates attempted practical application of that knowledge in at least part of the question, and some candidates attempted to develop that knowledge with evaluation and analysis. Candidates showed good organisation of their responses, structuring into two key sections with smaller parts within. There was a general lack of quality in the responses which attempted to explain the increased blood flow within the context of the badminton match, linking knowledge and understanding to practical application. While most candidates showed some knowledge and understanding of lever systems, many responses did not fully evaluate their role.

Most candidates correctly defined HR, SV and CO, some also correctly defined venous return and vascular shunt. Some candidates correctly explained the mechanics of the vascular shunt, less the venous return mechanisms where some candidates only identified them as a list. The most successful candidates explained these mechanics in relation to the exercising badminton player. The most common development related to the relationship between VR and SV.

Most candidates correctly identified the component order of 2nd and 3rd class levers, some described the component parts and good responses described the component parts within a practical context. Many candidates described the mechanical advantage of a 2nd class lever and the mechanical disadvantage of a 3rd class lever without considering the other side of evaluation. A common misconception was for candidates to consider a 2nd class lever at the ankle joint rather than the ball of the foot. Practical application on the most part was brief and lacked a depth of understanding, e.g. an example of a 3rd class lever is a biceps curl.

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