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Examiners' report

PHYSICAL EDUCATION

H155
For first teaching in 2016

H155/01 Summer 2019 series

Version 1

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. 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 can be downloaded from OCR.

Paper 1 series overview

There were some very good scripts offered in response to the Summer 2019 H155/01 examination paper, yet performance overall, quite logically varied greatly. The focus on AO1, AO2 and AO3 in centres appears to have started to take hold with many of the cohort. It is clear that many centres are becoming familiar with the challenges of the new specification and preparing their candidates accordingly. Candidates appear to understand what is required of them throughout all four sections and there was almost no evidence of candidates misinterpreting questions. Examination technique was comparable to last year. 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 address a number of items concerning movement at the ankle joint as well as the lever systems involved. Those achieving the top level managed to cope with the spread of information required which showed good preparation and structure. A thorough plan worked well in most cases.

As in 2018, when lower mark totals were evident, the key reason, unsurprisingly, was lack of fundamental knowledge. Additionally, candidates on lower marks were not specific with units for answers to tidal volume equation and were not attentive enough to the command words. Also, lack of clearly expressed knowledge is still an issue, leading to TV (Too Vague) being stamped on responses (no marks). Candidates should again be reminded that all additional objects (continuation sheets) must be labelled accurately so that examiners can link them correctly to answers in candidates' answer booklets. It is particularly important for candidates using word processed answers to label the question number accurately.

Section A

Question 1 (a)

1 (a) A football player will use their knee joint and the quadriceps group of muscles to perform a powerful clearance kick.

Identify **one** of the quadriceps muscles and the type of synovial joint at the knee.

Outline the functional role and type of contraction in the quadriceps muscle during the preparation and execution of the kick.

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

This question was generally answered well. The majority of candidates accessing both the main AO1 marks for rectus femoris and hinge joint. Some candidates chose to use the vastus group as examples of quadriceps muscles. A small number of candidates mistook the biceps femoris as part of the quadriceps group. In the main once candidates identified the correct muscle they were able to go onto access the AO2 marks for either the contraction or the role of the muscle in preparation and execution. A small number managed to identify both the role as well as the type of contraction. Examiners allowed access to the AO2 marks if candidates had misidentified the correct muscle, if it was clear they were referring to the quadriceps group as opposed to the incorrectly identified muscle.

Question 1 (b) (i)

(b) **Table 1** shows the distribution of blood in the body at rest and during exercise.

Table 1

Tissue/organ	At rest (ml/min)	Blood flow (%)	During exercise (ml/min)	Blood flow (%)
Skeletal muscle	1000	**B**	16000	80
Heart	250	5	750	3.75
Brain	750	15	750	3.75
Skin	**A**	10	1250	6.25
Kidneys	1000	20	750	3.75
Other	1500	30	500	2.50
Total	5000	100	20000	100

(i) Calculate the missing values for **A** and **B**.

A = ...

B = ...

[2]

A very well answered question. Only a small minority unable to access both marks.

Question 1 (b) (ii)

(ii) Explain how the changes in the distribution of blood to the skeletal muscles and other organs is achieved during exercise.

Skeletal muscles .....

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Other organs .....

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[4]

A reasonably well answered question. Marks were given mainly for points 2-5. Very few candidates accessed point 1 on the mark scheme. Candidates had to refer to vasodilation and constriction when referring to the arterioles. Examiners allowed vasodilation/constriction or relax/contract for pre-capillary sphincters. However, simply relax or contract for arterioles was TV. A BOD was given for reference to arteries or blood vessels.

Question 1 (c)

(c) Analyse the changes in the mechanics of breathing as exercise increases which would enhance the performance of an endurance swimmer.

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

This question had a mixed response from candidates. While many managed to identify the correct muscles involved they did not link the cause to effect and thus lost marks. The main issue was considering the effects of exercise causing 'increases' in force of contraction, volumes and pressures. Reference to ribs moving upwards and outwards or down and inwards further was credited if no reference to volumes was made. Exemplar 1 shows a candidate who managed to make the correct links between the muscles contracting and the resultant changes in volume and pressure. They managed to access all marks.

Exemplar 1

When exercising the diaphragm of the endurance swimmer would contract and flatten even more during inspiration, and allows more inspiration. The external intercostal muscles also contract ~~and~~ with more force, allowing the rib during expiration the external intercostal muscles move further down of the swimmer. The ICM, scalens and pectoral muscles allow the rib cage to be pulled further up and out, allowing more air to rush in, therefore a further decrease occurs in pressure. This means more breathing frequency increases and there is more oxygen entering the swimmer's body so there is an increase in oxygen to the muscles, allowing them to exercise for a longer duration at a ~~high~~ moderate intensity [4]

Question 1 (d)

(d) Compare the process of gas exchange at the muscles during exercise to resting conditions.

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

Comparison between rest and during exercise had to be made or implied using a comparative word i.e. lower in this question. However, a large number of candidates did not secure the marks because the change was implied rather than actually stated. Many candidates only accessed point 4. A small number referenced the increased dissociation of oxygen from haemoglobin/Bohr's shift.

Question 2 (a)

2 **(a)** Outline the timing and composition of pre-event meals an endurance athlete may use in the hours leading up to their event.

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

This question was difficult to separate times and composition of meals so marks were given as separate entities. If a candidate considered correct timings regardless of the content of the meal marks were given and vice versa. Many candidates accessed points 3 and 5 or point 2 and 4 but few managed to get all 4. Some just managed to identify a high carbohydrate meal. Some missed out by not mentioning a 'high' carb meal. Those scoring few marks tended to mention 'carbo-loading' and were referring to 'days' before performance not the immediate build up

Question 2 (b)

(b) Aerobic capacity is an important fitness component for team game players.

Evaluate the benefit of different physiological adaptations made by the muscular and metabolic systems after a period of aerobic training.

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

Adaptations must have an evaluation that explains how they are beneficial. There was a submax of 3 marks for both systems. Only a small number of candidates managed to gain marks for evaluating the effect of the adaptations. Weaker candidates referred to cardiac hypertrophy and the evaluation of effects on the circulatory system. Stronger responses were able to identify the muscle hypertrophy of SO/slow twitch fibres/ FOG/Fast Oxidative Glycolytic muscles and then went on to evaluate effectively. Exemplar 2 gains 2 marks for mentioning increase of mitochondria and myoglobin and the catch all at the end with an increase in VO2 max. Like many they did not address metabolic adaptations accurately.

Exemplar 2

One benefit is that they is an increase in mitchondria and myglobin. Another benefit is that the buffering capacity increased. Another benefit is that the anaerobic enzyme activity increases. This all these adaptations allow the performer to have a better aerobic & capacity and vo2 max.

Question 2 (c)

(c) Describe, using a practical example for each, the following types of strength.

Static strength .....

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Dynamic strength .....

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Maximum strength .....

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[6]

This question was generally answered well. Once a candidate managed to identify the type of strength they tended to be able to gain the marks for examples. The exception to this was point 6 where a reference to a single contraction in an example was required. Just a mention of 'heavy' weights was insufficient.

Question 2 (d) (i)

(d) (i) Identify **one** recognised method of evaluating flexibility. Describe **two** advantages and **one** disadvantage of this method.

Method: .....

Advantages: .....

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Disadvantage: .....

.....

[4]

A well answered question. The majority of candidates chose the sit and reach and went on to access all the marks.

Question 2 (d) (ii)

(ii) Explain why a javelin thrower would benefit from good shoulder flexibility.

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

Well answered on the whole. Candidates were required to mention how increased force is speed of contraction/ power/explosive strength **or** increase momentum enabled the javelin to travel further as a result of increased ROM. Just increased ROM on own was insufficient. Some candidates accessed the marks for reduced chance of injury

Question 3 (a) (i)

3 **(a)** Hockey players hit the ball at high speeds to prevent interceptions.

(i) Apply Newton's second law of motion to show how a hockey player may maximise the ball's acceleration.

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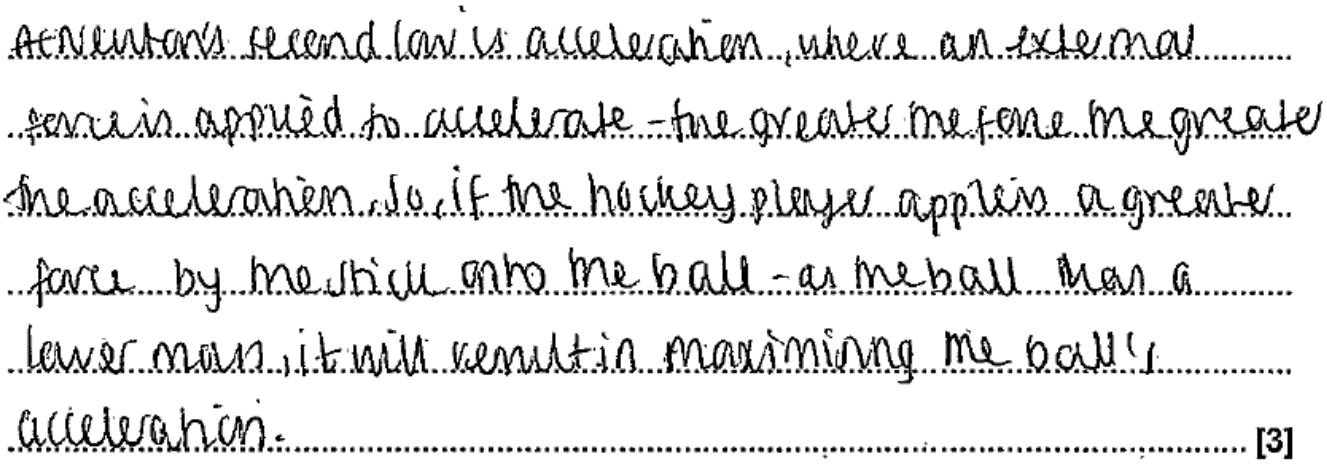
..... **[3]**

The majority of answers managed to access points 1 and 2 on the mark scheme for the definition of Newton's second law and then an application concerning increased force hitting the hockey ball. Very few candidates made any reference to speed of contact, point 3. No candidates discussed the mass of the stick. The answer below is a good example of how most candidates answered the question. They did attempt some reference to mass of the ball but no mention of mass of stick or speed of contact with the ball. 2 marks were given.

Exemplar 3



Question 3 (a) (ii)

(ii) Calculate the force applied to a hockey ball with a mass of 0.16 kg to cause it to accelerate at a rate of 30 ms^{-2}. Show your workings.

..... [2]

Well answered. The vast majority gained both marks. Those missing out either used the incorrect units or divided the two numbers instead of multiplying. Exemplar 3 below was a classic example of the correct equation being applied but losing marks with incorrect units (plus the answer was incorrect)

Exemplar 4

Force = mass x acceleration

= 0·16 x 30

Force = 4.5kg/ms [2]

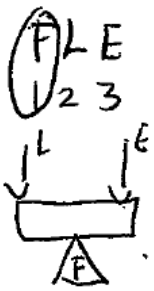
Question 3 (b)

(b) Identify all the component parts of a lever system. Use a practical example from sport to show the component order of a first class lever.

..... [4]

Again this question was generally well answered. The vast majority gaining a good 3 marks for points 1, 3 and 4. A small percentage included load and effort arms in their answer or in small diagrams which enabled them to access point 2. Weaker candidates tended to use the wrong order lever as an example (biceps curl) or were not specific enough using an example of heading in football. Reference to the spine or pivot joint or neck in the header would access the mark. The candidate below gained 3 marks for point 3 and 4. Point 3 was accessed with the diagram and point 4 with reference to the neck joint.

Exemplar 5



The Fulcrum is the joint of the lever. The effort is the force applied. The load is the weight carried. An example of a first class lever is heading the ball as you use the neck joint.

Question 3 (c)

(c) Explain, using practical examples, how force plates are used to enhance sporting performance.

..... [5]

This question for 5 AO2 marks was generally poorly answered. Those who managed to access marks described force being analysed. A few then managed to come up with a suitable example. Those that were unable to still accessed the mark as there was a submax of 3 with no examples. The better candidates included posture, rehab or injury prevention, but that was quite rare. Many scored zero for vague reference to weight measurement, or simply going straight to an example of how it will help improve the technique of a jumper, runner. The answer below was a rare example of a candidate who considered more than just force being applied to the plate. Posture, reducing risk of injury and ground reaction force. They also included the posture example for rugby. Had they not included the example they would have hit submax of 3 with no example.

Exemplar 6

Force plates are used in sport studies to improve analyse posture and technique in order to improve it. For example, a rugby player may squat on the force plates to analyse if there is an equal distribution of pressure on both legs when in position and taking off to move away. This would help improve the posture of the rugby player so they can improve technique and achieve better performance. These force plates also show all the forces such as: weight, ground reaction force and direction of force. They also help reduce the risk of injury through developing technique. [5]

Question 3 (d)

(d) A high jumper uses the Fosbury Flop technique.

Define centre of mass. Describe the changes in its position at take off and during flight that maximise performance.

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

Most candidates made a good attempt at this question. Point 1 was hit by the majority. Point 2 was generally missed and 3 was either spot on or TV because of reference to having the COM above the navel. Those that had clearly studied the COM of a high jump accessed full marks. Some managed to gain point 5 by luck. The definition for point 1 was either spot on or TV. The answer below gained point 1 for the definition but then was too vague for the remainder. Quite a few candidates referred to base of support and line of gravity in terms of stability, which took them away from the mark scheme.

Exemplar 7

Centre of mass is the point of patron where the mass is distributed evenly throughout the body. They centre of mass was optimised as their centre of mass was made lower when going over the hurdle allowing height as the performer falls later more ~~Stability~~ whereas the centre of mass at ~~when~~ taking off was higher making the centre of mass higher up the body. Also the ~~line of gravity~~ Base of Support was balanced when taking off but wasn't when during the flight. ~~Line of gravity was the force~~ B. causing the performer to fall. The line of gravity before taking off wal correct and stable whereas the line of gravity ~~at~~ during flight wasn't correct and wasn't stable. [6]

Section B

Question 4

4* Explain the physiological adaptations as a result of a flexibility training programme, applying them to a sporting activity of your choice.

Evaluate, using practical examples, the structural and functional characteristics of fast oxidative glycolytic muscle fibres. **[10]**

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Quite a broad range of marks either hitting Level 1 or Level 2 as very few candidates managed to successfully hit any AO3 marks by comparing FOG muscle fibre characteristics with type 1 or 2a. The majority managed to get AO2 for mentioning team sports or 800m runners applied in the correct context. Weaker candidates discussed how to complete flexibility training and what evaluated techniques which was not part of the question. Virtually no candidates accessed point 6 for AO3 about too much flexibility. A lot of AO1 for both parts and some reasonable. The exemplar below has two extracts which illustrate one of the few candidates who tried to evaluate FOG fibres by comparing them to type 1 in the first extract and type 2b in the second. This candidate only accessed 6 marks however because the flexibility section was poorly answered.

Exemplar 8

muscle fibres. People with type 2A muscle fibres tend to be more muscular than type 1 athletes. An example of this is Usain Bolt who has a larger % type 2A ratio has larger muscles than Mo farah who has a larger % ratio of type 1. Type 2A have a high output of force which is why Usain Bolt runs faster than Mo ~~farrah~~ farah but fast oxidative glycolytic muscle fibres fatigue more than slow oxidative as it causes a

Second extract

~~Type 2A muscle~~ An athlete with a high percentage type 2A muscle fibres isn't suited to endurance events because they fatigue after 20 seconds. He also isn't suited to events that require maximal force i.e. Shot put because those with ~~type 2~~ high percentage of Type 2b would be able to provide more force. People with a high precntage of Type 2A muscle fibres are better suited to event such as sprinting or high intensity team sport such as basketball.

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