

CAMBRIDGE TECHNICALS LEVEL 3 (2016)

Examiners' report

SPORT AND PHYSICAL ACTIVITY

05826–05829, 05872

Unit 1 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. 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.

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Unit 1 series overview

Candidates generally found this paper accessible and performed well this series.

Although many candidates wrote well, wrote fully and responded to each question set, many others showed confusion or misunderstanding of the requirements of each question. This revealed, for some, a lack of examination preparation. There was some confusion over the meanings of the words 'structure' and 'function' – for example in Questions 12a and 13a. Some gave functions instead of structures and vice versa.

Candidates should read each question carefully to ascertain what the examiner is referring to. For example in Question 14, the question asks for effects of a cool down on the muscular system. Some candidates referred to other systems, rather than the muscular system. Candidates should check carefully which part of human physiology the question refers to. For example, in Question 18a, the question refers to respiratory muscles and yet some candidates referred to bones in their response. In Question 18b, candidates were asked to refer to inspiration in the lungs and yet many referred to expiration.

There were areas of the syllabus for which candidates were clearly unprepared. For example, many candidates left the question on partial pressure in the lungs unanswered (Q18c). It is important that candidates are taught and revise thoroughly all parts of the specification.

In extended response Question 21, candidates scored well for this examination series with many hitting the required points in the mark scheme and followed carefully the bullet points identified in the question. Those that scored less well for this question did not use the bullet point guidance to lead them through the requirements of the question.

Most candidates showed that they had been taught the specification effectively and had many opportunities to relate theory to practical examples. The better candidates read each question carefully and often made a few notes before responding – especially for the extended question (Question 21).

Once again, most candidates finished the paper set in the time allocated with few requiring extra sheets of exam paper. Those that did use extra sheets often used these to expand on points they had made in response to Question 21.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
<ul style="list-style-type: none"> • identified accurately the requirements of each question and to which part of human physiology each question referred to • obeyed the 'command words' in each question – for example giving reasons when explaining and giving full descriptions when asked to describe • carefully considered each response when answering multi-choice questions • knew the difference between 'structure' and 'function'. 	<ul style="list-style-type: none"> • misunderstood the requirements of each question by apparently mis-reading the question • confused 'structure' with 'function' • showed a lack of preparation for certain aspects of the specification • did not cover all the variables set out in the extended question (Question 21).

Section A overview

The candidates who scored well in this section, which included multi-choice questions, carefully considered each of the responses given and through a process of elimination came up with the correct selection. Those that scored less well appeared to have rushed through this section and did not read carefully the requirements of the question. On the whole in this series, this section was answered well.

Question 1

1 Which one of the following is a typical resting value for minute ventilation?

(a) 0.1 litres per minute

(b) 0.6 litres per minute

(c) 1 litre per minute

(d) 6 litres per minute

[1]

Many scored zero for this question, showing a lack of knowledge about resting values for minute ventilation. Most candidates who scored zero incorrectly identified (b) instead of (d) as the correct response.

Question 2

2 Which one of the following components of blood contains haemoglobin?

(a) Plasma

(b) Platelets

(c) Red blood cells

(d) White blood cells

[1]

Most scored the mark for this, with very few scoring zero.

Question 3

3 Which one of the following is **not** a long-term effect of exercise on the muscular system?

(a) Hypertrophy of muscles

(b) Increased muscular endurance

(c) Increased tolerance to lactic acid

(d) Reduced capillarisation

[1]

Most scored the mark for this question and recognised the importance of 'not' in the question.

Question 4

4 Consider the following lung volumes:

A – Breathing frequency

B – Minute ventilation

C – Tidal volume

Which of these lung volumes increase during exercise?

(a) **A** and **B** only

(b) **A** and **C** only

(c) **B** and **C** only

(d) **A, B** and **C**

[1]

Many chose (d), which was the correct response, showing a good understanding of lung volumes. Those that scored zero mostly chose (a).

Question 5

5 Which one of the following pairs of muscles **both** cause movement at the shoulder?

(a) Deltoid and iliopsoas

(b) Deltoid and pectoralis major

(c) External oblique and pectoralis major

(d) External oblique and iliopsoas

[1]

Most chose (b) correctly but those that scored zero mostly chose (a).

Question 6

6 Which one of the following valves is found between the right atrium and right ventricle?

(a) Aortic valve

(b) Bicuspid valve

(c) Pulmonary valve

(d) Tricuspid valve

[1]

Most did well but those that scored zero, generally mixed up tricuspid with bicuspid.

Key point – Bicuspid valve and tricuspid valve

These are often confused by candidates.

Bicuspid valve - This valve has two valve flaps and is located in the left side of the heart, between the left atrium and left ventricle.

Tricuspid valve – This valve has three valve flaps and is located in the right side of the heart, between the right atrium and the right ventricle.

Question 7

7 Which one of the following describes the function of the epiglottis?

(a) Prevents food entering the lungs

(b) Removes carbon dioxide

(c) Site for gaseous exchange

(d) Warms and moistens air

[1]

Mostly well answered. Those that scored zero mostly chose (d).

Question 8

8 State the technical name for the bones of the spine.

..... [1]

The vast majority scored the mark, although some incorrectly referred to muscles.

Question 9

9 Which energy system uses phosphocreatine as a fuel?

..... [1]

The more able candidates did well on this question, others found it more challenging. Common errors include ATP (only) or an incorrect energy system. It is important at this level for candidates to be accurate when using technical terms/vocabulary.

Question 10

10 Calculate the heart rate of an individual with a stroke volume of 70 millilitres per beat and a cardiac output of 4900 millilitres per minute.

..... (beats per minute) **[1]**

Most scored 1 mark here and made an accurate calculation.

Section B overview

The questions in this section often required short but accurate responses. The most successful candidates looked at the marks allocated and judge the length of their responses accordingly. Generally, if 4 marks are available then four separate points should be made. Better candidates again read each question with care to identify which physiological system was being referred to. Weaker candidates often confused structure with function or did not give enough information for marks to be given.

Question 11 (a)

11 (a) Complete the following sentences, using words from the box below.

cartilage	levers	ligaments
organs	strength	tendons

Short bones are compact and are designed for weight-bearing and

.....

Long bones act as and are vital for movement.

Flat bones provide an attachment for muscles and often protect vital

.....

Sesamoid bones are found in and facilitate movement at a joint.

[4]

Most scored 3 out of the 4 marks - stating ligaments or cartilage instead of tendons for the final mark.

Question 11 (b)

(b) Name **two** bones of the axial skeleton, other than the bones of the spine.

1.....

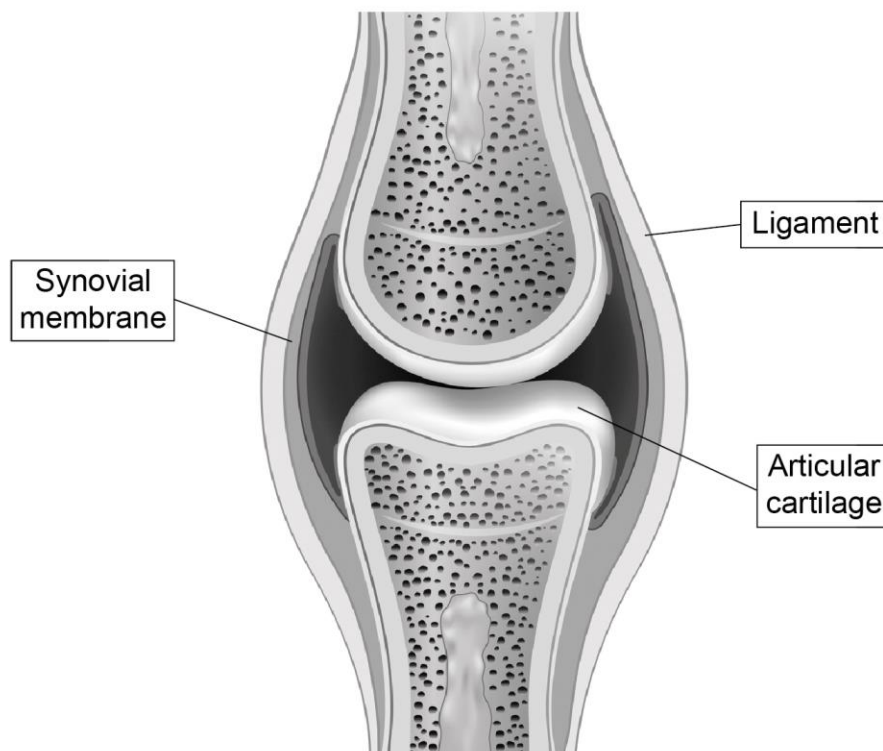
2.....

[2]

Most candidates correctly gave ribs and cranium, occasionally cranium/sternum or just ribs. Some put muscles or hip/vertebrae bones.

Question 12 (a)

12 The diagram shows a synovial joint with some structures labelled.



(a) Describe the function of each structure:

Articular cartilage

.....

Ligaments

.....

Synovial membrane

.....

[3]

The better scoring candidates scored at least 2 marks. Most common error was that candidates put that the synovial membrane held fluid rather than secrete/produced synovial fluid. Another common mistake was to write ligaments connecting muscle to bone and confusing with tendons. Some showed confusion between the terms function and structure.

Key point – Structure and Function

Candidates often confused these terms. Here, the question asks for function – in other words what does the structure do? Responses simply describing the structure scored zero marks. In this case, for example, a candidate who wrote that the synovial membrane 'is around the joint' is describing the structure and scored zero. If the candidate wrote that the synovial membrane 'secretes synovial fluid', then this is the correct function and would have scored the mark allocated.

Key point – Difference between ligaments and tendons

Candidates often confuse ligaments with tendons. Note that ligaments connect bone to bone and tendons connect muscles to bones.

Question 12 (b)

(b) State **three** other structures that are found at a synovial joint.

- 1.....
- 2.....
- 3.....

[3]

This was well answered by many candidates but some showed weak knowledge in this area and left this question wholly or partly unanswered.

Question 13 (a)

13 (a) Identify **one** structural characteristic and **one** function of fast glycolytic muscle fibres.

Structure

Function

[2]

The most common error for those that attempted this question was to confuse structure with function.

Question 13 (b)

(b) Name an athletics event that relies mainly on fast glycolytic muscle fibres for success.

..... [1]

The vast majority gave an appropriate athletic event. Those who scored zero often chose marathon or simply 'running'.

Question 14

14 One effect of a cool-down on the muscular system is to increase the elasticity of muscle fibres.

Describe **three** other effects of a cool-down on the muscular system.

1.....
.....

2.....
.....

3.....
.....

[3]

Those that scored less well did not appear to read the question carefully enough and came up with effects that were not applicable to the muscular system or gave one of their responses as increased elasticity, which was in the question. Some incorrectly assumed that a cool down prevents the build-up of lactic acid.

Question 15 (a)

15 Fig. 15 shows a diagram of the heart and the directional flow of blood through the heart.

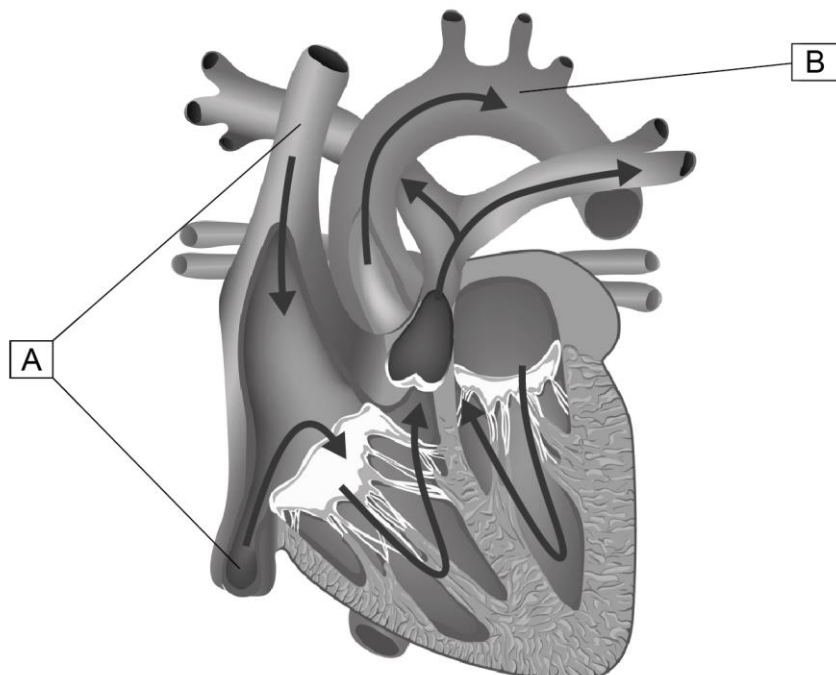


Fig. 15

(a) Identify structures **A** and **B** and describe the function of each.

A.....

Function of A.....

.....

B

Function of B.....

.....

[4]

Some candidates incorrectly identified the structures but scored marks for their functions. Many could accurately identify and link with the appropriate function.

Question 15 (b)

(b) Use Fig. 15 to explain how blood flows through the chambers and valves of the heart.

.....

.....

.....

.....

.....

.....

..... [4]

This was a high scoring question for many candidates who showed a good awareness of blood flow through the chambers and valves of the heart. This area of the specification has been well-taught by most centres.

Those that scored less well described blood going from one side of the heart and straight into the other side. Some wrote 'blood entering ventricles' rather than the atria first.

Question 16

16 Complete the sentences to explain the effects of a warm-up on the cardiovascular system.

A warm-up increases venous return which leads to an increase in
 volume.

A warm-up initiates the mechanism, which increases blood
 flow to the

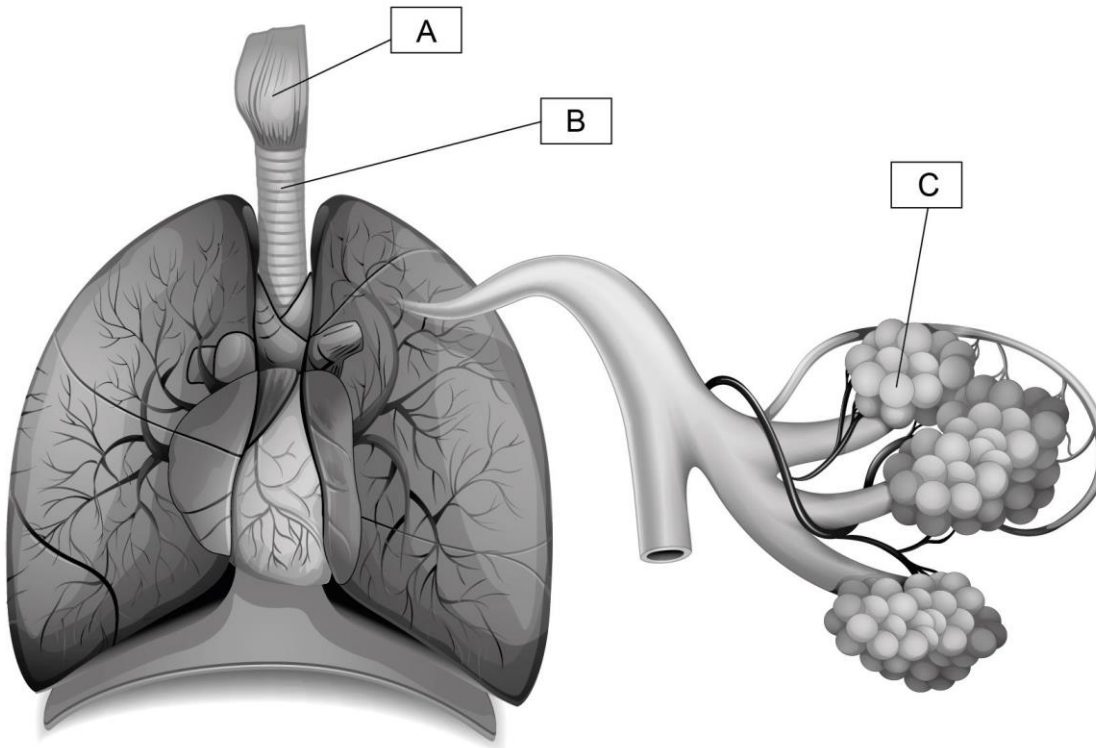
This is achieved by and vasoconstriction of blood vessels
 and pre-capillary sphincters. A warm-up also increases temperature which
 the viscosity of blood.

[5]

Many candidates scored 3 or 4 marks out of the 5 possible marks. This was sometimes due to putting tidal volume rather than stroke volume and an increase in viscosity rather than a decrease.

Question 17

17 The diagram shows the structures of the lungs.



Identify the structures labelled **A**, **B** and **C**.

A

B

C

[3]

Although many identified these structures correctly, some of the lower scoring candidates incorrectly identified A as the epiglottis or the pharynx. Weaker candidates labelled C incorrectly as the bronchioles.

Question 18 (a)

18 (a) Name **two** respiratory muscles that contract during inspiration.

1

2

[2]

Weaker candidates identified bones rather than muscles or gave muscles that are not associated with the lungs. Most correctly identified the diaphragm, but some inaccurately put intercostals which was too vague at this level to score a mark for internal intercostals.

Question 18 (b)

(b) Describe what happens to the following during inspiration:

Movement of the ribs

.....

Volume of the thoracic cavity

.....

Pressure in the lungs

.....

[3]

Often 1 or 2 marks were gained here for correctly stating up and out for the movement of the ribs and increases volume of the thoracic cavity, but many candidates made an error by putting increase the pressure of lungs.

Question 18 (c)

(c) Explain how differences in partial pressures of gases enable gaseous exchange to occur in the lungs.

.....

.....

.....

.....

.....

..... [3]

This proved one of the lower scoring questions, with many candidates leaving this question unanswered. Those that scored at least 1 mark recognised the movement of gases between an area of high pressure to an area of low pressure. Some candidates incorrectly referred to pulmonary respiration. Other candidates did not specify that oxygen travels into the capillaries (some just stated blood), others did not put a starting and/or end point of the diffusion process.

Question 19

19 Complete the table, using some of the words and numbers in the box below, to describe the main energy system used during a marathon.

aerobic	anaerobic	carbon dioxide	fats	minerals	
oxygen	proteins	water	1	2	36+

Type of reaction
Food fuels	carbohydrates and
Amount of ATP produced
By-products and H ₂ O

[4]

This question was well answered by many candidates, with most candidates achieving at least 2 or more marks. Some common errors included the number of ATP produced (a lot of responses stated one ATP).

Question 20

20 Complete the sentences to explain the recovery processes for the lactic acid system.

During recovery lactic acid is converted back to acid.

This is then oxidised or converted into

Lactic acid removal generally takes about, although it can take as much as 24 hours depending on intensity of work, fitness level and the recovery methods used.

One way to speed up the recovery process is to perform a

[4]

The stronger candidates showed a good understanding of the recovery process for the lactic acid system and scored the full 4 marks available. Those that scored less well, did not identify pyruvic acid for the first mark and could not give what this was converted to once oxidised.

Section C overview

This section includes one extended question worth 10 marks.

This extended question is marked using a 'levels' mark scheme that includes credit for the quality of written communication. There are three levels: Level 1 showing a limited response, Level 2 which shows a competent response and Level 3 which shows a comprehensive response.

As in the last series, very few candidates scored in the top level (8-10 marks), with most scoring Level 2 (5-7 marks) or Level 1 marks (1-4 marks).

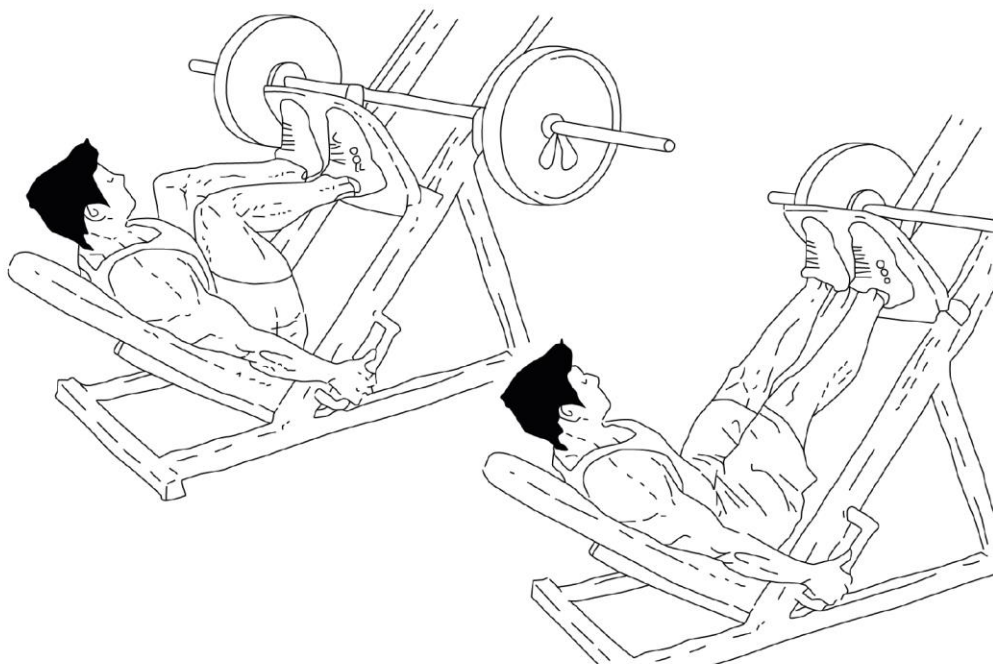
The question relates to the movements of the knee joint during two phases of the leg press shown in diagrams in the question. The question also gives six bullet points to help guide the candidates in analysing appropriately the movements during the activity. Those that scored well followed this guidance and showed a good understanding of muscle movements and types of contraction. Weaker candidates gave very few points and did not cover the variables set out in the bullet-point guidance.

High scoring candidates used technical terms to identify and describe muscle movements and went beyond simply stating the movements of the quadriceps and hamstrings. The better candidates could also identify and describe the role of fixators during the movements.

The few that score in the top level of the levels mark scheme, covered all the variables in the question with a high standard of written communication.

Question 21*

21* The diagram shows the performance of a leg press exercise.



Analyse the movements of the knee joint during both phases of the leg press.

Your answer should include:

- type of joint
- articulating bones
- joint movements
- main muscles acting
- the functions of the muscles involved
- types of muscle contraction.

[10]

This extended question expects an analysis of the movements at the knee joint for two phases of the leg press exercise.

Many candidates scored well as they made points guided by the bullet points in the question and covered both phases of the leg press.

Some candidates, however, gave irrelevant material related to the movements of other joints such as the hip joint and ankle joint and did not follow the bullet points that served as an aide memoire for candidates to cover all the necessary points. So the less successful responses scored mainly in Level 1 of the levels mark scheme showing limited answers.

The stronger candidates used the names of muscles within the quadriceps and hamstring muscle groups and could identify the types of muscle contraction in both phases.

These better scoring candidates stated that the rectus femoris (or others in the quadricep group) was the agonist in both phases. They understood that it performed a concentric contraction in the upward phase and then an eccentric contraction as the weight was lowered. They also understood that bicep femoris was the antagonist for both phases.

However, a significant number of candidates did say that 'despite being the antagonist the bicep femoris is performing a concentric contraction' which is not correct as it is relaxing. This prevented them from achieving full marks. Most of the stronger candidates understood the role of a fixator and could identify the fixators during the leg press.

Weaker candidates referred to the muscles as quadriceps and hamstrings throughout their response. Many of the weaker responses said that the roles of the agonist and antagonist swapped over as the phases of the leg press changed - stating that the hamstrings were the agonist - doing a concentric contraction, the quadriceps are the antagonist and relaxing.

The best candidates made a short plan and followed the guidance set out in the question. They wrote clearly and concisely in paragraphs and developed their points to show their understanding as well and their knowledge of muscle movements.

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