

**CAMBRIDGE TECHNICALS LEVEL 3 (2016)**

**Examiners' report**

# **SPORT AND PHYSICAL ACTIVITY**

**05826–05829, 05872**

**Unit 1 January 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; there were again some common issues with the paper, with responses requiring the appropriate technical vocabulary. The correct names of muscles for example were incorrectly written by some candidates, also the misspelling of technical terms was a common feature. Candidates again did well when responding to questions demanding recall, for example identifying the correct bones in Question 11 (a) and the functions of the skeleton in Question 11 (b). Candidates, as in the last series, did less well when responding to questions that required a good working knowledge of applying physiological theories, for example when attempting to explain how a warm-up can increase the speed and force of muscle contractions in Question 13 (c).

Most candidates finished the paper set in the time allocated with few requiring additional sheets of answer paper. Those that did use additional sheets often used these to expand on points they had made in response to Question 21.

There were several areas of the syllabus that candidates found difficult and performed less well on. For example, identifying the correct joint movement in Question 14 and the role of pre-capillary sphincters in Question 18 (a). In the extended response question, Question 21, candidates scored generally less well with many making points that were not developed and therefore not achieving credit above Level 1 in the 'levels' mark scheme.

Many centres again show that the teaching and learning for this unit has been highly effective, with candidates showing appropriate qualification at Level 3 responses. These excellent candidates were able to respond appropriately to the command words, such as explain and describe.

Candidates who did well on this paper generally did the following:	Candidates who did less well on this paper generally did the following:
<ul style="list-style-type: none"> <li>• gave responses at the appropriate depth required for this Level 3 qualification</li> <li>• scored well on the multi-choice section by reading through all the responses and choosing carefully the most appropriate response</li> <li>• were accurate with their use of technical terms</li> <li>• developed their points, covering all the question's variables, in their responses to the extended question (Question 21).</li> </ul>	<ul style="list-style-type: none"> <li>• left whole questions unanswered</li> <li>• did not read each question carefully enough and so wrote irrelevant material</li> <li>• did not develop their points in response to the extended question (Question 21).</li> </ul>

## Section A overview

Many candidates performed well overall, but some that scored less well misread the requirements of each question.

### Question 1

1 Which one of the following is the type of synovial joint at the neck?

(a) Ball and socket

(b) Condyloid

(c) Fused

(d) Pivot

[1]

Most candidates chose the correct synovial joint at the neck.

### Question 2

2 Which one of the following statements is correct?

(a) Diaphragm contracts during expiration

(b) Pectoralis minor muscles contract during inspiration

(c) Ribs contract during inspiration

(d) Scalene muscles contract during expiration

[1]

This was less well answered with many candidates incorrectly choosing (d).

### Question 3

3 How many ATP molecules does the lactic acid system produce from the breakdown of **one** glucose molecule?

(a) 1

(b) 2

(c) 32

(d) 38

[1]

This proved difficult for many, with candidates often choosing incorrectly (c).

### Question 4

4 Which one of the following is a long-term effect of exercise on the skeletal system?

(a) Capillarisation

(b) Cardiac hypertrophy

(c) Osteoporosis

(d) Thicker cartilage at joints

[1]

Most of those who scored 0 marks chose (c) for this question and showed a misunderstanding of the causes of osteoporosis.

## Question 5

5 Which one of the following muscles does **not** cause movement of the vertebral column?

(a) Erector spinae

(b) External obliques

(c) Pronator teres

(d) Rectus abdominus

[1]

Most scored well on this question, although some misread the question and looked for muscles causing, rather than **not** causing, the movement of the vertebral column.

## Question 6

6 Which one of the following correctly describes **two** short-term effects of exercise on the cardiovascular system?

(a) Decreased cardiac output and increased stroke volume

(b) Decreased cardiac output and decreased stroke volume

(c) Increased cardiac output and decreased stroke volume

(d) Increased cardiac output and increased stroke volume

[1]

Most did well on this question, but some misread the question and chose two answers rather than one with two effects.

## Question 7

7 Which one of the following muscles contracts to cause hip flexion?

(a) Adductor longus

(b) Gluteus maximus

(c) Iliopsoas

(d) Supinator

[1]

Many chose correctly that the muscle iliopsoas contracts to cause hip flexion.

## Question 8

8 Which one of the following does **not** assist gaseous exchange at the alveoli?

(a) High glycogen content

(b) Moist walls of alveoli

(c) Steep diffusion gradient

(d) Vast capillary network

[1]

Many candidates identified (a) as the response that does **not** assist gaseous exchange at the alveoli.



### Question 9

9 State the approximate timescale for full recovery of the ATP-PC/lactic system.

..... [1]

A whole range of answers were apparent, showing a very mixed picture of the candidates' understanding of the ATP-PC system with answers ranging from a few seconds to days, rather than the required 2-3 minutes.

### Question 10

10 Calculate the stroke volume of an individual with a cardiac output of 5600 ml/minute and a heart rate of 70 bpm.

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

Although many candidates did the right calculation to achieve the answer, many did not include the units in their answered and therefore scored 0 marks. The correct answer should be 80ml (per beat).

#### Key point call out – Using units in calculations

When asked to calculate, candidates must include the appropriate units with their calculated answer.

## Section B overview

This section includes questions that demand short answers or to select appropriate responses from a list given. The most successful responses showed that candidates had carefully read each question and responded accurately with appropriate technical vocabulary. Many candidates did not use the correct terms for bones, muscles or muscle movements and relied too heavily on more generic terms – for example, giving the term 'hamstrings', rather than a name of an individual muscle as an example for the antagonist in Question 13 (a).

### Question 11 (a)

11 Fig. 11 shows a diagram of the skeleton.

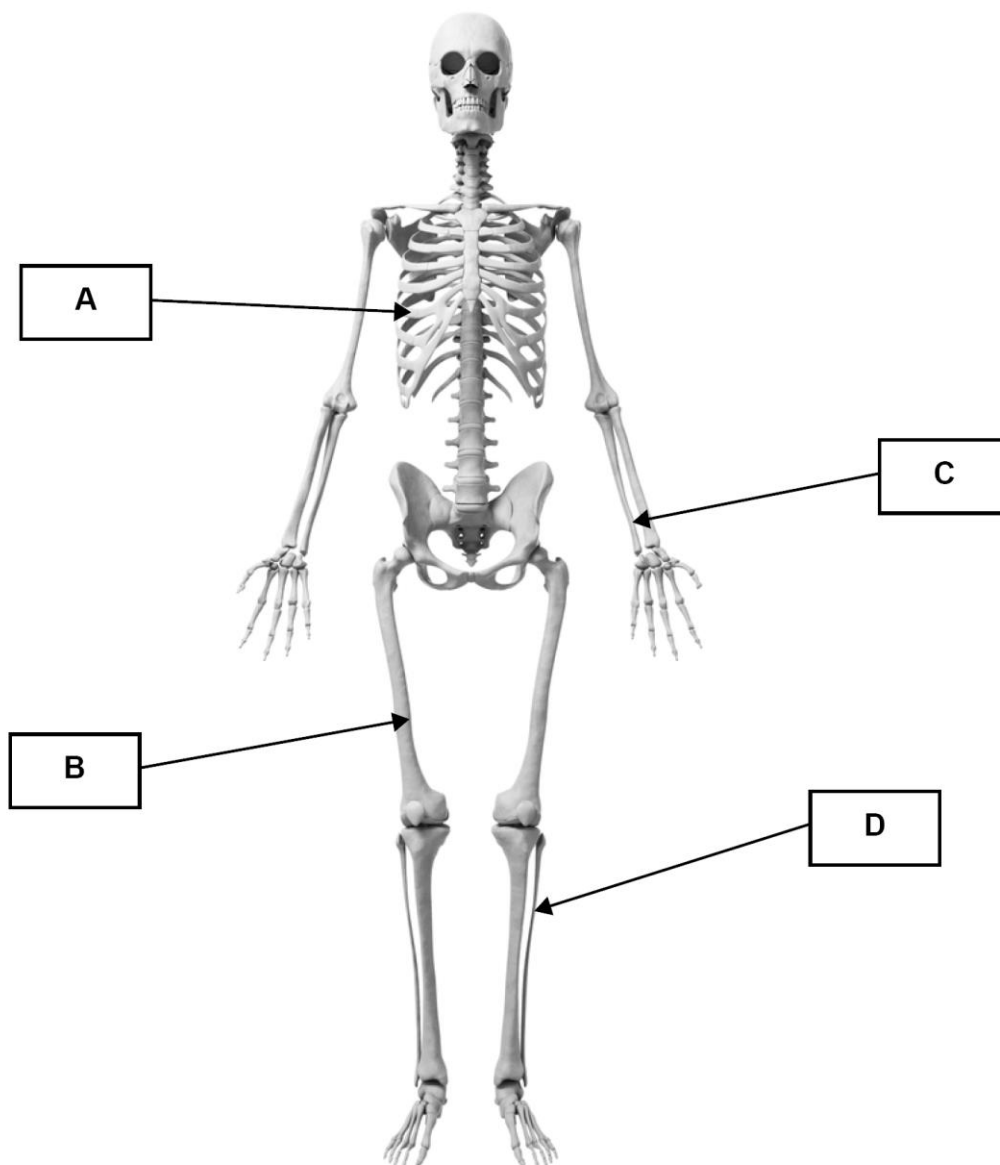


Fig. 11

(a) Identify the bones labelled **A**, **B**, **C** and **D**.

A .....

B .....

C .....

D .....

[4]

The majority of candidates scored the full 3 marks, correctly identifying the relevant bones. Many candidates misspelt the names of the bones, especially the fibula, with many confusing the term with the tibia and incorrectly writing 'tibula'.

### Question 11 (b)

(b) Other than protection and mineral storage, state **three** functions of the skeleton.

1 .....

2 .....

3 .....

[3]

Most candidates scored all 3 marks for this recall question, showing a good understanding of the functions of the skeleton. Some used the examples of protection or mineral storage, both of which are in the question and therefore scored 0 marks.

### Question 12

12 Fig. 12 shows the structures at a synovial joint.

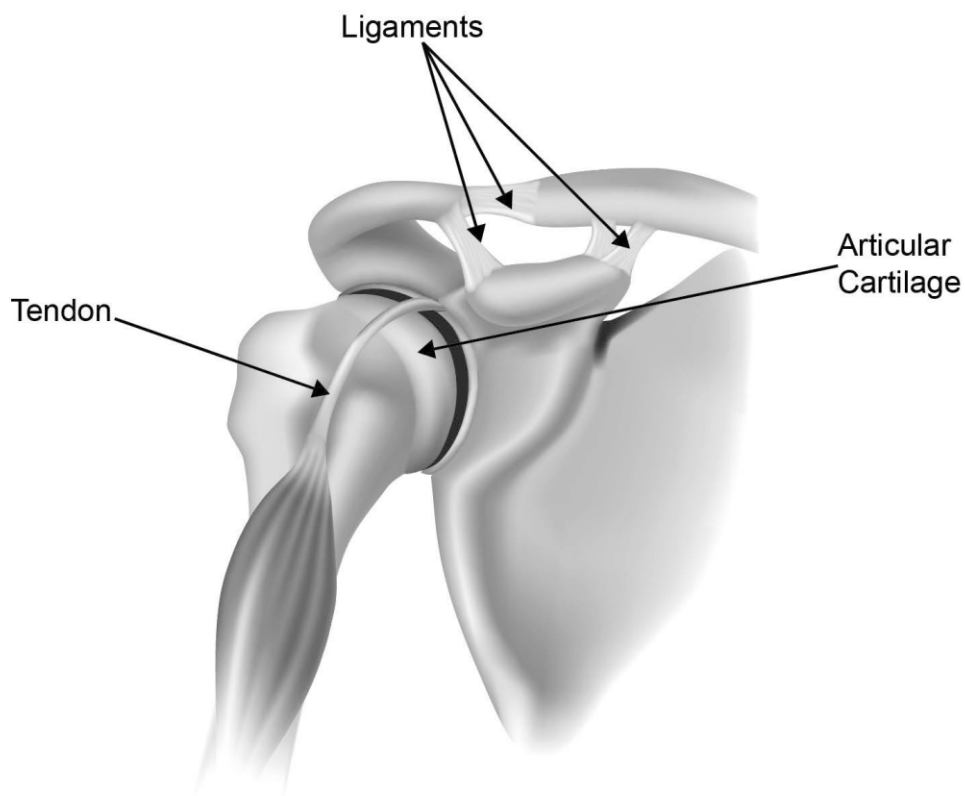


Fig. 12

Describe the function of each of the following structures at a synovial joint:

Articular cartilage

.....

.....

.....

Ligaments

.....

.....

.....

[2]

There was generally a good understanding shown by most candidates of the function of the articular cartilage and ligaments. Those that scored less well, often confused ligaments with the function of tendons.

### Question 13 (a)

13 Fig. 13 shows a footballer kicking a ball.



Fig. 13

(a) Explain how the muscles acting on the knee joint in the kicking leg work as agonist and antagonist when the ball is kicked.

.....

.....

.....

.....

.....

.....

..... [4]

This question proved difficult for many candidates, some of whom misread the question and explained the muscle movements associated with drawing the leg back in preparation rather than muscles acting on the kicking leg **when the ball is kicked**. Those that scored well, identified the correct agonist/s and the correct antagonist/s using the correct anatomical terms rather than the generic terms of the quadriceps and the hamstrings. At this level, candidates are expected to use the names of the muscles within such generic muscle groups.

**Key point call out – Using the correct muscle terminology**

When asked to identify muscles, candidates are expected to use the correct names of individual muscles, rather than generic groups of muscles. For example, rectus femoris rather than quadriceps and biceps femoris rather than hamstrings.

Question 13 (b)

(b) Name **one** fixator muscle that stabilises the ankle joint as the ball is kicked. Identify the type of contraction produced by this fixator.

Fixator .....

Type of contraction .....

[2]

Many identified one of the fixators and type of contraction correctly. Those that scored a single mark, commonly wrote isotonic or eccentric instead of isometric as the type of contraction.

Question 13 (c)

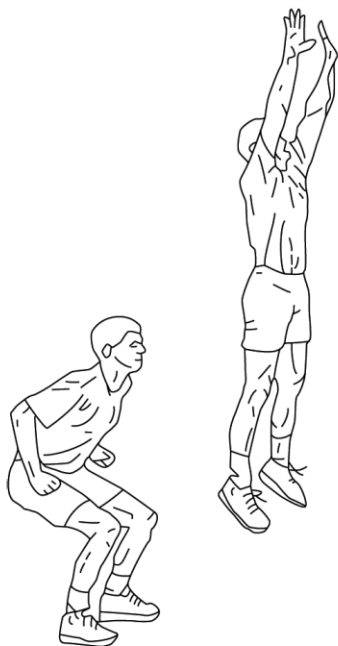
(c) Explain how a warm up can increase the speed and force of muscle contractions.

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

This was the least well answered question on the paper. Most who attempted this question, often described the actions of the warm-up or general effects of the warm-up, rather than how the warm-up can increase the speed and force of muscle contractions. Few candidates scored the full 3 marks available.

### Question 14

14 Fig. 14 shows the performance of a vertical jump.



**Fig. 14**

Complete the table to identify the type of synovial joint and joint movement at the shoulders and knees as the performer jumps into the air.

Joint	Type of synovial joint	Joint movement
Knee	.....	.....
Shoulder	.....	.....

**[4]**

This was answered well by most candidates. Those that did not score full marks often gave the incorrect joint movements, showing confusion with the terms extension and flexion.

### Question 15

15 The following statements describe the structure and function of fast oxidative fibres.

Complete the statements by selecting words from the box below:

capillary	force	contract	phosphocreatine
relaxation	fatigue	high	low

Fast oxidative muscle fibres are able to ..... powerfully.

However, they have a limited ability to resist .....

These fibres have a ..... anaerobic capacity.

They also have a higher ..... density than fast glycolytic fibres.

[4]

Most scored well on this question, with many scoring at least 3 marks. Successful responses came from candidates who selected the most appropriate words to complete the statements, often showing a good understanding of the structure and function of fast oxidative fibres. In past series candidates have struggled with questions on this topic, so it was pleasing that centres had prepared many of their candidates well for questions in this topic area.

### Question 16

16 Blood passes through various structures in the heart.

Identify the chamber of the heart that blood enters **after** passing through each of the **three** structures listed here:

Vena cava .....

Pulmonary vein .....

Bicuspid valve .....

[3]

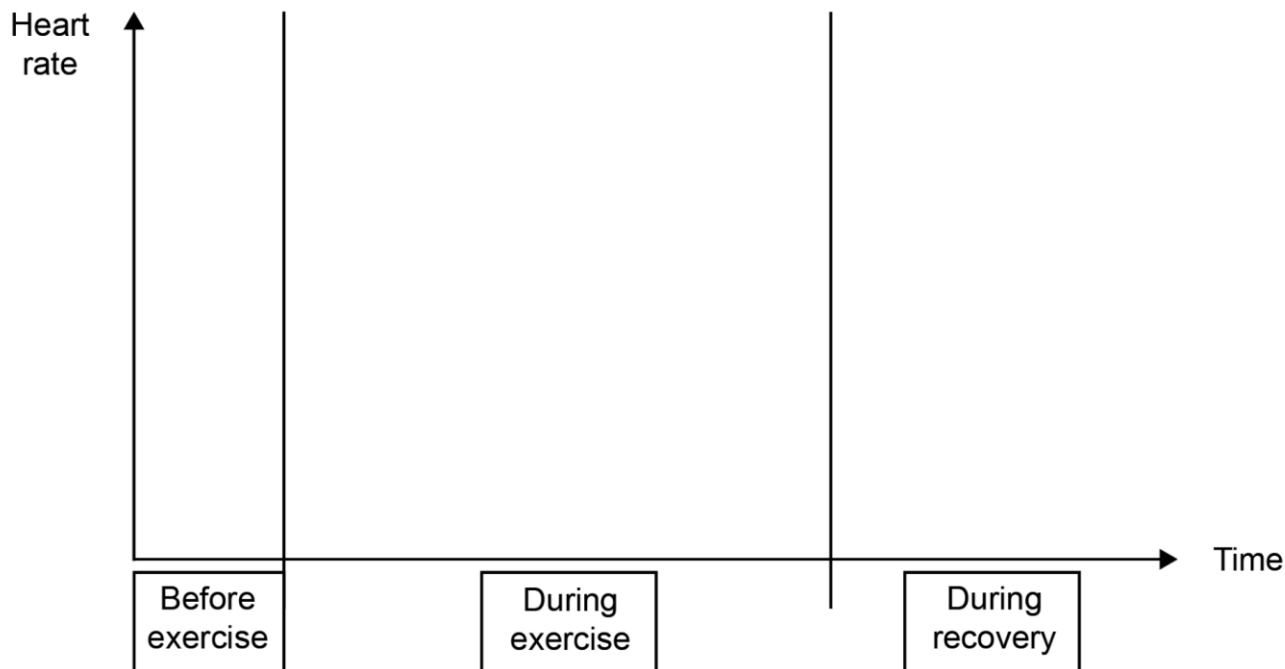
The majority of candidates scored at least 2 marks for this question. Most showed a good understanding of the flow of blood passing through the chambers of the heart.



### Question 17

17 Using **Fig. 17** sketch a line graph showing the heart rate response of a performer jogging at a steady pace on a treadmill for 20 minutes.

The graph should show heart rate before exercise starts, during exercise and during recovery.



**Fig. 17**

**[4]**

The standards shown of sketching an appropriate line graph varied considerably, but most scored at least 1 mark. Some candidates chose not to answer this question, others only partially drew the graph. The most successful responses showed a clear anticipatory rise before exercise, with a steeper increase and then a plateau during exercise, followed by a fall in heart rate during recovery.

### Question 18 (a)

**18 (a)** Explain the role of pre-capillary sphincters in the circulatory system during exercise.

.....

.....

.....

.....

.....

.....

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

The most successful responses showed an excellent understanding of the role of the pre-capillary sphincters in the circulatory system during exercise. These responses identified their role as regulating blood flow and went on to explain how this took place via dilation and constriction causing an increase or decrease in blood flow. Responses with sufficient detail attracted more marks. Those who merely referred to dilation and restriction and not linked this to blood flow did not receive credit.

### Question 18 (b)

(b) Complete **Table 18** to show the components and functions of blood.

Component	Function
Red blood cells	<p>.....</p> <p>.....</p> <p>.....</p>
<p>.....</p> <p>.....</p>	Help fight infections by attacking bacteria, viruses, and germs that invade the body.
<p>.....</p> <p>.....</p>	Help the body to form clots to stop bleeding.
Plasma	<p>.....</p> <p>.....</p> <p>.....</p>

**Table 18**

**[4]**

Most candidates scored at least 3 marks for this question. The least well answered was for the function of plasma.

### Question 19 (a)

19 Fig. 19 shows key structures of the respiratory system.

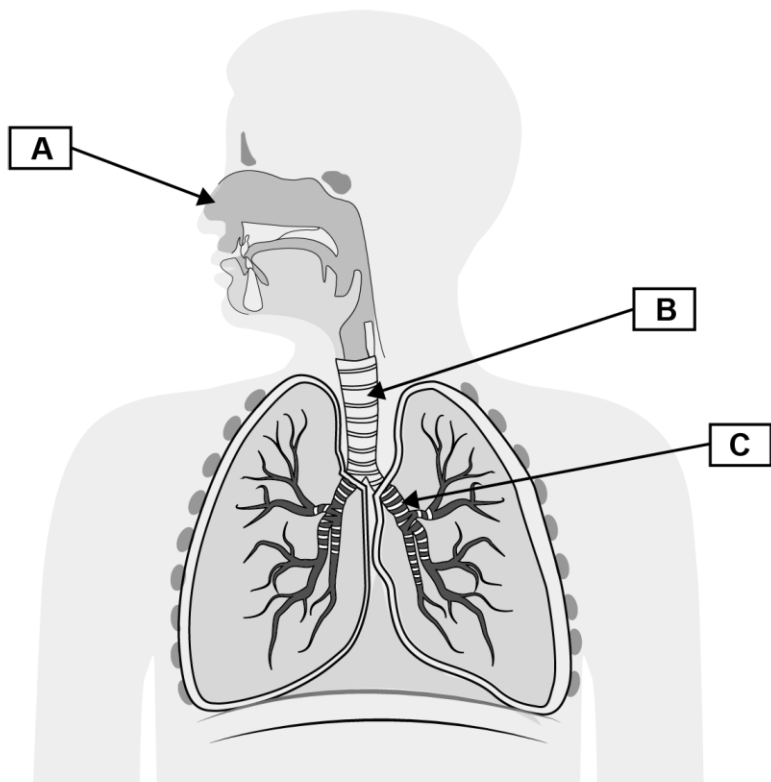


Fig. 19

(a) Identify the structures labelled A, B and C.

A .....

B .....

C .....

[3]

Most scored at least 1 mark for this question. Those that scored 2 marks often identified C incorrectly as a bronchiole rather than the bronchus.

### Question 19 (b)

(b) Describe the roles of **A** and **C**.

A .....

.....

.....

C .....

.....

.....

[2]

Most candidates scored the full 2 marks for describing the roles of the labelled structures. Some candidates did not score for structure C because they did not mention the passage of air to the lungs.

### Question 20

20 The following statements describe the aerobic energy system.

Complete the statements by filling in the missing words.

The aerobic system follows three stages: aerobic glycolysis,

the .....

and the electron transport chain.

The type of reaction is aerobic because sufficient ..... is

present.

The food fuels for the aerobic system are ..... and

.....

The by-products of the aerobic system are ..... and

water (H<sub>2</sub>O).

[5]

This was answered well by most candidates who completed the statements accurately, although many did not correctly include the correct Krebs cycle stage of the aerobic system. Most candidates showed a good understanding of the aerobic system.

## Section C overview

This section includes one extended question worth 10 marks. This is marked using a levels mark scheme that includes credit for the quality of written communication. As in the last series, very few candidates scored in the top level (8-10 marks), with most scoring Level 1 marks (1-4 marks).

The question included definitions with typical resting values and a requirement to suggest why the values differed for untrained and trained athletes. Many candidates scored few marks because they were unsure of or confused by the terms tidal volume, breathing frequency and minute ventilation. Those that did know about them terms could not give accurate values at rest.

The second part of the question about suggesting differences in the values at rest and during high intensity exercise for untrained and trained athletes was rarely addressed accurately or in the required detail.

The few that scored 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\*** Define the following respiratory terms:

- tidal volume
- breathing frequency
- minute ventilation.

Give typical resting values for each term for untrained individuals and trained athletes.

Suggest why the values for untrained individuals may be different to trained athletes at rest and during high intensity exercise.

**[10]**

The first section of the question related to recalling definitions. These were not known accurately enough by many candidates. Some candidates got the terms mixed up, giving the definition of tidal volume to breathing frequency and vice versa.

The most successful responses were clear and succinct– with candidates often giving a paragraph for each definition along with resting values for untrained and trained athletes. These candidates often then went on to suggest reasons for the differences in these values for rest and during high intensity exercise, with good development points related to respiratory adaptations and efficiency of gaseous exchange.

Too many candidates were unfamiliar with these respiratory terms and some had no idea about relevant values. Some candidates avoided the question completely or merely attempted the definitions with little else. Other candidates who scored few marks wrote about the heart and circulatory adaptations which were largely irrelevant to the question.

Candidates who answered well often wrote a short plan showing how they might respond to each variable in the question, for example:

1. Definitions of each.
2. Values for each at rest for untrained.
3. Values for each at rest for trained.
4. Reasons for differences in values during high intensity exercise.

Most candidates wrote fluently and there was an improvement in the standard of written communication from previous series. Candidates often used separate paragraphs to make separate developed points and the most successful used accurate technical and specialist vocabulary – for example, identifying the adaptation of specifically named respiratory muscles.

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