



Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education

Centre Number

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Candidate Number

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Life and Health Sciences

Assessment Unit AS 2

assessing

Human Body Systems

MV18

[SZ021]

Assessment

Assessment Level of Control Tick the relevant box (✓)

Controlled Conditions	<input type="checkbox"/>
Other	<input type="checkbox"/>

Time

1 hour 30 minutes, plus your additional time allowance.

Instructions to Candidates

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Answer **all seven** questions.

Write your answers in the spaces provided in this question paper.

Information for Candidates

The total mark for this paper is 75.

Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

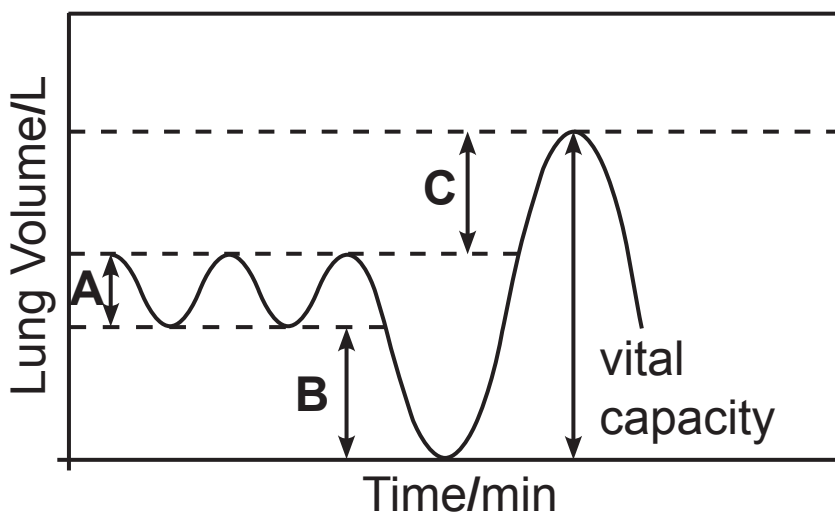
You may use an electronic calculator.

Quality of written communication will be assessed in Question 3.

1 Breathing is a mechanical process involving the lungs and the muscles of the ribs and diaphragm.

(a) Describe and explain the movement of air **out of** the lungs. [5 marks]

A spirometer is used to monitor the functioning of the respiratory system. A typical spirometer trace is shown in the diagram below.



(b) (i) Name the respiratory lung volume measurements labelled **A**, **B** and **C**. [3 marks]

A _____

B _____

C _____

(ii) Describe how a spirometer is used to measure a person's **vital capacity**. [2 marks]

In patients with severe emphysema, vital capacity is below normal values.

(iii) Explain, using your knowledge of emphysema, why vital capacity is reduced in this condition. [3 marks]

- 2 The table below gives information on the nutritional content of a vegetarian burger and a beefburger.

Food	Energy kcal/ 100 g	Total fat/ g/100 g	Saturated fat/ g/100 g	Cholesterol/ mg/100 g	Percentage (%) energy from total fat	Fibre/ g/100 g	Iron/ mg/100 g
Vegetarian Burger	146	4.8	0.5	0	30	6.0	0.5
Beefburger	291	24.7	10.7	76	76	0	1.6

(a) (i) Compare the amounts of **total fat**, **saturated fat** and **cholesterol** in the vegetarian burger with the amount in the beefburger. [3 marks]

(ii) State and explain which burger would be better for long-term health with respect to **energy kcal** and **percentage (%) energy from total fat**. [4 marks]

The vegetarian burger contains 6g/100g fibre; the beefburger does not contain any fibre.

(b) (i) State **one** function of fibre in the diet. [1 mark]

(ii) Give **one** long-term health problem that is linked to a lack of fibre in the diet. [1 mark]

(c) (i) Explain why the beefburger would be better for health with respect to **iron** content. [1 mark]

(ii) Explain why it is important for health to maintain the correct levels of iron in the body. [3 marks]

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- 3 The table below provides information on the units of alcohol contained in a range of alcoholic drinks.

Alcoholic drink	Units of alcohol
Small bottle of alcopop	1
Large bottle of alcopop	3
Single measure of spirit	1
Pint of beer	2
Glass of wine	2

You have been asked to give a presentation to a group of healthcare professionals on the **UK guidelines on alcohol consumption**. The average alcohol intake among these healthcare professionals is 4 glasses of wine, 4 pints of beer and 2 measures of spirit spread over 2 days per week. [8 marks]

During your talk you should:

- State the average number of units of alcohol taken by these healthcare professionals per week;
- Provide advice on whether the average current alcohol intake and frequency by the healthcare professionals is meeting the UK guidelines on alcohol consumption;
- Discuss the **long-term negative effects on health** of regularly exceeding the recommended intake of alcohol.

Quality of written communication will be assessed in this question.

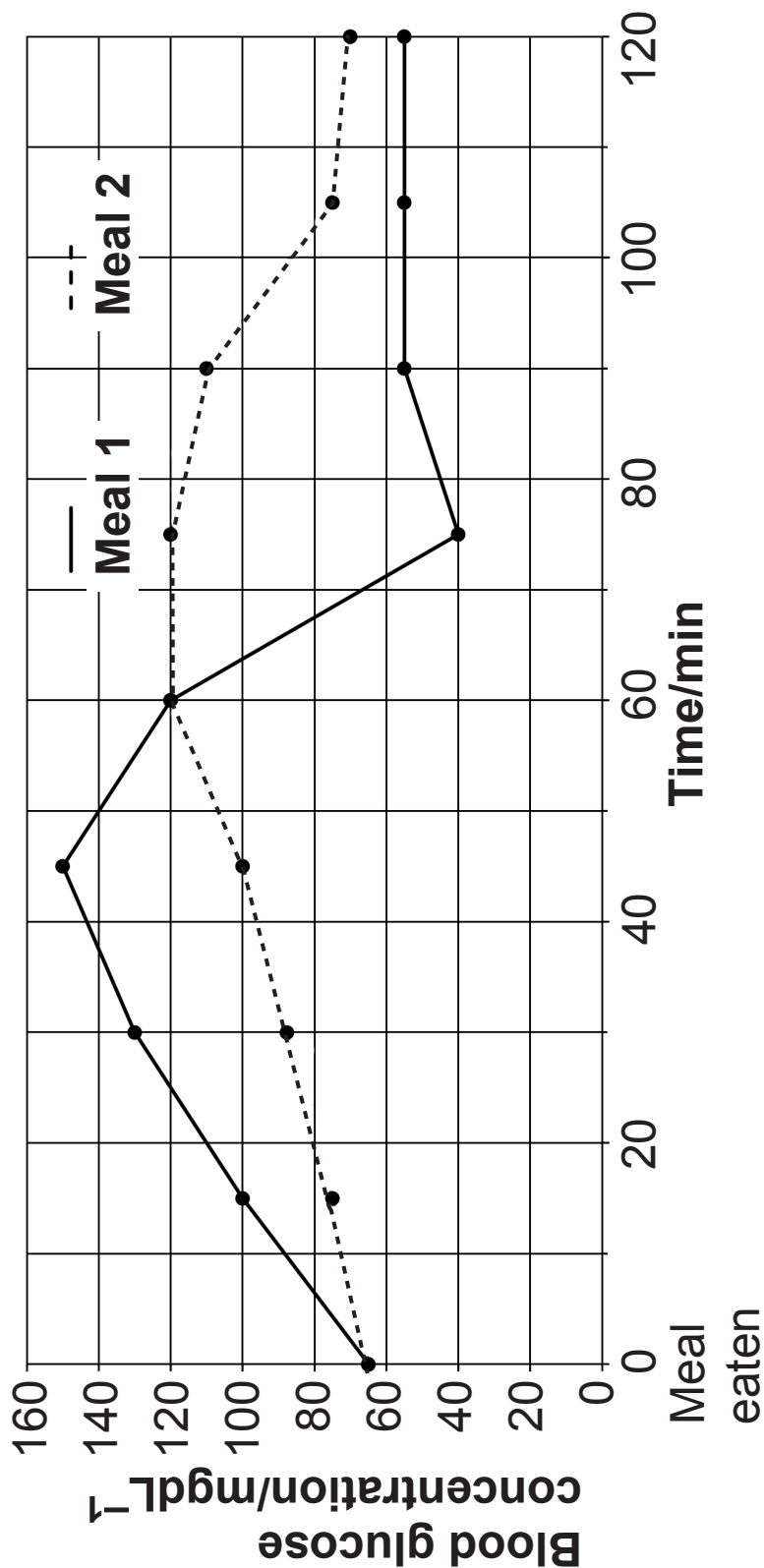
Alcohol intake and advice

Long-term negative effects on health

- 4 A woman took part in a clinical trial to test the effect of two different meals on her blood glucose concentration.

After eating each meal her blood glucose concentration was measured every fifteen minutes for two hours.

The results are shown in the graph below.



- (a) (i) Use the graph to calculate the difference in the blood glucose at 20 minutes after eating meal 1 and meal 2. [2 marks]

You are advised to show your working.

Difference: _____

- (ii) Use an arrow to indicate on the graph a time where the level of **glucagon** would be raised after consuming **meal 1**. [1 mark]
- (iii) Why is glucagon produced at this time? [1 mark]

(b) Meal 2 contains complex carbohydrates.

Using the graph, explain how complex carbohydrates are beneficial in the regulation of blood glucose.

[3 marks]

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- 5 A student carried out an investigation to compare the effect of running and of public speaking on his pulse rate.

His pulse rate was **80 beats per minute before beginning** each of the two activities. He carried out each activity and then measured his pulse rate for seven minutes **after each activity had finished**.

Time after activity /min	Pulse rate /beats per minute	
	Running	Public speaking
1	121	105
3	110	97
5	97	85
7	85	80

- (a) (i) Plot these results on the graph paper opposite, with time on the x axis. Label both axes. [6 marks]
- (ii) Explain why the student measured his pulse rate before beginning each activity. [1 mark]
-

6 The UK government guidelines state that children aged 5–15 years should carry out moderate to vigorous physical activity for a minimum of 60 minutes each day.

(a) State one short-term and one long-term positive effect of regular physical exercise on general health.

[1 mark for each]

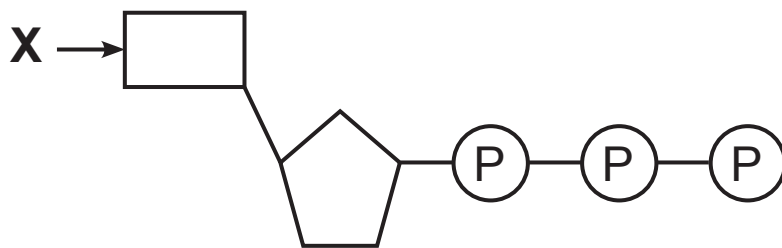
Short-term _____

Long-term _____

The table below provides information from a survey on the percentage of children aged 5–15 years, separated by gender, who met the daily physical activity guidelines from 2008–2015.

	Percentage of children who met UK government daily physical activity guidelines	
Year	Boys	Girls
2008	28	19
2012	21	16
2015	23	20

- 7 The structure of an ATP molecule is represented in the diagram below.



- (a) (i) Identify the part of the molecule labelled **X** in the diagram. [1 mark]

X _____

- (ii) Explain what happens when an ATP molecule is hydrolysed to ADP. [2 marks]

- (iii) Give **two** advantages of using ATP as an immediate energy source within the cell, rather than glucose. [2 marks]

The Krebs cycle takes place in the mitochondrial matrix. It releases hydrogen ions. These hydrogen ions are used in the synthesis of ATP molecules in the electron transport chain in the inner membrane of the mitochondria.

(b) (i) Describe how ATP is synthesised in the electron transport chain. [3 marks]

During sprinting, the percentage of energy derived from aerobic and anaerobic respiration by runners was measured.

The table below shows the results.

Time /s	Energy obtained/%	
	Aerobic respiration	Anaerobic respiration
10	5	95
30	30	70
90	50	50

The current men's world record in the 100 m sprint is 9.58 seconds, set by Jamaica's Usain Bolt in 2009. Usain Bolt did not need to breathe in during his 100 m sprint.

(ii) Use this information and the data in the table to explain why. [2 marks]

This is the end of the question paper

Sources

Q2..... Adapted from Micronutrient Profile Factsheet. © Quorn

Q6(a).... Source: modified from Health Survey for England 2015, National Archives
(<http://webarchive.nationalarchives.gov.uk/20180307193646/http://digital.nhs.uk/catalogue/PUB22610>)

SOURCES

Q2 Source: © http://www.mycoprotein.org/what_is_mycoprotein/fat.html

Q4 Source: *Principal Examiner*

Q6 Source: *modified from Health Survey for England 2015, National Archives*

(<http://webarchive.nationalarchives.gov.uk/20180307193646/http://digital.nhs.uk/catalogue/PUB22610>)

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
Total Marks	

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