Centre Number

Candidate Number

Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2017

Life and Health Sciences

Assessment Unit AS 2
assessing
Human Body Systems

SZ021

[SZ021]
MONDAY 15 MAY, AFTERNOON

TIME

1 hour 30 minutes.

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.

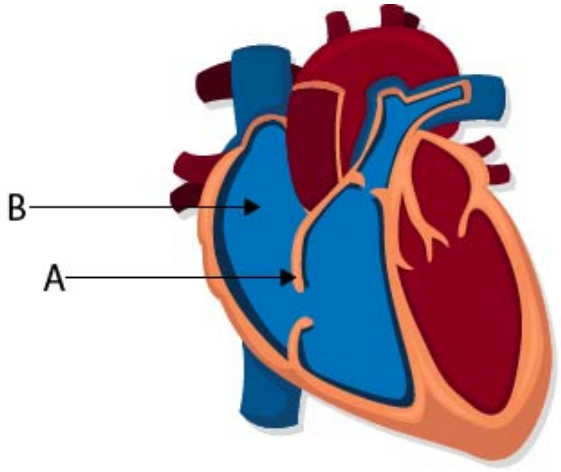
INFORMATION FOR CANDIDATES

The total mark for this paper is 75.
Figures in brackets printed down the right-hand side of pages 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 **4**.

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

Examiner Only	
Marks	Remark

1 **(a)** The diagram below shows a cross section of a heart and blood vessels.



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(i) Identify the structures A and B from the above diagram.

A _____ [1]

B _____ [1]

(ii) Which chamber of the heart has the thickest wall?

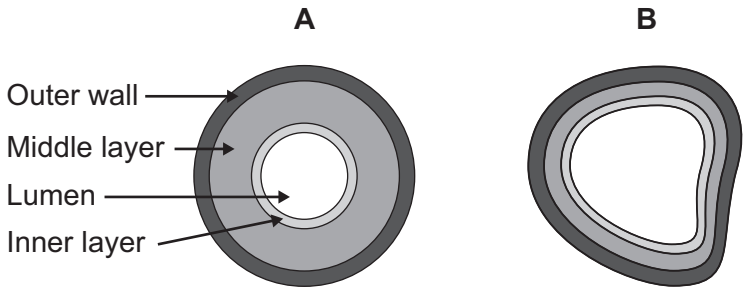
_____ [1]

(iii) Name the blood vessel in which deoxygenated blood returns to the heart from the body.

_____ [1]

Examiner Only	
Marks	Remark

(b) The diagrams below show cross sections of two types of blood vessels; an artery and a vein.



Source: CCEA

State **two** visible features in Diagram A which indicate that it is an artery.

1. _____

_____

2. _____

_____ [2]

(c) Adam carried out an experiment to compare the effect of exercise on the blood pressures of his male and female classmates.

His classmates went for a run and they each measured their blood pressure when they had finished.

Evaluate this experiment by suggesting **three** ways in which this experiment could be improved.

1. _____

_____

_____

2. _____

_____

_____

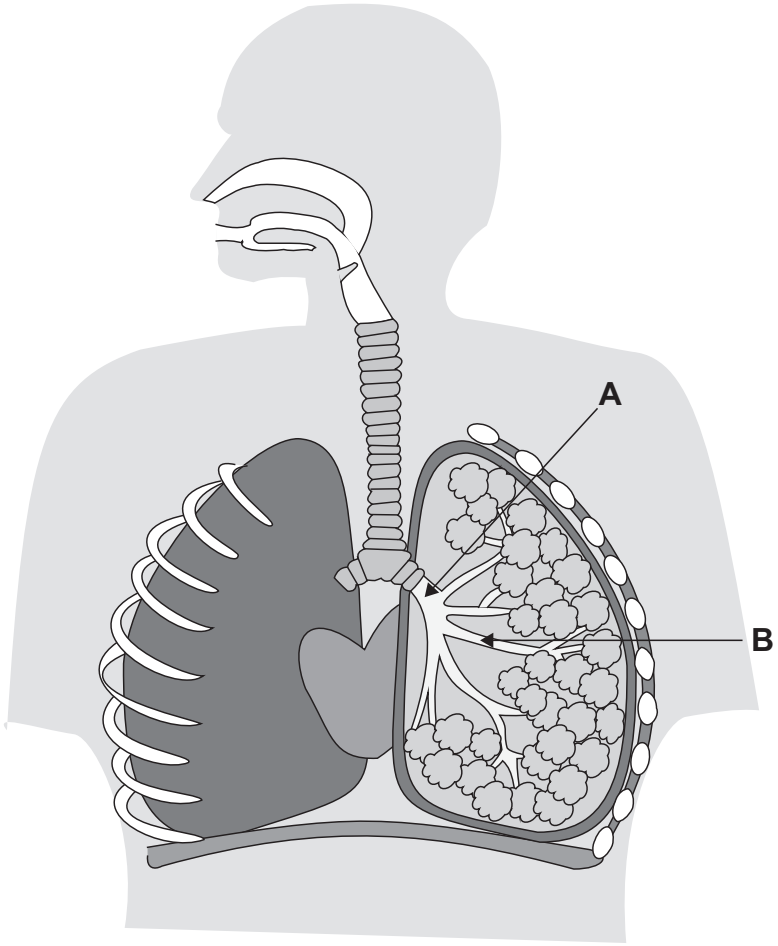
3. _____

_____

_____ [3]

Examiner Only	
Marks	Remark

2 A diagram of the human respiratory system is shown below.



Source: CCEA

(a) (i) Name the parts labelled **A** and **B**.

A _____ [1]

B _____ [1]

Carbon dioxide and oxygen are exchanged in the lungs by the process of diffusion.

(ii) State where oxygen diffuses to after it leaves the alveoli.

_____ [1]

(iii) State and explain **three** ways the alveoli are adapted for gas exchange.

1. _____

_____

_____

2. _____

_____

_____

3. _____

_____

_____ [6]

Examiner Only	
Marks	Remark

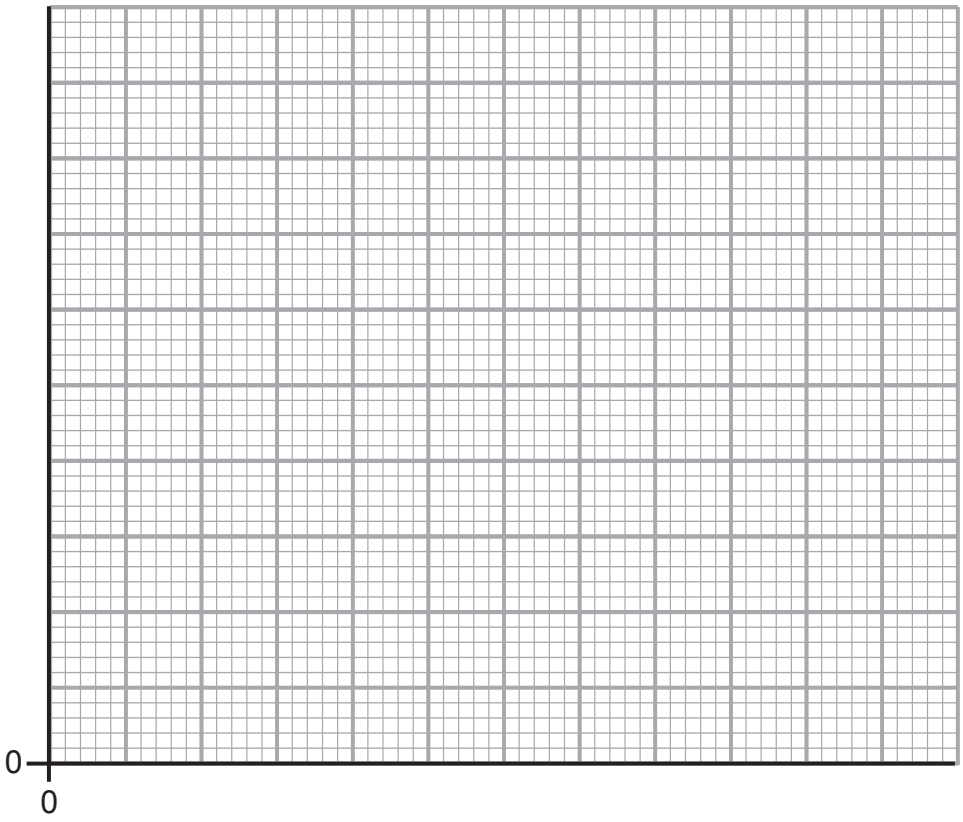
Examiner Only	
Marks	Remark

(b) A patient with cystic fibrosis took part in a clinical trial to test if a drug was effective at improving his lung function.
The percentage oxygen saturation of the patient's blood at different partial pressures of oxygen was measured.
This was carried out both **before** treatment and **after** four weeks of drug treatment.
The results are shown in the table below.

Partial pressure of oxygen in inhaled air/mmHg	Percentage saturation of blood with oxygen	
	Before treatment	After four weeks treatment
0	0	0
20	10	15
60	60	70
80	65	75
100	65	80
120	65	85

Source: Principal examiner

(i) Plot these results on the graph paper, with partial pressure of oxygen in inhaled air on the x axis. Label both axes. [6]



(ii) Use your graph to determine the difference in the percentage saturation for the patient with cystic fibrosis at a partial pressure of 40 mm Hg **before** and **after** treatment.
Show your working.

_____ % [2]

(iii) This drug may help counteract the effects of cystic fibrosis.
Suggest **one** way this drug may be acting to improve oxygen uptake by the blood.

_____

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

3 A 20-year-old woman attended her doctor complaining of feeling tired. The woman was overweight and she looked pale.
The doctor asked the woman to use a food diary to record everything she ate for one week.

From her food diary, the doctor calculated the average daily amounts of energy, protein and important vitamins and minerals the woman was eating. He compared these figures with the reference nutrient intakes (RNI).
This data is given in the table below.
The values given in the table below are per day.

	Energy /kcal	**Protein /g**	**Fat /g**	**Vitamin C /mg**	**Vitamin A /µg**	**Iron /mg**
Woman	3000	50	85	20	400	8
RNI	2000	50	70	40	600	15

Source: Principal examiner

(a) Comment on the woman's average daily amounts of fat, vitamin C and iron compared to RNI figures.
Make **three** recommendations of food sources which could improve the woman's diet for fats, vitamin C and iron.

[6]

Examiner Only	
Marks	Remark

The doctor also found that the woman was drinking eight units of alcohol per day on two days every week.

(b) Give **two** pieces of advice the doctor would give to the woman to reduce her health risks from drinking alcohol.

_____

_____

_____ [2]

(c) The doctor requested a blood test for the woman. The results showed that the woman had low haemoglobin levels.

Explain how low levels of haemoglobin in the blood would result in the woman being pale and tired.

Pale _____

_____

Tired _____

_____ [2]

Examiner Only	
Marks	Remark

4 A 20-year-old male carries out low levels of physical exercise.
Give **six** specific adverse effects on his health if his low level of physical exercise continues over several years.

Quality of written communication is assessed in this question.

[6]

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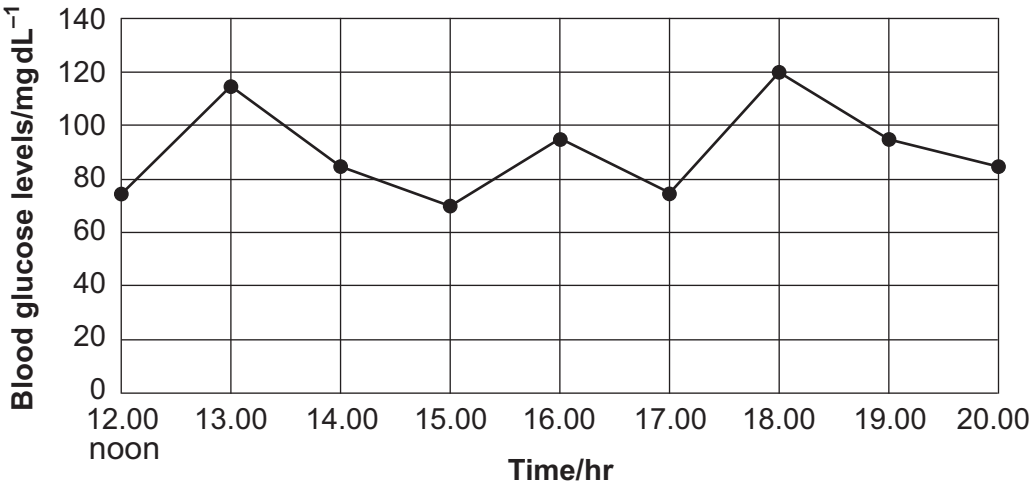
(Questions continue overleaf)

Examiner Only	
Marks	Remark

5 Blood glucose levels were measured in a healthy person over eight hours starting at 12.00 noon. The results are shown in the graph below.



(a) (i) Describe the trend shown in the graph between 12.00 noon and 15.00 hours.

_____

_____

_____

_____ [1]

(ii) On the appropriate graph axis indicate, using arrows, **two** times where the levels of **insulin** would be the highest. [2]

(iii) Why is insulin released at these times?

_____

_____ [1]

(iv) State **two** ways that insulin carries out its function.

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

(b) (i) Draw a dashed line on the graph opposite to show how the blood glucose levels of a person with **untreated diabetes** would differ from those of a healthy person between 12.00 noon–13.00 hours. [2]

(ii) Explain why the blood glucose levels of a person with untreated diabetes would differ from those of a healthy person.

_____

_____ [1]

(iii) State **two** reasons why people with diabetes should include complex carbohydrates rather than simple carbohydrates in their diet.

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

6 A scientist wanted to find out whether taking a cholesterol-lowering **drink or** a cholesterol-lowering **drug** was more effective in reducing fasting blood cholesterol to healthy levels (5.0 mmol L^{-1} or less).

The scientist divided thirty healthy men aged 55, all with slightly elevated fasting cholesterol levels, into three groups.
All the men ate the same normal diet during the investigation.

Group 1: Ten men took one cholesterol-lowering **drug** each day.

Group 2: Ten men took one cholesterol-lowering **drink** each day.

Group 3: Ten men continued to eat a normal diet.

The investigation was carried out for twelve weeks.
Fasting blood cholesterol levels were measured in all thirty men before the beginning of the investigation (week 0) and during weeks 4, 8 and 12.
The results are shown in the table below.

Mean fasting blood cholesterol levels/mmol L^{-1}				
	Week 0	**Week 4**	**Week 8**	**Week 12**
Group 1	6.7	4.8	4.3	4.0
Group 2	6.7	5.5	5.1	5.0
Group 3	6.6	6.6	6.6	6.6

Source: Principal examiner

(a) (i) State the **main** function of cholesterol in the human body.

_____

_____ [1]

(ii) State the **main** effect of persistently high cholesterol levels on a person's health.

_____

_____ [1]

(b) (i) Explain **two** ways that the scientist helped to ensure that the results were valid.

1. _____

2. _____ [2]

(ii) Give **two** factors, **not** already mentioned in the investigation, that could have affected the fasting blood cholesterol levels of the men.

1. _____

2. _____ [2]

(iii) Explain the purpose of **Group 3** in this investigation.

_____

_____

_____ [1]

(c) Using the information given and appropriate data from the table, **analyse** how effective each cholesterol-lowering method was in reducing fasting blood cholesterol.

_____

_____

_____

_____

_____

_____

_____

_____

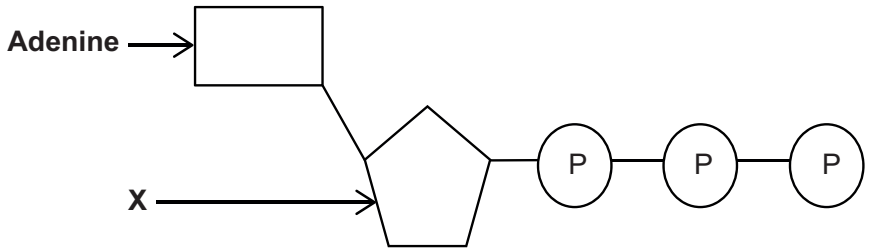
_____

_____

_____ [4]

Examiner Only	
Marks	Remark

7 The diagram below represents the structure of a molecule of ATP.



(a) (i) Identify the component labelled **X**.

X _____ [1]

(ii) Explain how ATP is produced in the electron transport chain.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [6]

Examiner Only	
Marks	Remark

(b) Both aerobic and anaerobic respiration produce ATP.

Give **three** differences between aerobic and anaerobic respiration in muscle cells.

1. _____

_____

2. _____

_____

3. _____

_____ [3]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER