Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2019

Centre Number

Candidate Number

Life and Health Sciences

Assessment Unit AS 2
assessing
Human Body Systems

SZ021

[SZ021]
WEDNESDAY 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 **5(d)**.

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

Examiner Only	
Marks	Remark

1 A student went to the supermarket to buy a pre-prepared bacon and tomato pasta dish for lunch. She found two options – the 'standard' and the 'healthy' dish.

The table below shows some of the nutritional information on the packaging.

	Standard pasta dish	Healthy pasta dish
Energy /kcal	542	357
Sugar /g	3	5
Fat /g	30	8
Saturated Fat /g	6	3
Salt /g	3	2

The guideline **daily energy intake** for an adult in the UK is 2000 kcal.

(a) (i) Calculate the percentage (%) of the guideline daily energy intake that the **standard** pasta dish contains.

You are advised to show your working.

_____ % daily energy intake [2]

(ii) State **two** reasons why the standard pasta dish might **not** be considered good for health when compared to the healthy pasta dish. Use data from the table to support your answer.

_____

_____

_____

_____ [2]

(iii) Suggest why the healthy pasta dish might **not** be considered good for health.

_____

_____ [1]

(iv) Using your answer to **(iii)**, give **one** possible long-term effect on the body as a consequence of eating foods like this.

_____

_____ [1]

Examiner Only

Marks	Remark

The table below provides nutritional information for a milk chocolate bar and a banana.

Food	Nutritional information per 100 g of the food				
	Energy /kcal	Sugar /g	Fibre /g	Vitamin B /mg	Vitamin C /mg
Banana	81	18	2.6	0.5	9
Chocolate bar	468	25	4.2	0	0

(b) (i) Using the data provided in the table, explain why the banana would be a more healthy source of nutrition.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [3]

(ii) Give **one** function of vitamin B in the body.

_____ [1]

(iii) Give **one** function of vitamin C in the body.

_____ [1]

Examiner Only	
Marks	Remark

2 **(a)** **(i)** Define the term homeostasis.

_____

_____ [1]

Sodium chloride contains sodium ions and chloride ions which are essential in the human body.

(ii) State **three** functions of these ions.

_____

_____

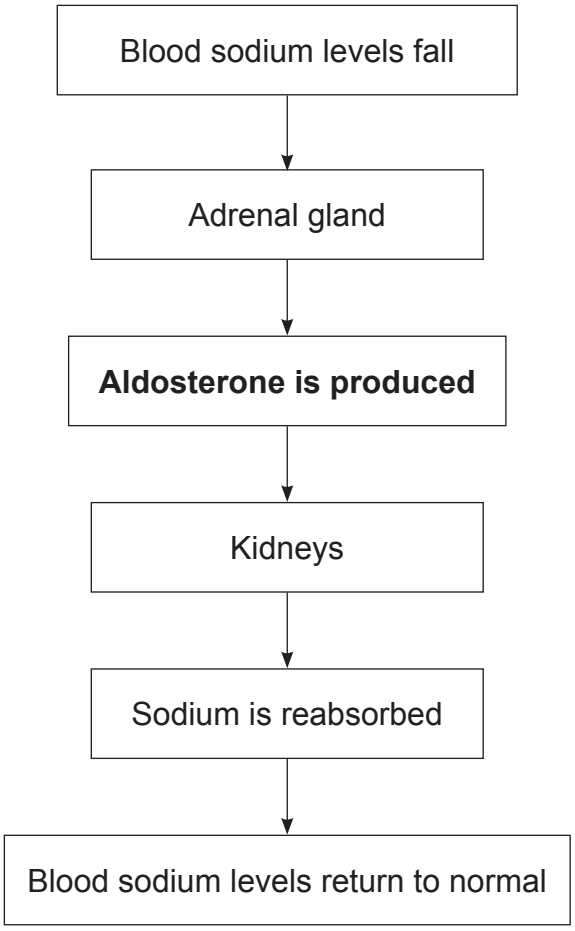
_____

_____

_____

_____ [3]

The flow diagram below shows how blood sodium levels are regulated.



Aldosterone is produced by the adrenal gland, carried in the blood to the kidneys and causes the kidneys to reabsorb sodium.

Examiner Only	
Marks	Remark

(b) (i) What type of chemical is aldosterone?

_____ [1]

(ii) State and explain what happens to the levels of aldosterone when blood sodium levels return to normal.

_____

_____

_____

_____ [2]

It is recommended that an adult drinks 2 litres of water every day and eats no more than 6 g of added salt (sodium chloride) each day. Hyponatraemia is a medical term for low blood sodium levels.

(iii) State **two** ways in which an adult might develop hyponatraemia.

_____

_____

_____

_____ [2]

The level of salt in the diet of people is often too high.

(c) Give **three** negative consequences on health of having too much salt in the diet.

_____

_____

_____

_____

_____

_____ [3]

Examiner Only	
Marks	Remark

3 The UK government recommends that children and adults get 10 µg of vitamin D each day.

Vitamin D is found in a number of foods, either naturally or added to the food by the manufacturer (fortified). The table below shows the vitamin D content of some foods.

Vitamin D food source	Vitamin D µg/serving
Egg	0.5
Salmon	5.0
Liver	1.0
Mushrooms	5.0
Milk (fortified)	2.5
Breakfast cereal (fortified)	1.5

(a) (i) A person ate a breakfast on Day 1 containing 4 µg of vitamin D. Complete the table for Day 1 to show how the person could obtain an additional 6 µg of vitamin D using only food sources from the table above. [1]

(ii) Complete the table for Day 2 using food sources from the above table **other** than those used on Day 1.
You must ensure breakfast contains 4 µg of vitamin D and dinner contains 6 µg of vitamin D. [2]

	Breakfast	**Dinner**
Day 1	containing 4 µg vitamin D	
Day 2		

The body creates vitamin D from direct sunlight on the skin when a person is outdoors. In the UK people make most of their vitamin D in the summer months.

Many children in the UK do not obtain the recommended intake of vitamin D.

(b) Suggest **two** reasons why children in the UK might not obtain the recommended intake of vitamin D.

1. _____

2. _____ [2]

It is essential that pregnant women get 10 µg of vitamin D each day.

(c) **(i)** Suggest why pregnant women in particular need vitamin D.

_____

_____ [1]

(ii) What advice would you give to a woman who is pregnant over the autumn and winter months in the UK in order to ensure she obtains 10 µg of vitamin D each day?

_____

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

4 **(a)** **(i)** State the typical range of the human pulse rate.

From _____ beats per minute to _____ beats per minute [1]

(ii) What feature of the left ventricle of the human heart causes high blood pressure to be produced here?

_____ [1]

The left ventricle contains a maximum volume of blood before it contracts and pumps blood into the blood vessels. The time between contractions is one beat of the heart.

The table below shows the volume of blood in a woman's left ventricle at different times during **one second**.

Time / seconds	Volume of blood in left ventricle /cm^3
0.0	110
0.1	118
0.2	93
0.3	63
0.4	50
0.5	55
0.6	80
0.7	88
0.8	100
0.9	110
1.0	118

(b) **(i)** Use the information in the table to calculate the woman's pulse rate in **beats per minute**.

You are advised to show your working.

_____ beats per minute [2]

When the left ventricle pumps blood into the blood vessels, some blood remains in the ventricle.

The stroke volume is the volume of blood **pumped out** of the left ventricle during one cardiac cycle.

(ii) Use the table opposite to determine the woman's stroke volume.

You are advised to show your working.

Stroke volume _____ cm^3 [1]

Some people with high blood pressure are given a drug to widen blood vessels.

(c) (i) Suggest which part of the vessel structure is affected by this drug.

_____ [1]

(ii) Explain how this change in vessel structure produces a lowering of blood pressure.

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

5 **(a)** State what the UK guidelines advise on how adults should **spread** their alcohol consumption throughout a week.

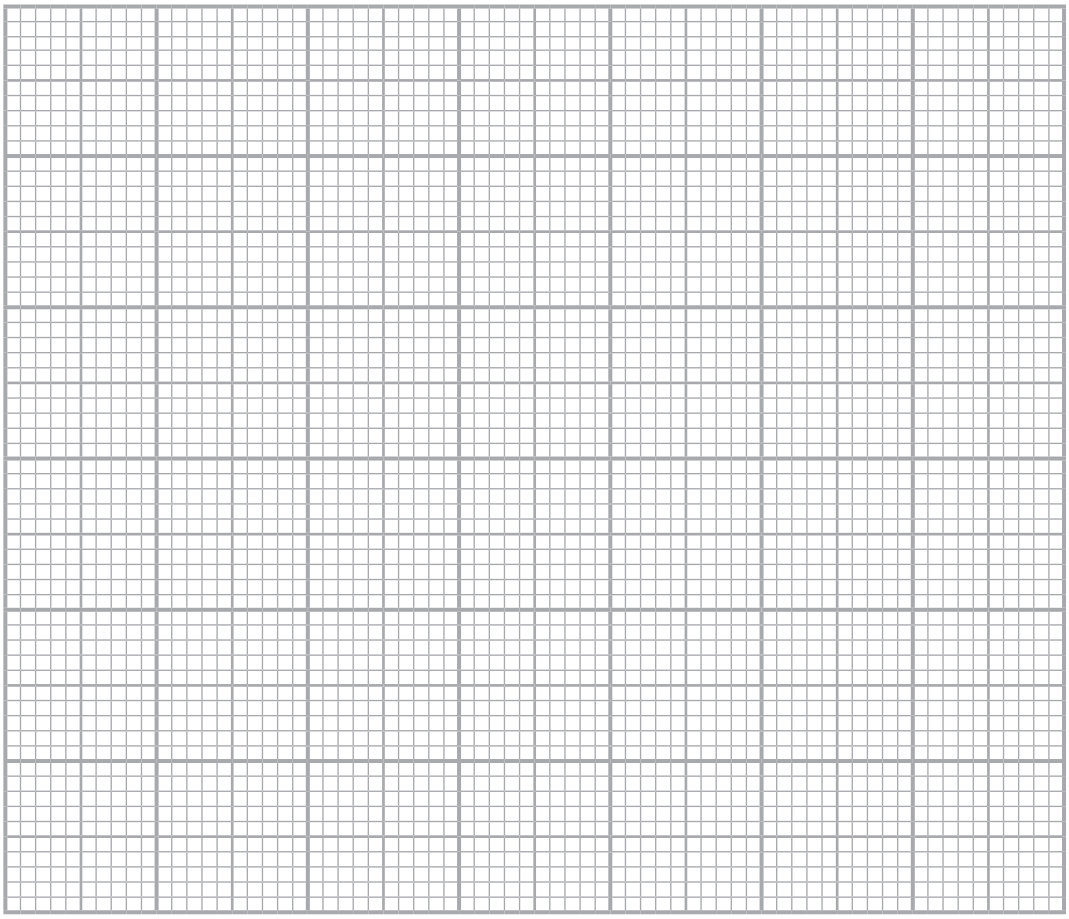
_____

_____ [1]

The table below shows information on the percentage of adults who drank up to 14 units, or more than 14 units of alcohol per week according to age group.

Age group	Percentage of age group /%	
	Up to 14 units /week	More than 14 units /week
Young adults	26	17
Adults	28	11
Middle-aged	24	8
Elderly	9	2

(b) Construct a bar graph for both sets of results on the grid below, with percentage (%) of age group on the y axis. Label both axes.



[6]

(c) What percentage of young adults do **not** drink alcohol?

You are advised to show your working.

_____ % [2]

The UK guidelines on alcohol consumption advise an intake of 14 units or less of alcohol per week.

(d) Using the information given, and appropriate data from the table, analyse the alcohol consumption of the four age groups in terms of the UK guidelines on alcohol consumption.

Quality of written communication is assessed in this question.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [6]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

6 A peak flow meter measures respiratory system function. Peak expiratory flow rate is a measurement of how quickly a person can blow air out of their lungs.

(a) Describe how peak expiratory flow rate is measured using a peak flow meter.

[4]

Peak expiratory flow rate is often used to help diagnose and monitor asthma.

A doctor wanted to compare the effects of two asthma drugs (drug **A** and drug **B**) on peak expiratory flow rate in women.

Twenty women aged 35 **with asthma** were divided by the doctor into two groups.

Group 1: Ten women took drug **A** each day.
Group 2: Ten women took drug **B** each day.

The investigation was carried out for twelve weeks.

Peak expiratory flow rates were measured in all twenty women before the beginning of the investigation (week 0) and in weeks 4, 8 and 12.

The results are shown in the table below.

Mean Peak expiratory flow rates /L min^{-1}				
	Week 0	**Week 4**	**Week 8**	**Week 12**
Group 1	340	425	450	465
Group 2	342	400	425	450

The normal value for mean peak expiratory flow rate for women aged 35 is 450 L min^{-1}.

Examiner Only	
Marks	Remark

(b) (i) Calculate the percentage (%) **reduction from the normal value** for mean peak expiratory flow rate for Group 1 at week 0. Give your answer correct to one decimal place.

You are advised to show your working.

_____ % reduction [2]

Asthma is a potentially life-threatening condition.

(ii) Suggest why the women in both Group 1 and Group 2 were all treated with an asthma drug.

_____

_____ [1]

(c) Using the information given, and appropriate data from the table, **analyse** how effective **each** drug was in increasing mean peak expiratory flow rate.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [4]

Examiner Only	
Marks	Remark

7 Human skeletal muscles can respire both aerobically and anaerobically.

(a) (i) Name **two** stages that are present in aerobic respiration but not present in anaerobic respiration.

1. _____

2. _____ [2]

(ii) State **one** reason why anaerobic respiration is advantageous to human skeletal muscles.

_____

_____ [1]

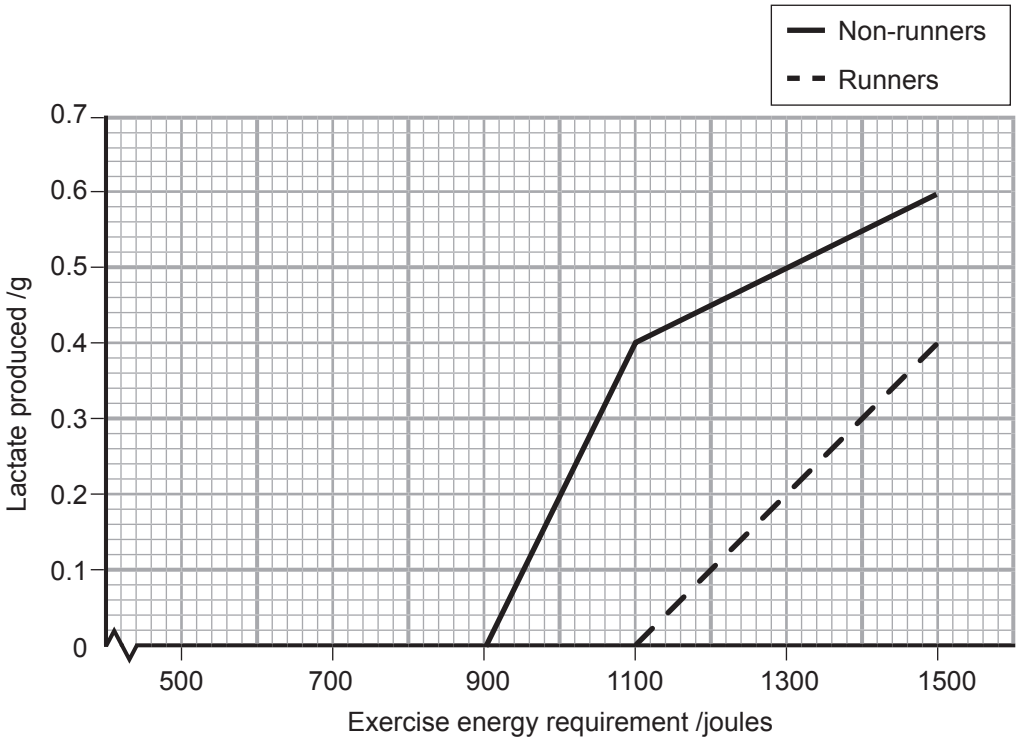
BLANK PAGE

(Questions continue overleaf)

Examiner Only	
Marks	Remark

A sports scientist carried out an investigation to find the effect of exercise on lactate production in men who ran regularly and men who did not.

The graph shows the results of the investigation.



Source: Principal Examiner

(b) (i) Under which conditions is lactate produced in the body?

_____ [1]

(ii) Use the graph to find the **difference** in lactate production between the runners and non-runners when exercising at a level requiring 1200 joules of energy.

You are advised to show your working.

Lactate produced = _____ g [2]

Examiner Only	
Marks	Remark

(iii) Explain why men who ran regularly could exercise at a level requiring higher energy than non-runners.

_____

_____

_____ [2]

(iv) Describe how regular vigorous exercise benefits the respiratory system.

_____

_____

_____ [2]

THIS IS THE END OF THE QUESTION PAPER