



Rewarding Learning
ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2018

Centre Number

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Candidate Number

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Life and Health Sciences

Assessment Unit AS 2
assessing
 Human Body Systems



SZ021

[SZ021]

TUESDAY 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(a)**.

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

Total Marks	
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- 1 A 22-year-old man attended his doctor with symptoms of tiredness with muscle and joint pain. He told the doctor that his gums were swollen and sore, and he had begun to bruise easily. The doctor noticed spots that looked like tiny red-blue bruises on the man's skin.

The doctor requested blood tests for vitamin C and iron. The results showed the man had low levels of both.

- (a) (i) State **one** symptom which led the doctor to request the test for vitamin C.

_____ [1]

- (ii) State **one** symptom which led the doctor to request the test for iron.

_____ [1]

- (iii) Suggest how the man could change his diet to increase his vitamin C levels.

_____ [1]

- (iv) Suggest how the man could change his diet to increase his iron levels.

_____ [1]

Another patient told the doctor that she was concerned about her alcohol intake and asked the doctor about the effects of alcohol on her health.

- (b) State and explain **three** harmful effects of alcohol on the woman's long-term health.

1. _____

2. _____

3. _____

_____ [6]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

- 2 The results from a dietary survey of young people aged 11–18 in the United Kingdom are shown in the table below.

Dietary Component	Daily Intake for young people aged 11–18	Recommended Daily Intake
Fruit and vegetables (portions eaten per day)	2.8	5
Total Fat (% food energy)	33.6	less than 35
Saturated Fat (% food energy)	12.6	less than 11
Sugar (% food energy)	15.0	less than 5
Sugar (gday ⁻¹)	212.0	less than 30
Total Energy (kcal)	1108	2000

© Crown Copyright. National Diet and Nutrition Survey, 2008/9–10/11, Department of Health.
<https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

- (a) Calculate the percentage that 1108 kcal represents of the **recommended daily total energy intake** for young people aged 11–18.

You are advised to show your working.

_____ % [1]

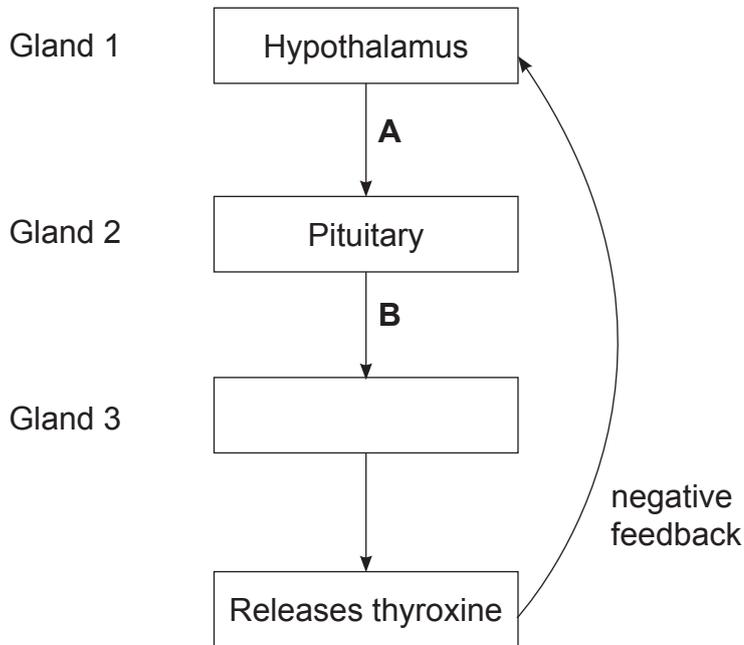
Examiner Only

Marks Remark

3 (a) (i) State **two** functions of thyroxine in the body.

1. _____ [1]
2. _____ [1]

The flow chart below shows how the body controls levels of thyroxine in the blood.



(ii) State the **full** name of hormones **A** and **B**.

- A** _____ [1]
- B** _____ [1]

(iii) Name Gland 3.

_____ [1]

Examiner Only	
Marks	Remark

High levels of thyroxine are treated with medication.

- (b) Use the flow chart opposite to suggest **one** way that the medication could act to restore high thyroxine levels back to normal.

 [1]

- (c) A woman who takes this medication weighs 57 kg and requires a dose of 5 mg per kilogram of body weight once a day. The medication was in a solution containing 50 mg of active ingredient in every 2.5 ml.

- (i) What is the dose of medication she requires each day?

_____ mg [1]

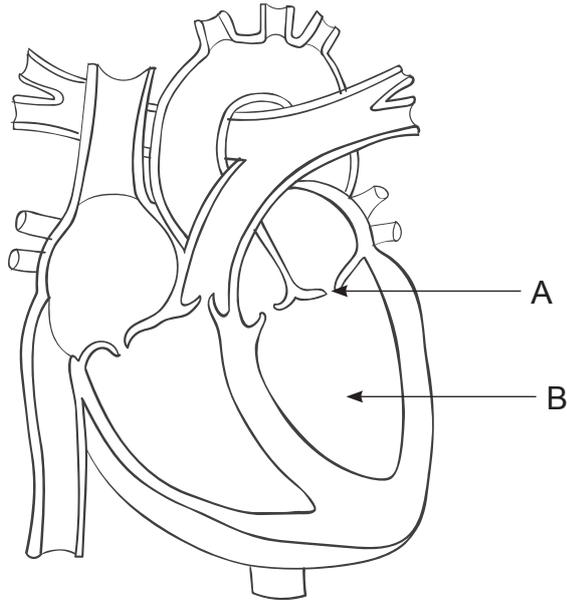
- (ii) Using your answer to (i), calculate the volume of solution the woman would require each day.

You are advised to show your working.

Volume required = _____ ml [2]

Examiner Only	
Marks	Remark

5 The diagram below shows a cross-section through a human heart.



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(a) (i) Identify structures A and B.

A _____ [1]

B _____ [1]

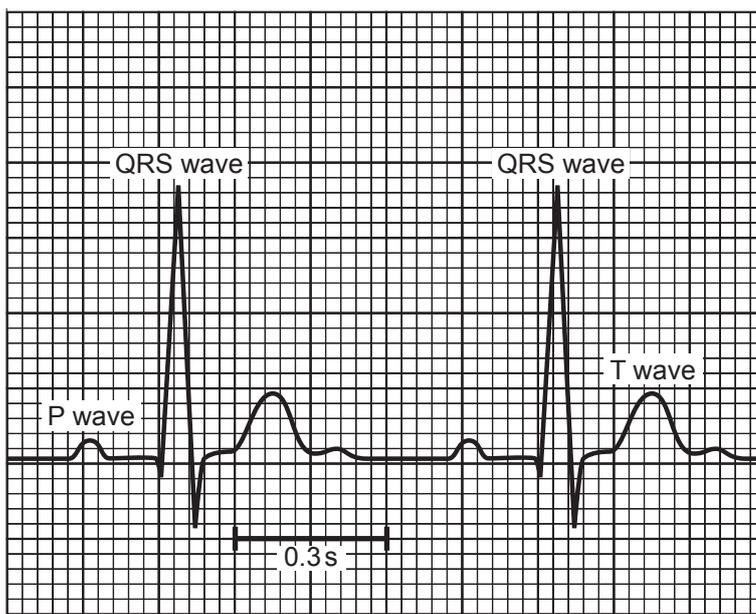
(ii) Draw arrows on the diagram to show the path taken by the blood returning from the body organs before going to the lungs. [2]

(b) Name the blood vessel in which deoxygenated blood travels from the heart to the lungs.

_____ [1]

Examiner Only	
Marks	Remark

The diagram shows an enlarged electrocardiogram (ECG) trace from a heart.



Examiner Only	
Marks	Remark

(c) Describe what is happening to the heart at each part of the trace.

P wave _____ [1]

QRS wave _____ [1]

T wave _____ [1]

(d) Calculate the heart rate of the person whose ECG trace is shown in the diagram.

You are advised to show your working.

_____ beats per minute [2]

- 6 (a) (i) Describe the chemical composition of haemoglobin in relation to its role in oxygen transport in the blood.

[2]

- (ii) Human blood is buffered.
What is the role of a buffer in the blood?

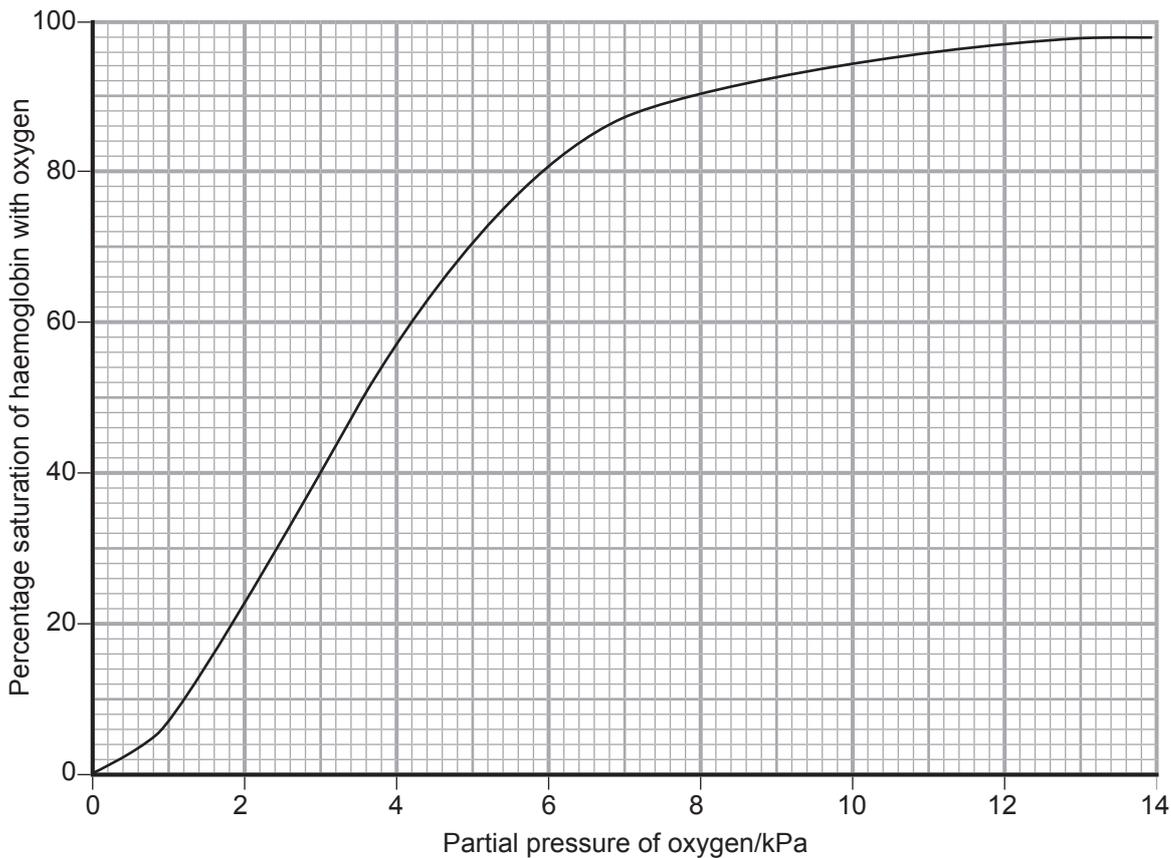
[1]

- (iii) What is the normal pH range of the blood?

_____ to _____ [1]

Examiner Only	
Marks	Remark

The graph below shows how the percentage saturation of haemoglobin with oxygen changes with different partial pressures of oxygen (kPa).



Source: Principal Examiner

- (b) (i) Using the graph, determine the percentage saturation of haemoglobin in the lungs when the partial pressure of oxygen is 13 kPa.

_____ % [1]

- (ii) The partial pressure of oxygen in some body tissues is approximately 5 kPa. Calculate the difference in percentage saturation of haemoglobin between the lungs and the tissues.

You are advised to show your working.

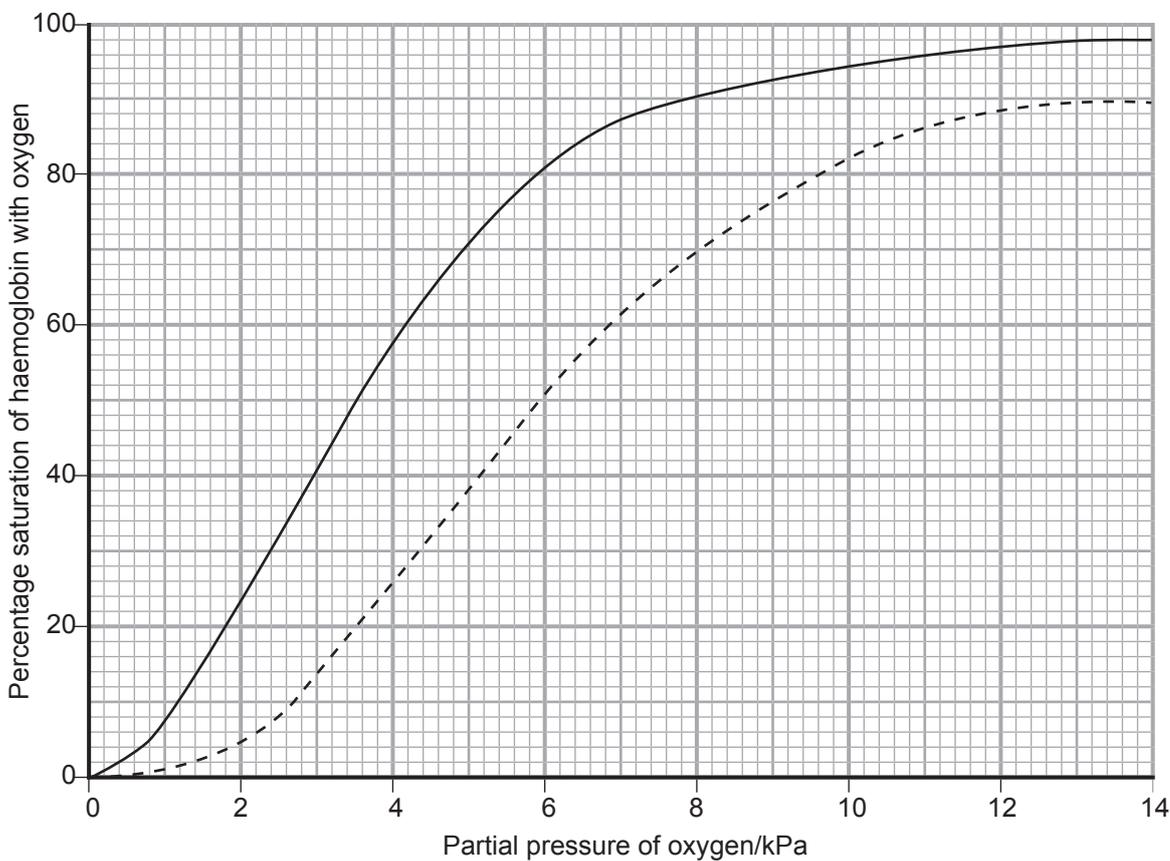
_____ % [1]

Examiner Only	
Marks	Remark

(iii) Describe fully what happens to the oxygen carried by the haemoglobin in the blood when it reaches the tissues.

[3]

The dashed line on the graph below has been added and shows how increased carbon dioxide levels affect the percentage saturation of haemoglobin at different partial pressures of oxygen (kPa). This is known as the **Bohr shift** (or Bohr effect).



Source: Principal Examiner

(c) (i) State under what circumstances the Bohr shift would occur.

[1]

Examiner Only	
Marks	Remark

(ii) Describe the effect of the Bohr shift in the tissues of the body.

[2]

(d) Describe how the body detects an increase in carbon dioxide levels.

[2]

Examiner Only	
Marks	Remark

7 Glycolysis is one of the stages in respiration.

The equation below represents the process of glycolysis.



(a) (i) Name **one** of the other processes that occurs during respiration.

_____ [1]

(ii) Explain how glycolysis produces ATP.

 _____ [4]

(b) (i) Explain why respiration produces more ATP per molecule of glucose when oxygen is present than it does when oxygen is absent.

 _____ [3]

(ii) State **two** similarities between aerobic and anaerobic respiration.

1. _____ [1]

2. _____ [1]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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