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ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2018

Centre Number

Candidate Number

Life and Health Sciences

Assessment Unit AS 2
assessing
Human Body Systems

MV18

[SZ021]
TUESDAY 15 MAY, AFTERNOON

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 **4(a)**.

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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 mark]

_____

(ii) State **one** symptom which led the doctor to request the test for iron. [1 mark]

_____

(iii) Suggest how the man could change his diet to increase his vitamin C levels. [1 mark]

_____

(iv) Suggest how the man could change his diet to increase his iron levels. [1 mark]

_____

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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**. [6 marks]

1. _____

_____

_____

2. _____

_____

_____

3. _____

_____

_____

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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**

(a) Calculate the percentage that 1108 kcal represents of the **recommended daily total energy intake** for young people aged 11–18. [1 mark]

You are advised to show your working.

_____**%**

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(b) Using the data in the table, analyse and evaluate for each dietary component the **daily intake** for young people aged 11–18 compared to the **recommended daily intake**. [5 marks]

(c) **(i)** What are normal cholesterol levels for a healthy adult? [2 marks]

_____ to _____ mmol L^{-1}

(ii) Describe how an adult might reduce cholesterol levels by making changes to diet and lifestyle. [1 mark for each]

Diet: _____

Lifestyle: _____

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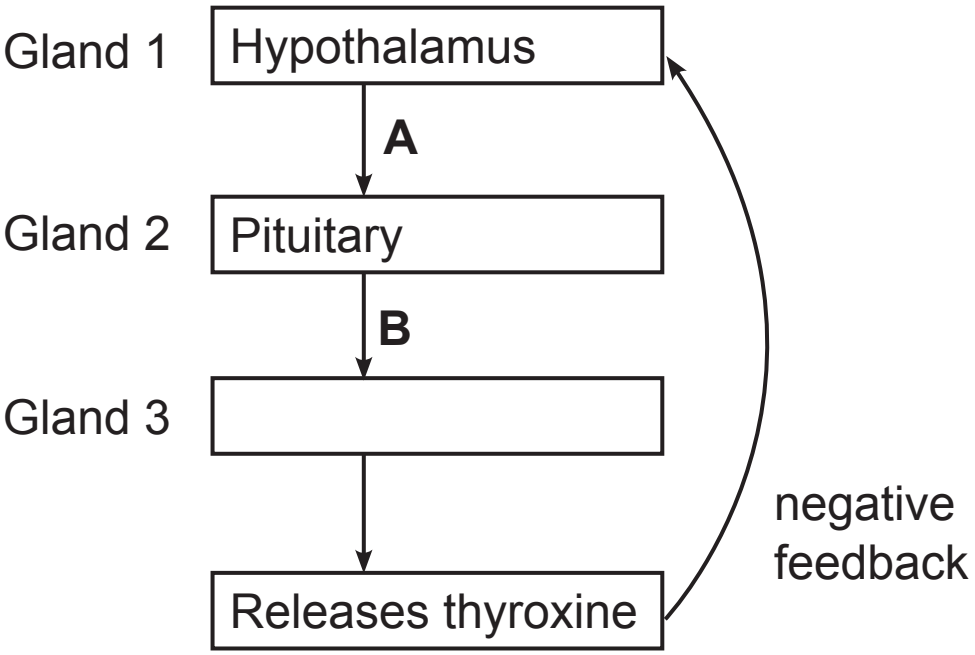
3 (a) (i) State **two** functions of thyroxine in the body.
[1 mark for each]

1. _____

2. _____

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**.
[1 mark for each]

A _____

B _____

(iii) Name Gland 3. [1 mark]

_____

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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 mark]

_____

_____

_____

(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? [1 mark]

_____ mg

(ii) Using your answer to **(i)**, calculate the volume of solution the woman would require each day.
[2 marks]

You are advised to show your working.

Volume required = _____ ml

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4 It is recommended that adults aged 18–64 should do at least 150 minutes of moderate–vigorous intensity aerobic physical activity spread throughout the week.
A 25-year-old woman walks for 20 minutes three times each week.
She also goes swimming for 30 minutes once a week.

(a) Analyse and evaluate the woman's present level of physical activity with respect to these recommendations. Your answer should include a discussion of how the woman could increase her physical activity to the recommended level. [6 marks]

Quality of written communication will be assessed in this question.

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(b) Give **six** benefits of increased physical activity on the woman's **current and future health**. [6 marks]

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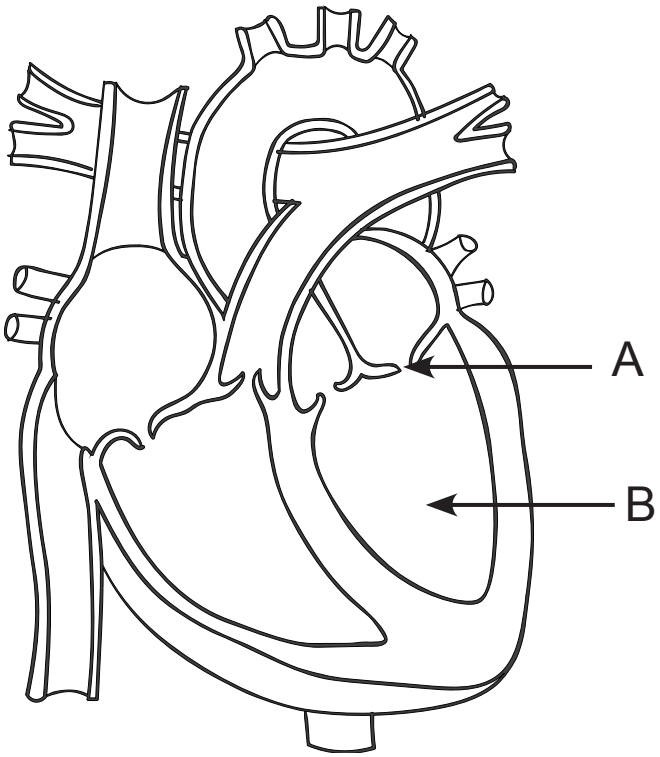
5 The diagram below shows a cross-section through a human heart.



(a) (i) Identify structures A and B. [1 mark for each]

A _____

B _____

(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 marks]

(b) Name the blood vessel in which deoxygenated blood travels from the heart to the lungs. [1 mark]

_____

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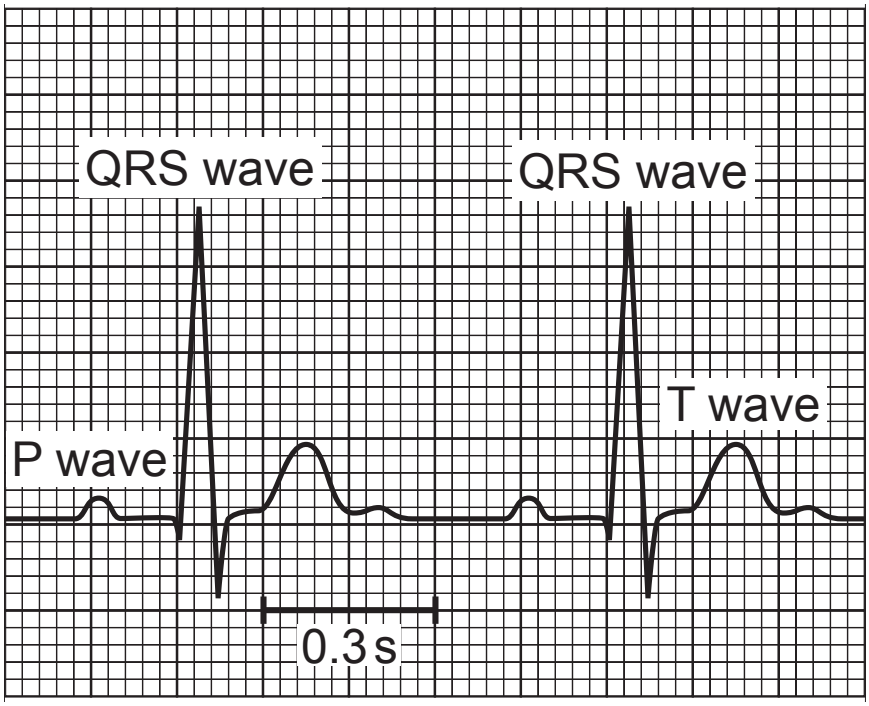
The diagram shows an enlarged electrocardiogram (ECG) trace from a heart.



(c) Describe what is happening to the heart at each part of the trace. [1 mark for each]

P wave _____

_____

QRS wave _____

_____

T wave _____

_____

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(d) Calculate the heart rate of the person whose ECG trace is shown in the diagram. [2 marks]

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_____ beats per minute

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6 **(a)** **(i)** Describe the chemical composition of haemoglobin in relation to its role in oxygen transport in the blood. [2 marks]

_____

_____

_____

_____

(ii) Human blood is buffered.
What is the role of a buffer in the blood? [1 mark]

_____

(iii) What is the normal pH range of the blood? [1 mark]

_____ to _____

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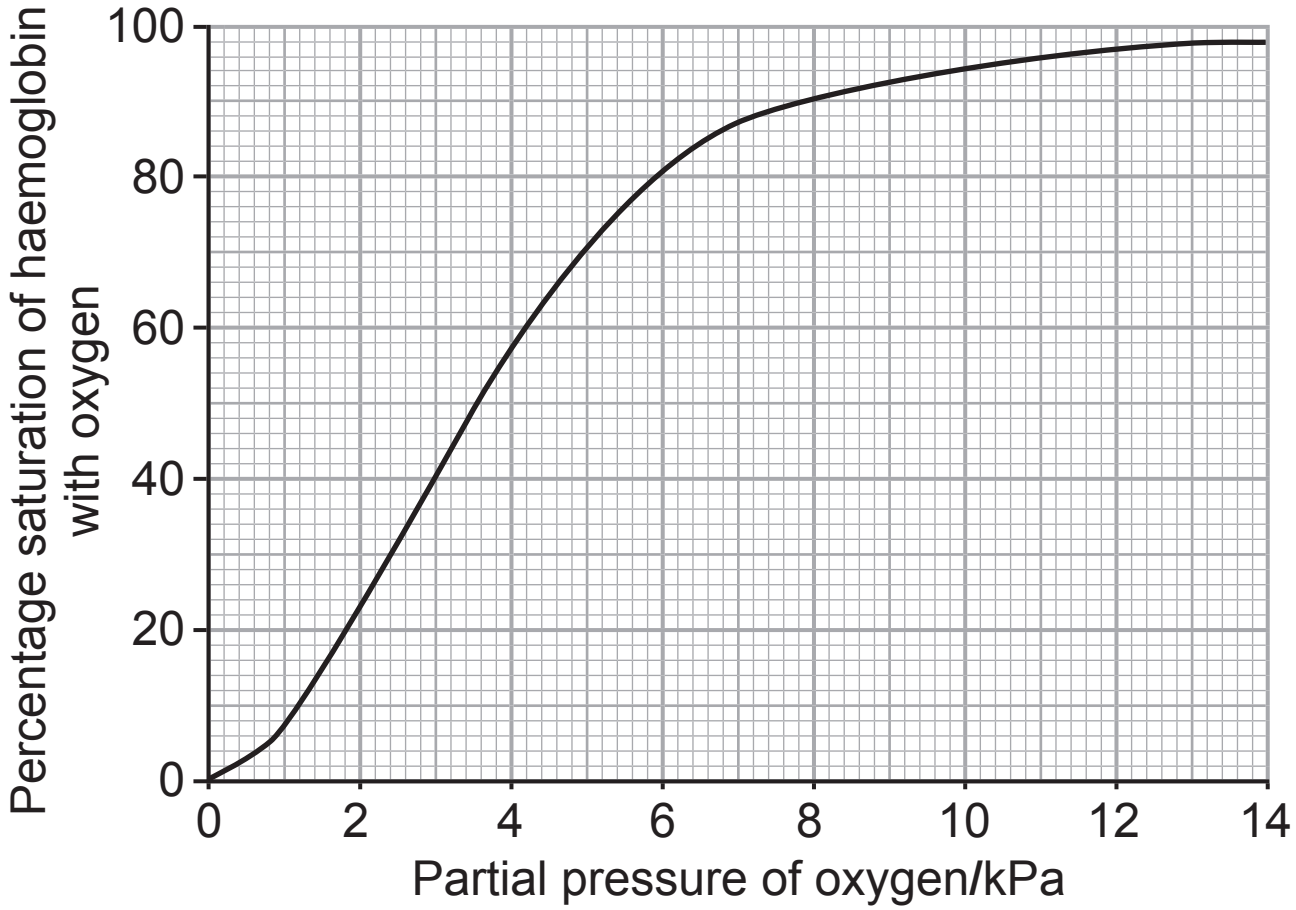
The graph below shows how the percentage saturation of haemoglobin with oxygen changes with different partial pressures of oxygen (kPa).



(b) (i) Using the graph, determine the percentage saturation of haemoglobin in the lungs when the partial pressure of oxygen is 13 kPa. [1 mark]

_____ %

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(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.
[1 mark]

You are advised to show your working.

_____ **%**

(iii) Describe fully what happens to the oxygen carried by the haemoglobin in the blood when it reaches the tissues. [3 marks]

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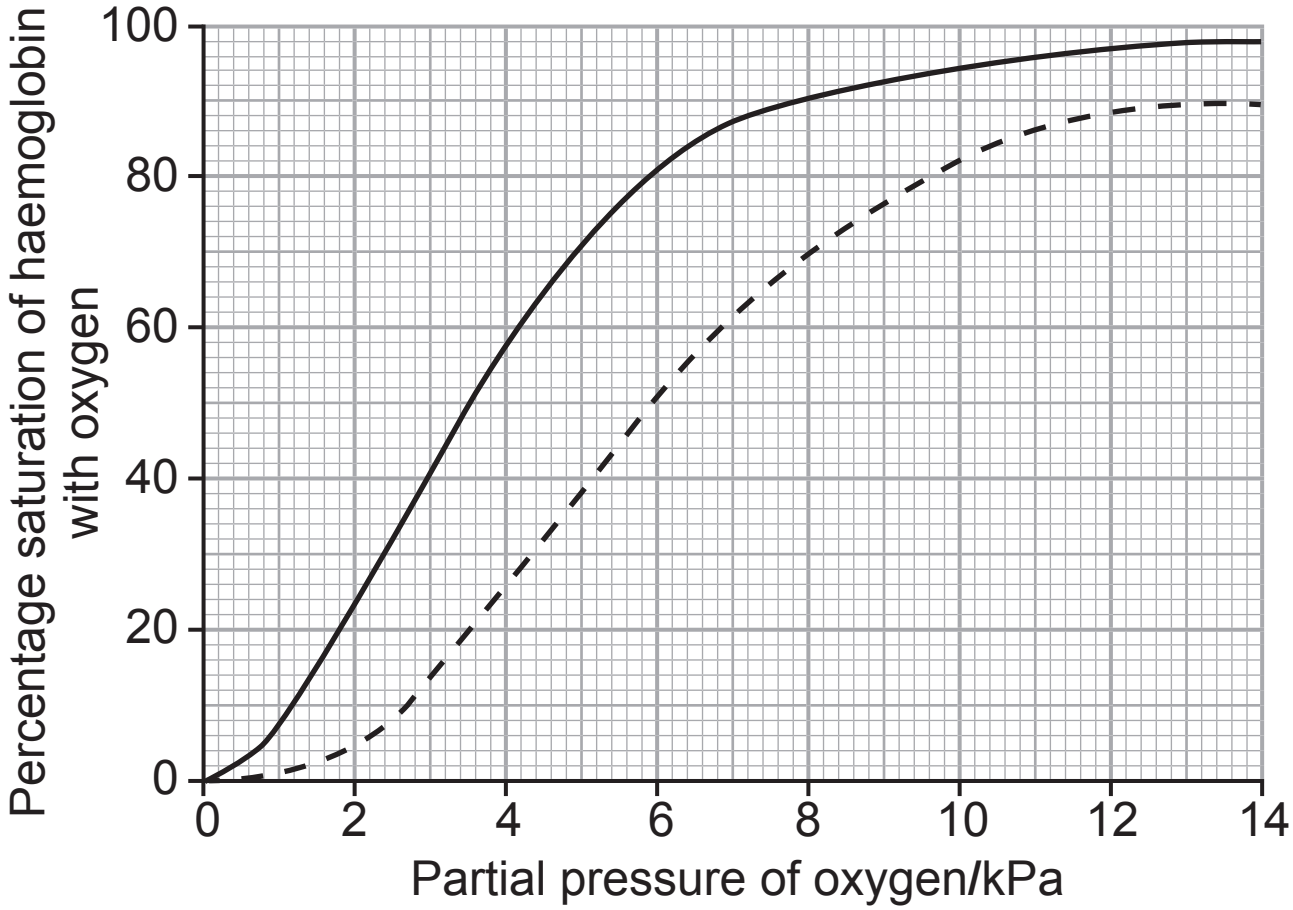
The dashed line on the graph below has been added and shows how increased carbon dioxide levels affect the percentage saturation of haemoglobin at different partial pressures of oxygen (kPa).
This is known as the **Bohr shift** (or Bohr effect).



(c) (i) State under what circumstances the Bohr shift would occur. [1 mark]

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(ii) Describe the effect of the Bohr shift in the tissues of the body. [2 marks]

(d) Describe how the body detects an increase in carbon dioxide levels. [2 marks]

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7 Glycolysis is one of the stages in respiration.

The equation below represents the process of glycolysis.

$$\text{Glucose} + 2NAD^{+} + 2ADP + 2Pi \rightarrow$$
$$2\text{pyruvate} + 2NADH + 2H^{+} + 2ATP + 2H_2O$$

(a) (i) Name **one** of the other processes that occurs during respiration. [1 mark]

(ii) Explain how glycolysis produces ATP. [4 marks]

(b) (i) Explain why respiration produces more ATP per molecule of glucose when oxygen is present than it does when oxygen is absent. [3 marks]

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(ii) State **two** similarities between aerobic and anaerobic respiration. [1 mark for each]

1. _____

_____

2. _____

_____

THIS IS THE END OF THE QUESTION PAPER

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SOURCES

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Q5(a).....©ElisaLara/iStock/Thinkstock
Q5(b).....©Chromatos/iStock/Thinkstock

Q5(c).....Source: Thinkstock488117198 (modified)

Q6(b)(i) ..Source: Principal Examiner

Q6(c)(i) ..Source: Principal Examiner

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Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
Total Marks	

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