Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2023

Biology

Unit 1
Higher Tier

[GBL12]

GBL12

TUESDAY 16 MAY, MORNING

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in black ink only. **Do not write with a gel pen.**
Answer **all nine** questions.

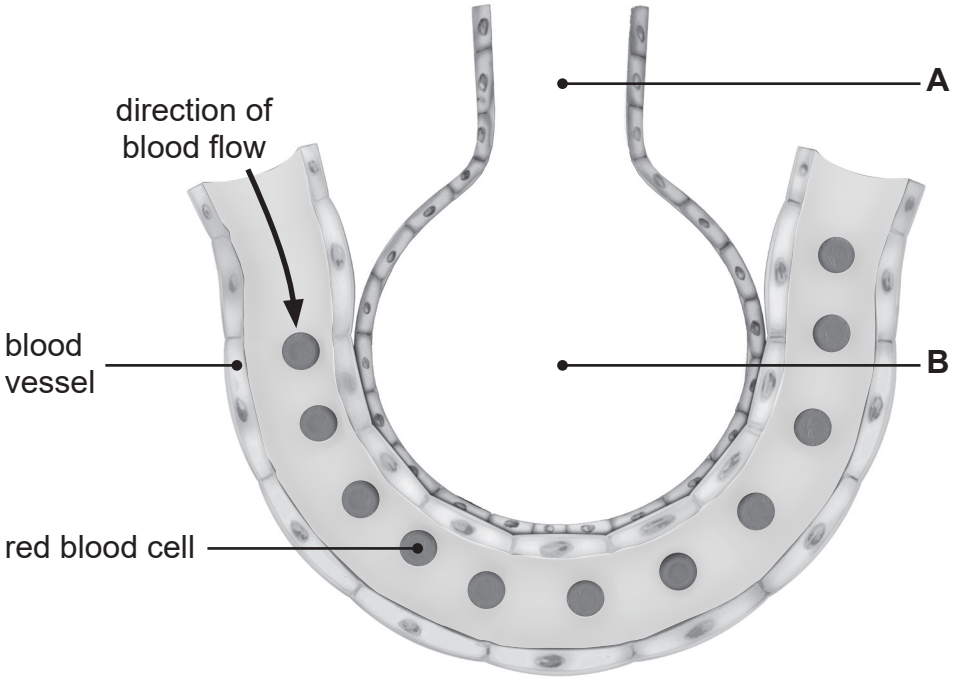
INFORMATION FOR CANDIDATES

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.
Quality of written communication will be assessed in Question **9(b)(iii)**.

13405

28GBL1201

1 The diagram shows part of the respiratory system.



Source: © Getty Images

(a) Name parts **A** and **B**.

A _____

B _____ [2]

(b) On the diagram, draw an arrow to show the movement of oxygen when gas exchange occurs during **breathing in**. [1]

(c) Use the diagram to help describe and explain **two** ways the respiratory system is adapted for gas exchange.

1. Description _____

   Explanation _____

   _____

   _____

2. Description _____

   Explanation _____

   _____

   _____ [4]

2 **(a)** The photograph shows a Sumatran tiger. It lives in forests on the island of Sumatra in Indonesia.

Source: © Getty Images

Table 1 shows the change in the population of Sumatran tigers on the island over a period of 40 years.

Table 1

Year	Number of Sumatran tigers
1980	1000
1990	850
2000	750
2010	625
2020	495

Source: Adapted from © Project Ark Foundation

(i) What is meant by the term ‘population’?

_____

_____

_____ [1]

Look at **Table 1**.

(ii) Calculate the percentage decrease in the number of Sumatran tigers from **1990** to **2010**.

Show your working.

_____ % [3]

(b) **Table 2** shows the area of forest on the island of Sumatra between 1990 and 2010.

Table 2

Year	Area of forest / million hectares
1990	21
2000	16
2010	13

Source: "Mapping and monitoring deforestation and forest degradation in Sumatra (Indonesia) using Landsat time series data sets from 1990 to 2010" © Belinda Arunarwati Margono et al 2012. Environ. Res. Lett. 7 034010 DOI 10.1088/1748-9326/7/3/034010 Published 19 July 2012

(i) Use evidence from **Table 1** and **Table 2** to suggest and explain what may have caused the change in the population of Sumatran tigers.

_____

_____

_____

_____

_____ [2]

(ii) Suggest **one other** cause of this change in the population of Sumatran tigers.

_____

_____ [1]

(iii) Suggest **one** government initiative which could be introduced to protect the population of Sumatran tigers.

_____

_____ [1]

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(Questions continue overleaf)

3 Fats are large biological molecules.

(a) Name the **two** smaller biological molecules that make up fats.

1. _____

2. _____ [2]

A food label gives information about biological molecules in the food.

The table shows some information from the food labels of three different foods, **A**, **B** and **C**.

Food	Average values per 100 g	
	Protein / g	Carbohydrate / g
A	9.9	35.7
B	24.0	15.2
C	6.0	57.6

Source: Principal Examiner

(b) Suggest which food, **A**, **B** or **C**, has the highest energy content.

Explain your choice.

_____

_____

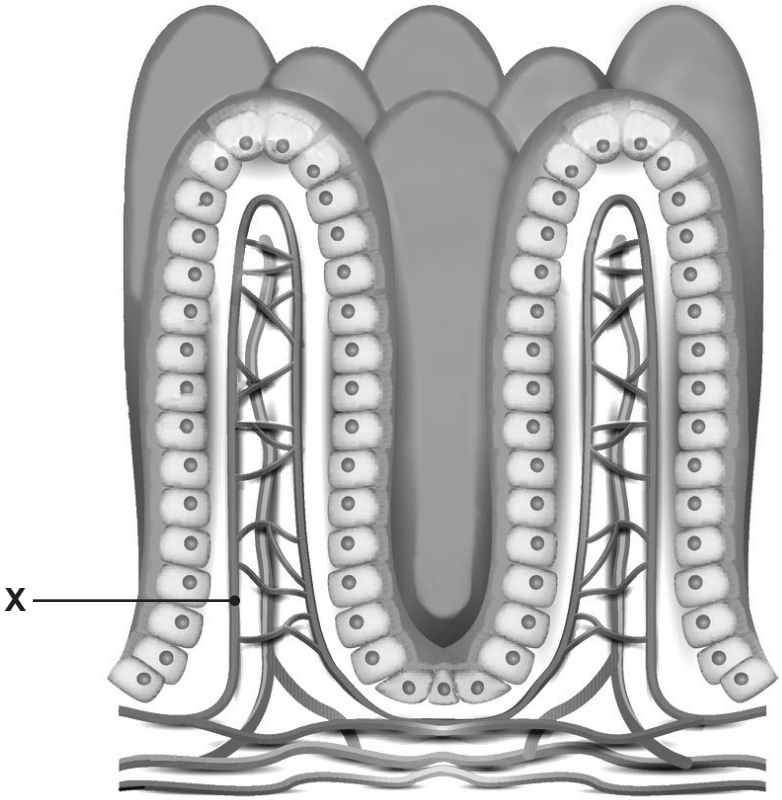
_____ [2]

Carbohydrates can be simple or complex.

(c) Name the complex **storage** carbohydrates in

- animals. _____
- plants. _____ [2]

4 The diagram shows structures found in the digestive system.



Source: © Getty Images

(a) Name these structures.

_____ [1]

(b) Name the part of the digestive system where these structures are found.

_____ [1]

(c) **(i)** Name part **X**.

_____ [1]

(ii) Explain how part **X** helps to maintain a high concentration gradient for the efficient absorption of digested food molecules.

_____

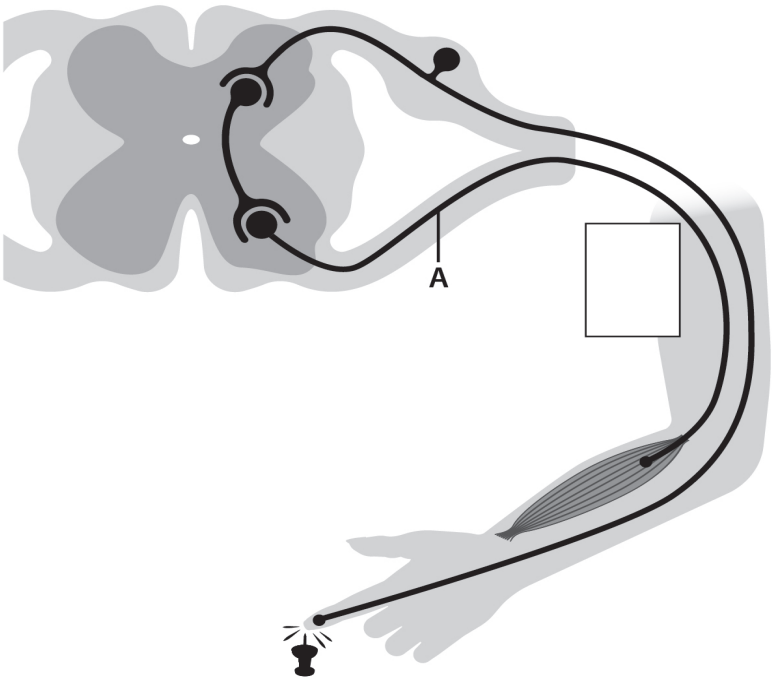
_____

_____ [1]

(d) Name **one** digested food molecule found in part **X**.

_____ [1]

5 The diagram shows part of a reflex arc.



Source: © CCEA

(a) Name the type of neurone labelled **A**.

_____ [1]

(b) **(i)** Draw an **arrow** in the box to show the direction of the nerve impulse in neurone **A**. [1]

(ii) Draw a circle around a synapse. [1]

(iii) Draw a **line** labelled **E** to the effector. [1]

(c) What type of signal passes along a neurone?

_____ [1]

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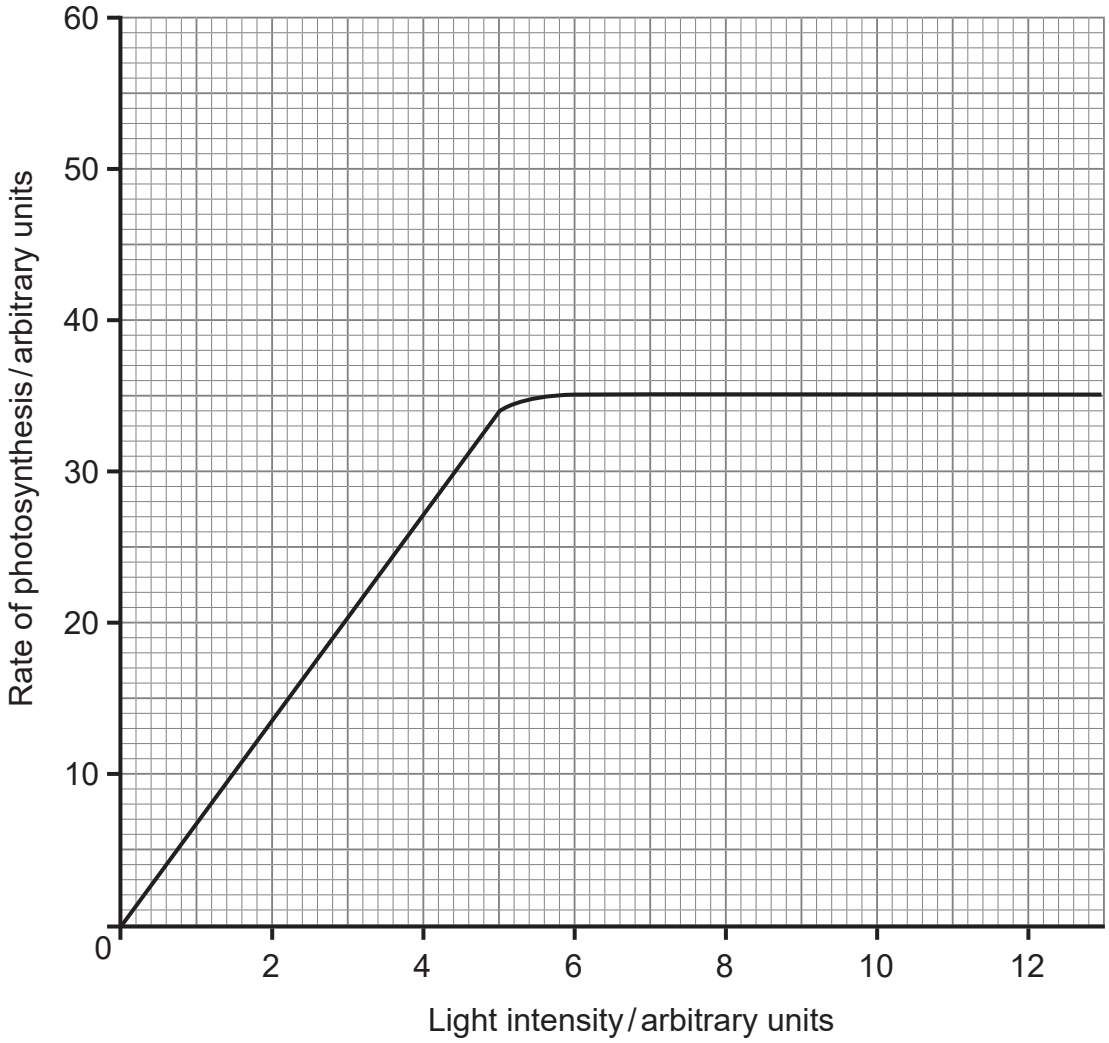
(Questions continue overleaf)

6 **(a)** Complete the balanced chemical equation for photosynthesis.

$$\boxed{} + \boxed{6\,CO_2} \xrightarrow[\text{chlorophyll}]{\text{light}} \boxed{} + \boxed{}$$

[3]

(b) The graph shows the effect of light intensity on the rate of photosynthesis in a plant at **15°C**.



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(i) At what intensity does light **stop** being a limiting factor?

Explain your answer.

Light intensity _____ arbitrary units

_____

_____

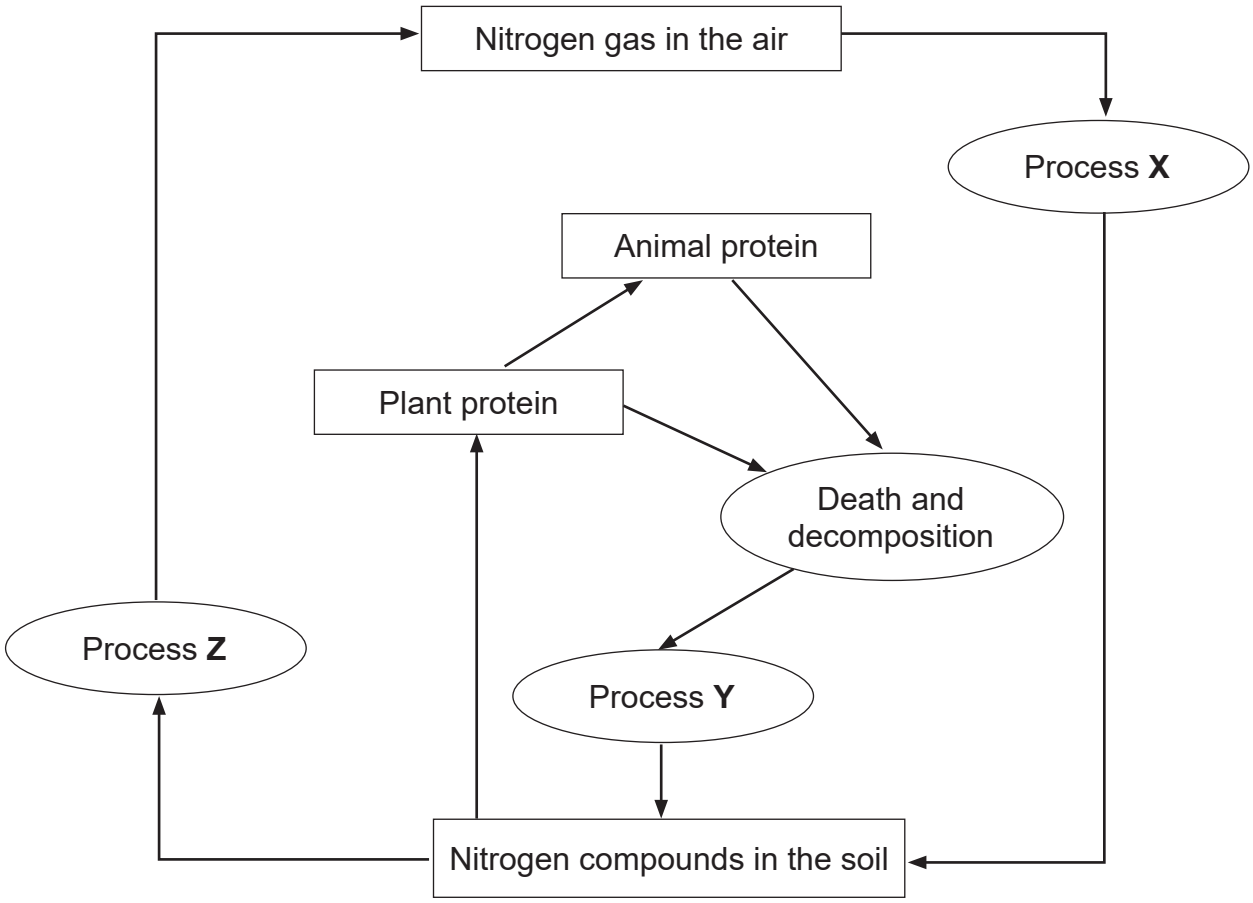
_____ [2]

(ii) Draw a line on the graph to show the rate of photosynthesis when the temperature is increased to **20°C**. [2]

(iii) Give **one** factor, other than temperature, that could be limiting the rate of photosynthesis at a light intensity of 10 arbitrary units.

_____ [1]

7 The diagram shows part of the nitrogen cycle.



(a) Name and describe processes **X** and **Y**.

X _____

Description _____

_____

Y _____

Description _____

_____ [4]

(b) Describe how plants absorb nitrogen compounds from the soil.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [3]

The table shows the yield of wheat obtained from two fields.

One field has well-drained soil and the other has waterlogged soil.

Type of soil in field	Yield of wheat / tonnes
Well-drained	9.33
Waterlogged	8.21

(c) Explain the difference in the yield of wheat obtained in the two fields.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [4]

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(Questions continue overleaf)

8 **(a)** Give **two** functions of the kidney.

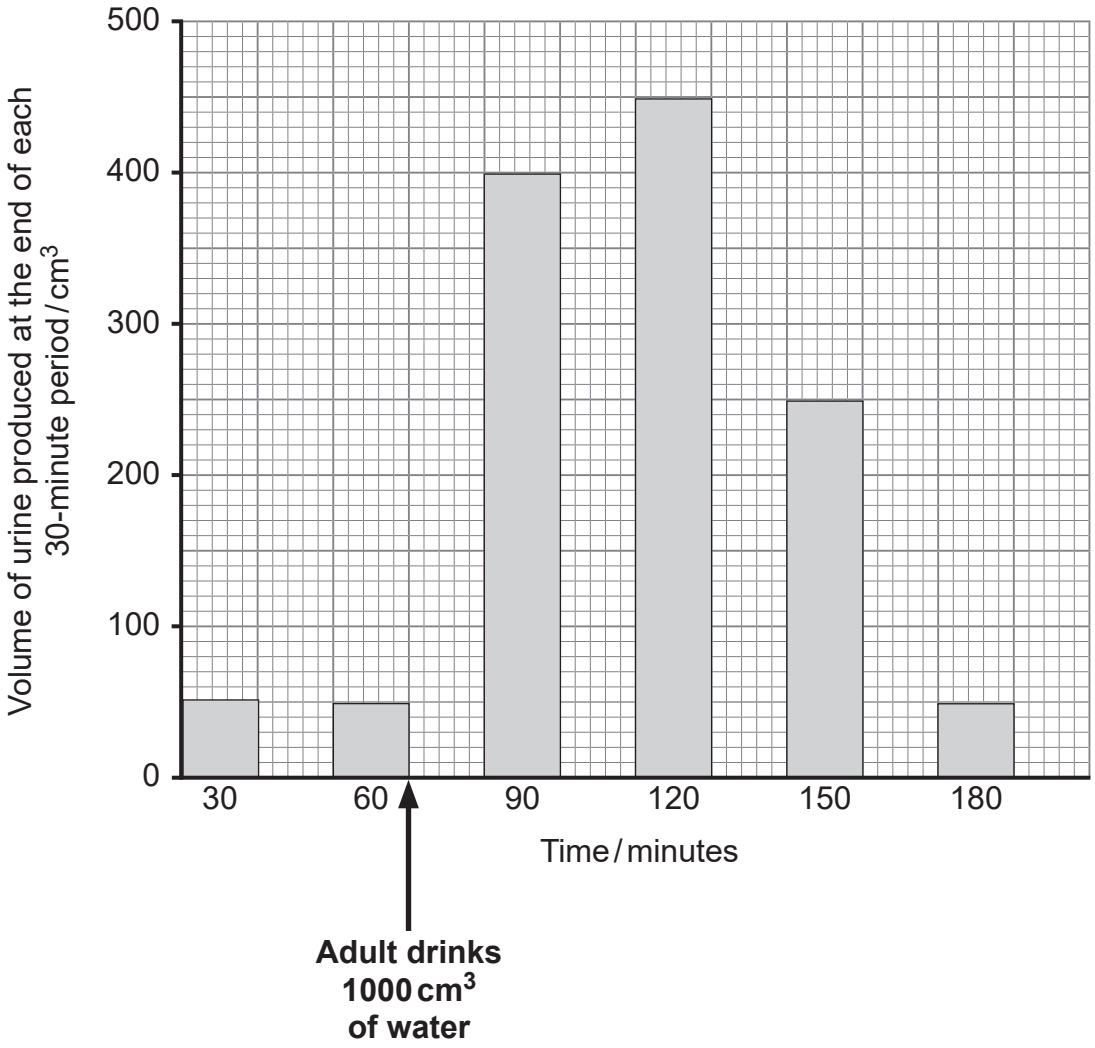
1. _____

2. _____ [2]

(b) The graph shows the volume of urine produced by an adult over a three-hour period (180 minutes).

At the end of each 30-minute period, the volume of urine produced was measured.

At the end of the first hour, the adult drank 1000 cm^3 (1 litre) of water.



13405

Before drinking 1000 cm^3 of water, the rate of urine production was 100 cm^3 per hour.

(i) Calculate the **overall** rate of urine production per hour **after** the adult drank 1000 cm^3 of water.

Show your working.

_____ $cm^3\ hr^{-1}$ [4]

(ii) Name the hormone which controls the volume of urine production.

_____ [1]

After drinking 1000 cm^3 of water, the adult produced less of this hormone.

(iii) Explain how a reduced volume of this hormone affects the kidneys and urine production.

_____

_____

_____

_____

_____

_____

_____ [3]

[Turn over

Urine is one way water is lost from the body.

(iv) Give **two other** ways water is lost from the body.

1. _____

2. _____ [2]

9 Leukaemia is a type of cancer which occurs in the bone marrow.

It affects the production of white blood cells.

The table shows the average number of new cases of leukaemia diagnosed per year for different age groups in the UK from 2013 to 2015.

Age group / years	**Average number of new cases per year**	
	Males	**Females**
0–4	168	144
5–9	92	63
10–14	58	44
15–19	62	37

Source: Source: © Based on a graphic created by Cancer Research UK

(a) Describe **one** similarity and **one** difference in the trends for males and females.

Similarity _____

_____

Difference _____

_____ [2]

(b) The diagram shows how stem cells may be used to treat leukaemia.

Images removed due to Copyright

Step 1	**Step 2**	**Step 3**	**Step 4**
Stem cells removed from the patient's bone marrow	Stem cells cultured in a Petri dish	Patient given pre-treatments	Stem cells transplanted into patient

Sources: www.biologyjunction.com/images/maturestemcelltreatment and www.therapies.com/images/surgery

In **step 1** of this treatment, stem cells are removed from the patient's **own bone marrow**.

(i) Suggest **one** advantage of using the patient's **own** stem cells.

_____

_____

_____ [1]

(ii) Give **one other** source of stem cells for use in medical treatments.

_____ [1]

(iii) **Step 3** shows two types of pre-treatments that a patient with leukaemia may be given before their stem cells are transplanted.

- Name these two types of pre-treatments in step 3.
- Explain their function.
- Give the risks associated with these pre-treatments.

In this question you will be assessed on your written communication skills, including the use of specialist scientific terms.

[6]

[Turn over

Step 4 shows the stem cells being transplanted into the patient's body.

(iv) Describe what happens to these **stem cells** when they are transplanted into the patient's body.

_____

_____

_____

_____

_____

_____ [3]

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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total Marks	

Examiner Number

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