



Rewarding Learning

General Certificate of Secondary Education
2024

Centre Number

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Candidate Number

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Double Award Science Biology

Unit B2
Foundation Tier



[GDW41]

GDW41

TUESDAY 11 JUNE, 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 ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70.

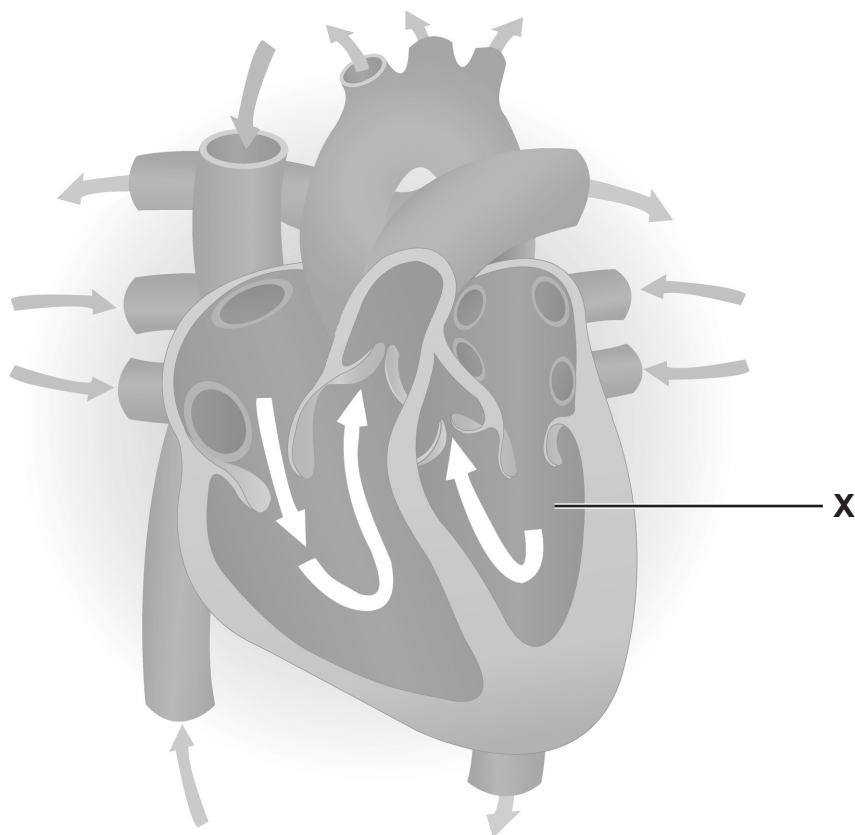
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

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



- 1 (a) Blood flows into the heart, enters an atrium and then flows into a ventricle. It leaves the heart in an artery as shown in the diagram.

This happens on both sides of the heart at the same time.



- (i) **X** is the left ventricle.

How can you tell from the diagram:

- **X** is a ventricle
- **X** is the **left** ventricle?

ventricle _____

left ventricle _____

_____ [2]



- (ii) Blood flows from the **left** ventricle (**X**) into an artery and then moves away from the heart.

Name this artery.

[1]

The diagram opposite shows structures that stop blood flowing backwards in the heart.

- (iii) On the diagram draw a line, labelled **Y**, to the structure that stops blood flowing backwards **into** the **left ventricle**.

[1]

- (b) Name the blood vessels that bring blood to heart **muscle cells**.

Circle the correct answer in the list.

vena
cava

pulmonary
veins

coronary
blood vessels
(arteries)

pulmonary
arteries

[1]

[Turn over



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2 (a) Blood contains red blood cells, white blood cells and platelets.

(i) Give the function of red blood cells.

[1]

(ii) Give **three** ways that red blood cells are adapted for their function.

[3]

(b) Name the component of blood that transports red blood cells, white blood cells and platelets around the body.

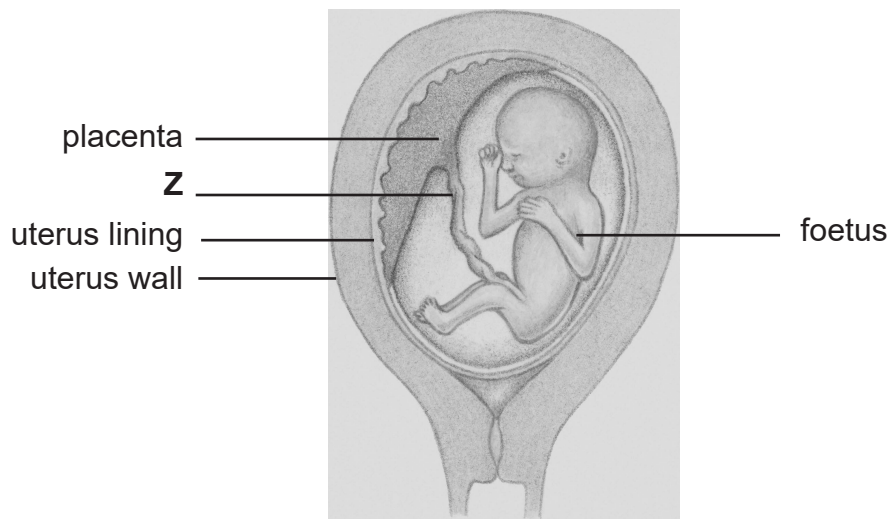
[1]

[Turn over



3 The diagram shows a foetus in the uterus of a pregnant woman.

It also shows structure **Z** that connects the placenta to the foetus.



(a) Name structure **Z** that connects the placenta to the foetus.

[1]

(b) Blood vessels allow the exchange of substances between a pregnant woman and a foetus.

The blood of a pregnant woman and the foetus **do not** mix.

(i) Use the diagram to give the name of the structure that contains **only** the pregnant woman's blood.

Circle the correct answer in the list.

uterus lining

placenta

structure **Z**

[1]

(ii) Explain how the placenta is adapted to allow the exchange of substances between a pregnant woman and the foetus.

[1]



The table shows some substances that can pass between a pregnant woman and the foetus.

- (iii) Complete the table by writing a tick [✓] to show the correct direction of movement for each of the substances.

Substance	Passes from pregnant woman to the foetus	Passes from the foetus to pregnant woman
carbon dioxide		
alcohol		
urea		
oxygen		

[3]

- (c) Some women do not want to become pregnant.

One method of contraception they can use is a barrier method.

- (i) Name a barrier method of contraception.

[1]

- (ii) Explain how this method of contraception prevents pregnancy.

[1]

- (iii) This method of contraception can help prevent the spread of sexually transmitted infections.

Name **two** sexually transmitted infections.

1. _____

2. _____

[2]

[Turn over



- 4 Water is transported from the roots to the leaves in plants where it can be used.

Water can also be lost from the leaves through transpiration.

- (a) Complete the four sentences in the table about water and transpiration in plants.

Circle the correct word to complete each sentence.

1 Water is lost through pores on the leaf surface by ...	diffusion	absorption	osmosis
2 These pores on the leaf surface are called ...	epidermis	mesophyll	stomata
3 When it is hot, transpiration helps the leaf ...	clean	cool	warm
4 The water transported to the leaves is used to produce glucose when the plant carries out ...	photosynthesis	respiration	digestion

[4]

- (b) The surface area of leaves affects the rate of transpiration in plants.

- (i) Complete the sentence to describe the effect of surface area on the rate of transpiration.

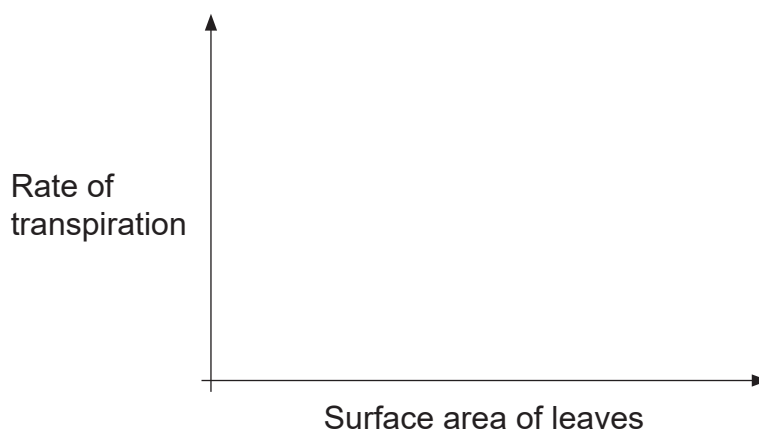
As the surface area of leaves increases, the rate of

transpiration _____ .

[1]



- (ii) On the axes below, draw a line to show the effect of the surface area of leaves on the rate of transpiration.



[1]

- (iii) Give **three other** factors that affect the rate of transpiration.

1. _____
2. _____
3. _____

[3]



5 (a) Eye colour in humans is an inherited characteristic.

The allele for brown eyes **B** is dominant to the allele for blue eyes **b**.

A man with brown eyes and a woman with blue eyes have children.

The man is **heterozygous** for eye colour.

The woman is **homozygous recessive** for eye colour.

(i) Use the symbols for the alleles to give the genotype of each parent.

Man with brown eye colour _____

Woman with blue eye colour _____ [2]

(ii) Give the allele or alleles, for eye colour, present in the sperm cells produced by the man and the egg cells produced by the woman.

Allele(s) in sperm cells of man _____

Allele(s) in egg cells of woman _____ [3]



Punnett squares can be used to predict possible eye colours in children.

The Punnett squares show the results of possible crosses between four **different** sets of parents.

The alleles in the gametes are **not** shown.

	1	2	3	4
	BB BB BB BB	Bb Bb Bb Bb	BB Bb BB Bb	BB Bb Bb bb

(b) Give the **number** of the Punnett square that shows the **result** of a genetic cross between:

- two parents who are both heterozygous for eye colour

Number _____

- one parent who is homozygous dominant for eye colour and one parent who is homozygous recessive for eye colour.

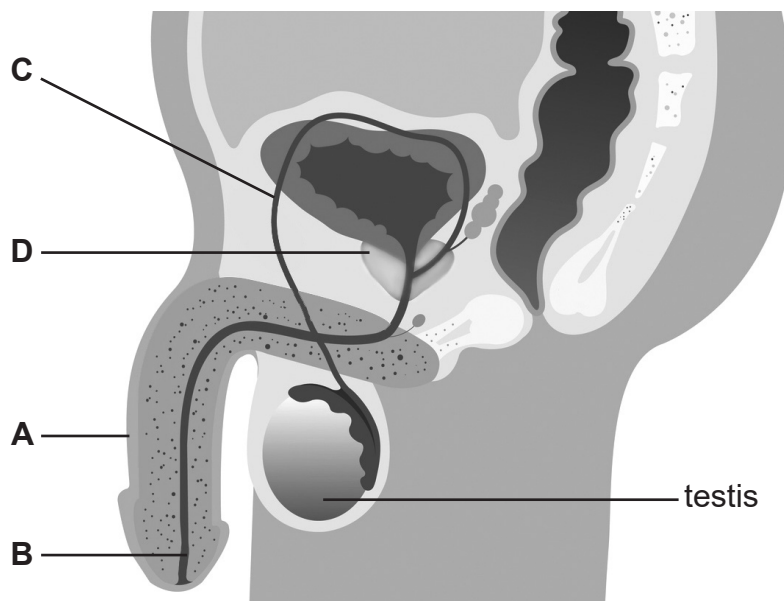
Number _____

[2]

[Turn over



6 The diagram shows a side view of the male reproductive system.



(a) Name the structures labelled **A** and **B**.

A _____

B _____

[2]

(b) Give the **functions** of structures **C** and **D**.

C _____

D _____

[2]

The testes produce sperm cells.

(c) Give the function of the flagellum in a sperm cell.

[1]





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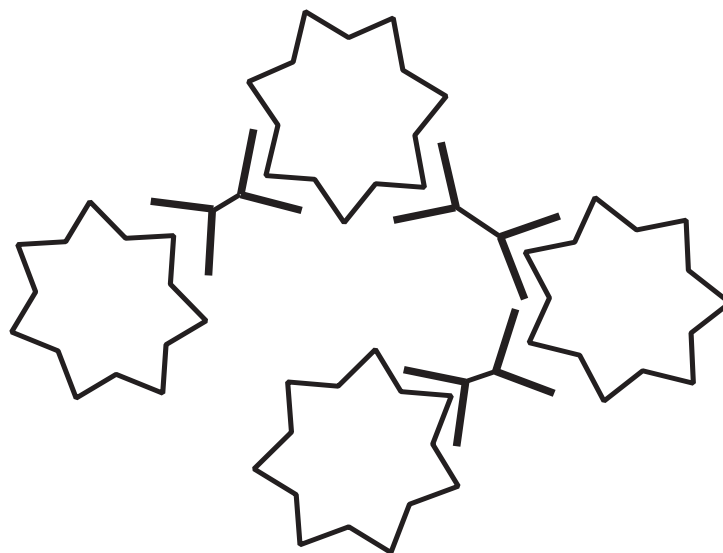
(Questions continue overleaf)



- 7 When a microorganism infects the body, white blood cells produce specific antibodies.

These antibodies cause the microorganisms to clump together.

The diagram shows how antibodies clump one type of microorganism.



- (a) On the diagram, draw a line labelled **A** to **one** antibody. [1]

- (b) Explain why **only** these antibodies can produce a clump with this type of microorganism.

[2]



When a clump of microorganisms is formed, the microorganisms become immobilised.

(c) Suggest how immobilising microorganisms helps the body to defend itself.

[1]

After the microorganisms have been immobilised, a different type of white blood cell destroys the clump.

(d) Name this type of white blood cell and describe how the clump of microorganisms is destroyed.

[3]

[Turn over

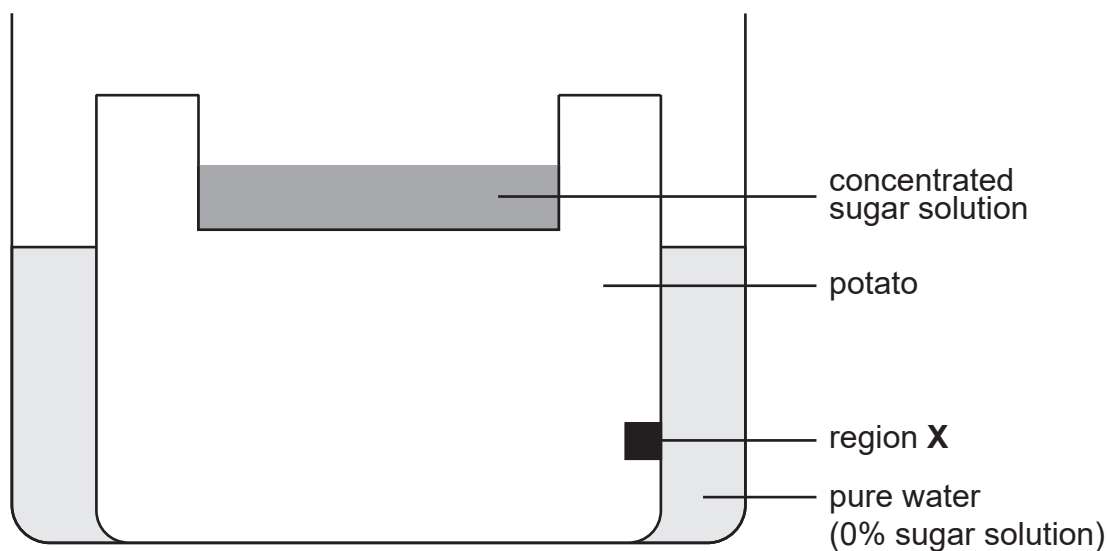


- 8 (a) A student carried out an experiment to investigate osmosis using a potato.

The student cut a piece out of the potato and partially filled the space with concentrated sugar solution.

The student then placed the potato into a beaker containing pure water (0% sugar solution).

The diagram shows the set-up of the student's experiment.



- (i) Describe and explain what happened to the cells in region X when the student placed the potato into the beaker of pure water.

Circle the letter of the correct statement in **list 1** and the letter of the correct statement in **list 2**.



List 1

Statement	Description
A	water moved out of the cells in region X into the pure water
B	water moved into the cells in region X from the pure water
C	there is no movement of water between the cells in region X and the other potato cells

List 2

Statement	Explanation
D	because osmosis is the movement of water from a more concentrated solution to a dilute solution
E	because osmosis is the movement of water from a dilute solution to a more concentrated solution
F	because osmosis is the movement of water between two solutions with the same concentration

[2]

The student left the potato in the pure water for several hours.

- (ii) Describe and explain what happened to the level of the **concentrated sugar solution** after several hours.

Description _____

Explanation _____

_____ [2]

[Turn over



(b) When plant cells lose a large amount of water they become **plasmolysed**.

(i) What change, if any, occurs in the **size** of the following structures when a plant cell becomes plasmolysed?

vacuole _____

cytoplasm _____

[2]

(ii) Describe what happens to the cell membrane when a plant cell becomes plasmolysed.

_____ [1]





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(Questions continue overleaf)



9 (a) Cancer is a disease of cells.

(i) Name the process in the body that produces cancer cells.

_____ [1]

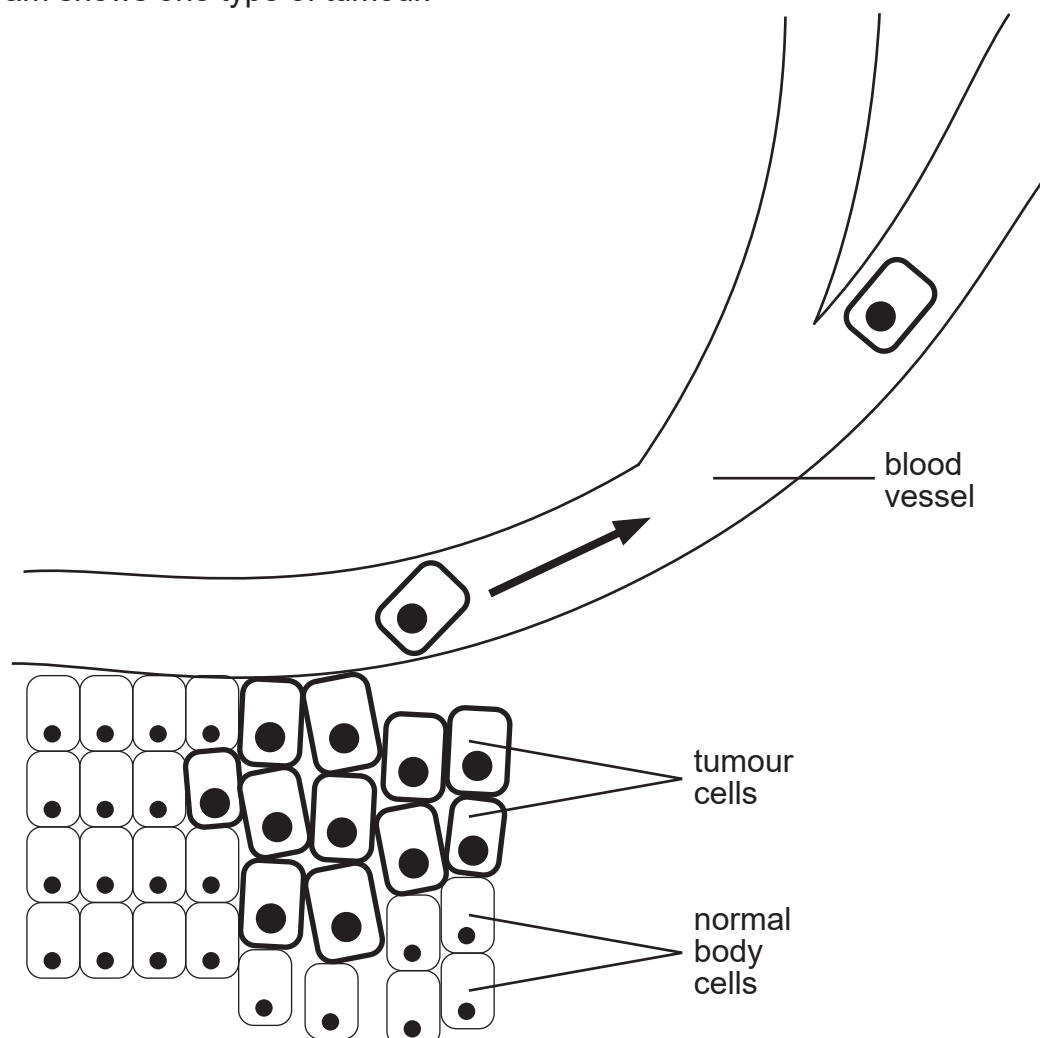
One type of cancer is skin cancer.

(ii) Give the environmental factor that causes skin cancer.

_____ [1]

Cancer cells can form tumours.

The diagram shows one type of tumour.



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- 10 The Government recommends that the maximum amount of alcohol that should be consumed in one week is 14 units.

One pint of beer contains **2** units of alcohol.

One measure of gin contains **1** unit of alcohol.

The table gives information about the alcoholic drinks consumed by three people, **A**, **B** and **C**, over one weekend.

These people **did not** consume any alcoholic drinks from Monday to Thursday.

Day	Alcoholic drinks consumed over one weekend		
	person A	person B	person C
Friday	2 gins	8 pints of beer	4 gins
Saturday	2 gins	none	3 pints of beer
Sunday	none	none	2 gins

- (a) Which person, **A**, **B** or **C**, had the most unhealthy drinking habits over the weekend?

Give **two** reasons for your answer.

Person _____

Reason 1 _____

Reason 2 _____

[3]

[Turn over



A study into the number of deaths linked to drinking alcohol in middle-aged men and middle-aged women was carried out.

The graphs show the trends of the results.



(b) Complete the table using **only** information from the graphs.

Place a tick [✓] in **one** empty box for each statement.

Statement	True	False	Can't tell
For men only, the total deaths from all causes is lowest for men who drink one unit of alcohol per day.			
Fewer men than women died from cardiovascular diseases .			
Women who drink one unit of alcohol per day have less risk of dying from cardiovascular diseases than women who drink no units of alcohol per day.			
The trend for deaths from cardiovascular diseases for young women would be the same as for these middle-aged women.			

[4]

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SOURCES

Question 1: © Getty Images

Question 3: © Getty Images

Question 6: © Getty Images

Question 7: Principal Examiner

Question 8: Principal Examiner

Question 9: Principal Examiner

Question 10: *The New England Journal of Medicine*, 11 December 1997, Vol. 337 No. 24, M.J. Thun, R. Peto et al

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Question Number	Marks
1	
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Examiner Number

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