FOR OFFICIAL USE

N5 National Qualifications 2026

Mark

X807/75/01

Biology
Section 1 — Answer Grid and Section 2

TUESDAY, 28 APRIL
1:00 PM – 3:30 PM

X8077501

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Number of seat

Date of birth
Day Month Year

Scottish candidate number

Total marks — 100

SECTION 1 — 25 marks

Attempt ALL questions.

Instructions for the completion of Section 1 are given on *page 02*.

SECTION 2 — 75 marks

Attempt ALL questions.

Write your answers clearly in the spaces provided in this booklet. Additional space for answers and rough work is provided at the end of this booklet. If you use this space you must clearly identify the question number you are attempting. Any rough work must be written in this booklet. Score through your rough work when you have written your final copy.

Use **blue** or **black** ink.

Do not remove any exam materials. You must leave this booklet on your desk; if you do not, you could lose all the marks for this paper.

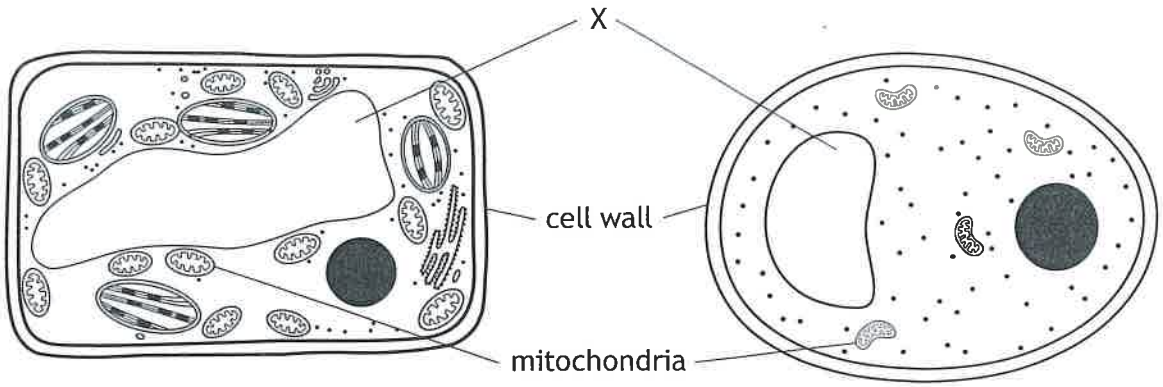
Qualifications Scotland
Teisteanasan Alba

X807750101

SECTION 2 — 75 marks

Attempt ALL questions

1. The diagram shows a typical plant cell and a typical fungal cell and some of their structures.



(a) Name structure X and give its function. 2

Structure X _____

Function _____

(b) Apart from the difference in size and shape, describe **one** other structural difference between typical plant and fungal cells. 1

_____

_____

(c) Select one structure from the list that is found in **all** typical plant, fungal, animal and bacterial cells and give its function. 2

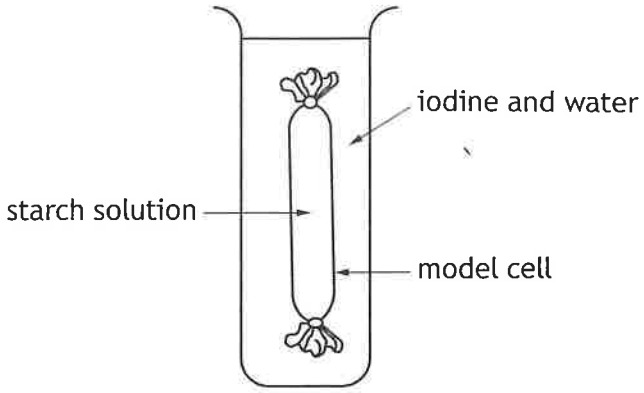
Nucleus	Cytoplasm	Ribosome	Mitochondrion

Structure _____

Function _____

[Turn over

2. A model cell was set up as shown to investigate the movement of molecules across a selectively permeable membrane.



(a) Iodine is a small soluble molecule that changes from yellow to black in the presence of starch. Starch is a large insoluble molecule.

(i) From the information given, state the colour of the solution outside the model cell at the **start** of the investigation. 1

_____

(ii) After one hour, the following results were observed:

1. The contents of the model cell turned black.
2. There was no change in colour outside the model cell.

Explain these results. 2

1 _____

_____

2 _____

_____

(b) Name the process that would allow water to move across the membrane of the model cell. 1

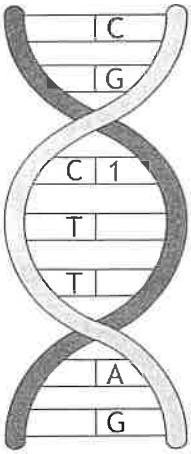
_____

(c) Name one component of a cell membrane. 1

_____

MARKS | DO NOT WRITE IN THIS MARGIN

3. The diagram represents a section of DNA.



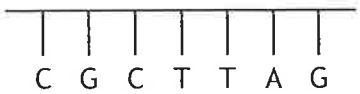
(a) Give the term used to describe the structure of a DNA molecule. 1

_____

(b) Name base 1. 1

_____

(c) The base sequence shown represents 1.4% of the total number of bases in a single strand of DNA.



Calculate the total number of bases in this strand. 1

Space for calculation

_____ bases

(d) (i) Give the term used to describe a section of DNA that codes for a protein. 1

_____

(ii) A mutation occurred in this section of DNA.

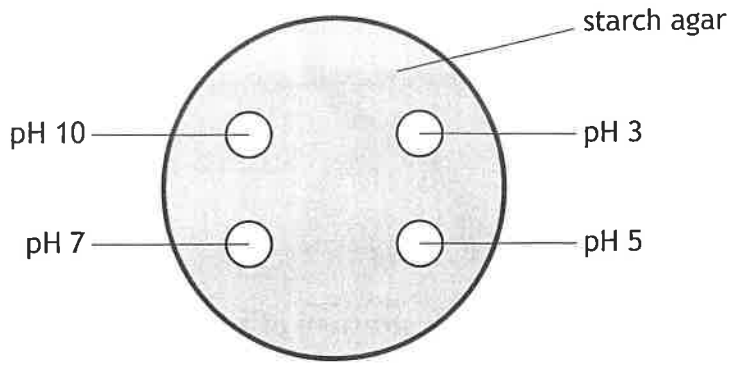
Explain why this mutation would result in a change to the protein's shape and function. 1

_____

_____

4. An experiment was carried out into the effect of increasing pH on the activity of the enzyme amylase. Starch is broken down by amylase to produce maltose.

Three petri dishes of starch agar were set up. Each had four wells filled with amylase solution at the pH values shown.



The dishes were left at 30 °C for 24 hours.

(a) (i) State two other variables, not already mentioned, that should be controlled to ensure the validity of this experiment. 2

1 _____

2 _____

(ii) Explain why three petri dishes of starch agar were set up. 1

_____

_____

4. **(continued)**

(b) After 24 hours, iodine solution was poured over the surface of each dish. When iodine is added to starch, it turns black in colour.

Clear areas, where the iodine did not turn black, were found around each well and their diameters were measured.

The results are shown in the table.

pH	Diameter of clear area (mm)			
	Dish 1	Dish 2	Dish 3	Average
3	6	6	6	6
5	18	22	23	
7	27	31	29	29
10	23	27	22	24

(i) Complete the table by calculating the average diameter of the clear area for pH 5. 1

Space for calculation

(ii) Explain why there was a clear area around each well to measure. 1

_____

_____

(iii) Give a suitable conclusion for **this** experiment. 1

_____

_____

[Turn over

5. An investigation was carried out to compare the breakdown of glucose by different respiratory pathways in cells.

The results are shown in the table.

	Respiratory pathway		
Product	**A**	**B**	**C**
Carbon dioxide	✓	✓	✗
Water	✓	✗	✗
Ethanol	✗	✓	✗
Lactate	✗	✗	✓

✓ = yes
✗ = no

(a) (i) Use these results to identify the type of respiration in pathway A. **1**

_____

(ii) Name a type of cell in which respiratory pathway B would occur. **1**

_____

(iii) State the location in the cell where respiratory pathway C would be completed. **1**

_____

(b) Further investigation into the energy released by these respiratory pathways produced the following results.

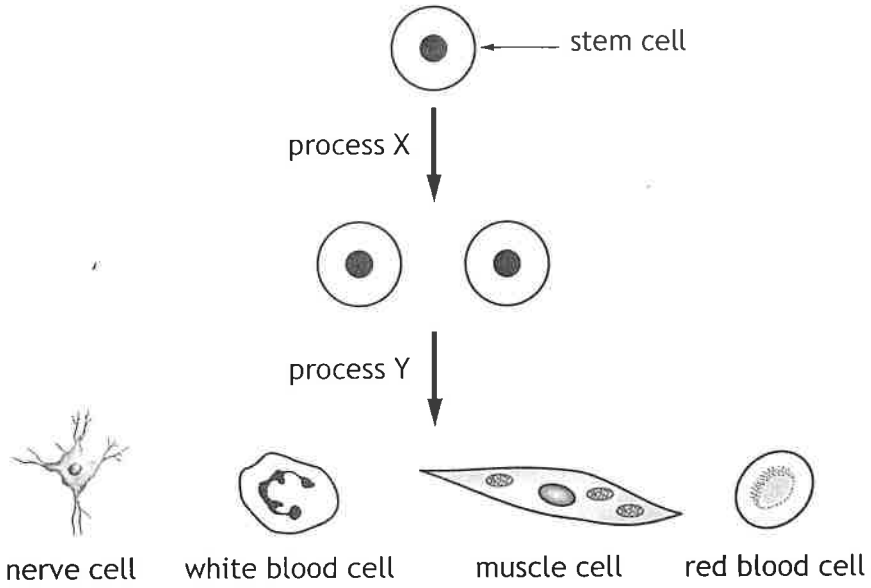
Respiratory pathway	Energy released (kJ)
A	16.8
B	0.8
C	0.8

Calculate the simple whole number ratio for these results. **1**

Space for calculation

_____ : _____ : _____
A B C

6. The diagram shows some stages in the development of a variety of cells in the body.



(a) (i) State the feature of stem cells that gives them the potential to become many different body cells. 1

_____

(ii) Give a function of stem cells. 1

_____

(b) (i) Process X allows the number of stem cells to increase.

Name this process. 1

_____

(ii) Stem cells can be grown in the laboratory. They double in number every 48 hours.

Calculate the time taken for 16 stem cells to be produced from one stem cell. 1

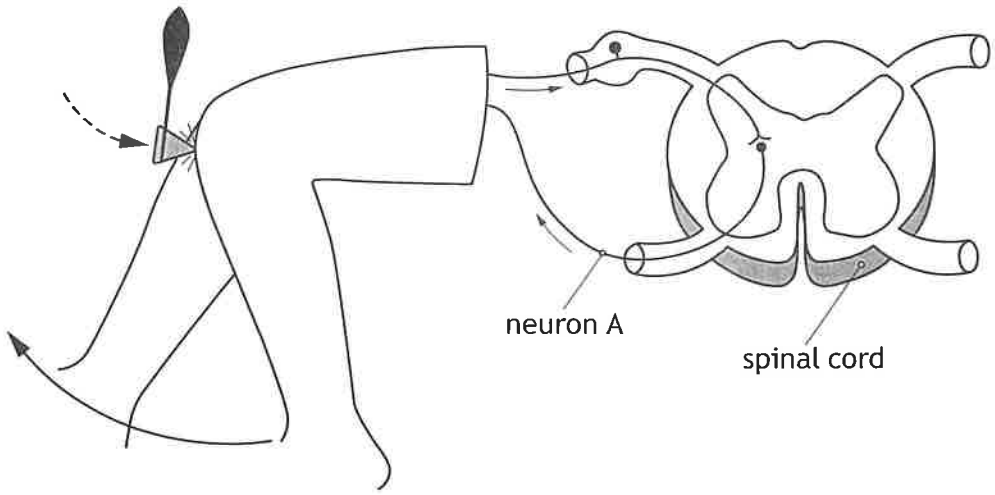
Space for calculation

_____ hours

(c) Name the system in the human body of which white blood cells are part of. 1

_____

7. The diagram represents part of the knee jerk reflex arc.



(a) Identify neuron A. 1

_____

(b) Describe how a message:

(i) travels along a neuron 1

_____

(ii) is transferred between neurons. 1

_____

(c) A typical knee jerk response takes 15 milliseconds.
Calculate the speed of the response if the distance covered is 1.2 metres. 1
(1 second = 1000 milliseconds)
Space for calculation

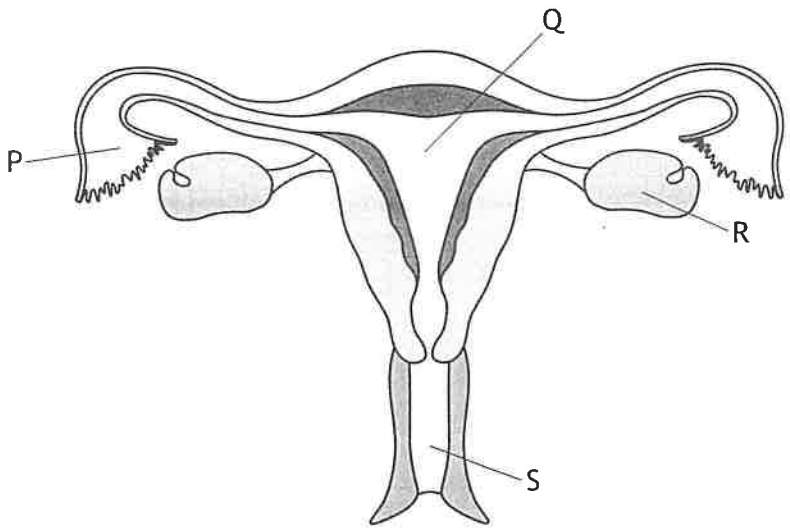
_____ metres per second

(d) State the function of a reflex. 1

_____

_____

8. The diagram shows the human female reproductive system.



(a) Which letter in the diagram shows the site of female gamete production? **1**

_____

(b) (i) A hormone produced in the brain triggers the release of this gamete.

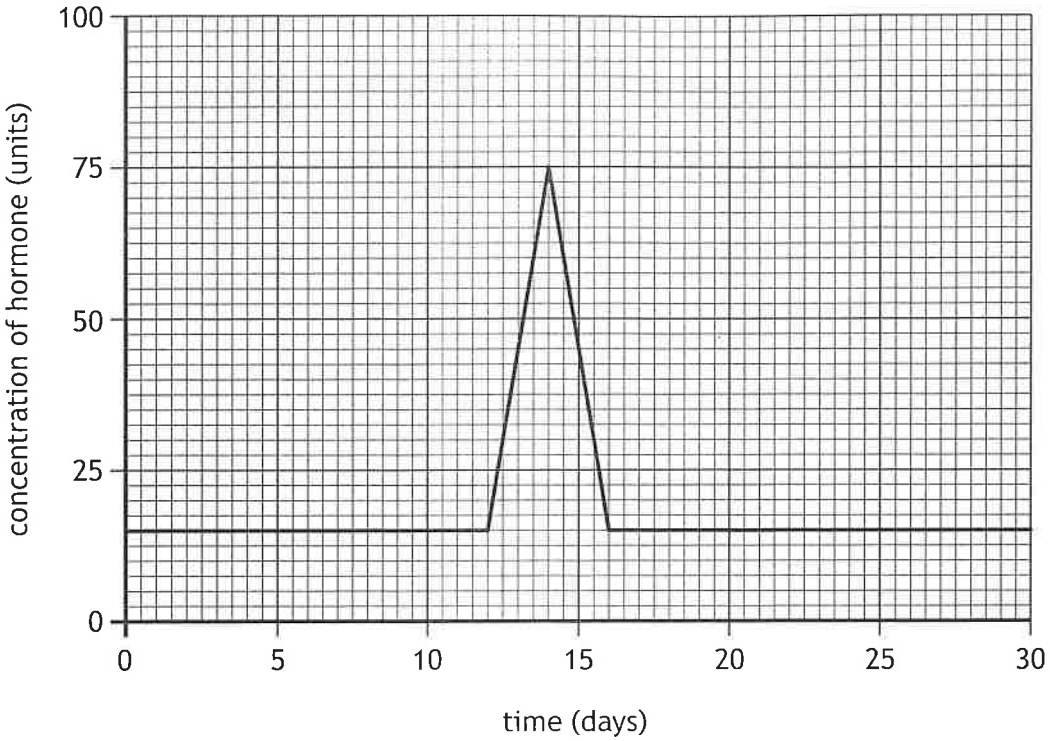
Describe how this hormone travels from the brain to the female reproductive system. **1**

_____

[Turn over

8. (b) (continued)

The graph shows the changes in concentration of this hormone during one month.



(ii) Use the data to describe the changes in the hormone concentration from day **0** to day **14**. 2

(iii) Calculate how many times greater the hormone concentration is at day 14 compared to day 16. 1

Space for calculation

_____ times greater

MARKS | DO NOT WRITE IN THIS MARGIN

9. Hair length in cats is an inherited characteristic controlled by different alleles of a gene. H represents the allele for short hair, and h represents the allele for long hair.

The diagram shows the inheritance of hair length in cats.

P Phenotype	short hair × long hair
P Genotype	HH × hh
F_1 Phenotype	all short hair
F_2 Genotypes	HH and Hh and hh

(a) (i) Give the genotype of cats in the F_1 generation. 1

_____

(ii) Explain why the F_1 generation all have short hair. 1

_____

_____

(b) In addition to the phenotypes shown above, some cats can be hairless. This is caused by a genetic mutation.

(i) Give the definition of the term mutation. 1

_____

_____

(ii) To be hairless, a cat must inherit the mutated allele from both parents.
State the term used to describe this genotype. 1

_____

[Turn over

10. Scientists carried out a study to investigate if claims that protein supplements increase lean mass and strength were true.

24 volunteers followed the same training programme where they trained three times a week for eight weeks. After each session, one group were given a protein supplement, and the other group were not. Both groups were asked to keep a food diary to allow their daily intake of protein to be recorded.

At the beginning and end of the training programme, lean mass and strength were measured. The average percentage increase in each of these measurements was calculated.

The results are shown in the table.

Measurement	Average percentage increase in measurement	
	With protein supplement	Without protein supplement
Lean mass	1.2	1.0
Thigh muscle thickness	5.9	2.7
Knee strength	28.0	35.0

(a) The group taking the protein supplement were compared to the group who did not take a protein supplement.

Give the term used to describe the group who did not take the protein supplement. 1

_____

(b) Suggest one reason why the volunteers recording their own daily intake of protein could be described as a limitation. 1

_____

10. (continued)

(c) An individual with an initial knee strength of 50 kg took part in a similar training programme.

Predict their knee strength after 8 weeks if they took no protein supplements after each session. 1

Space for calculation

_____ kg

(d) Suggest why it may **not** be necessary to take this protein supplement. 1

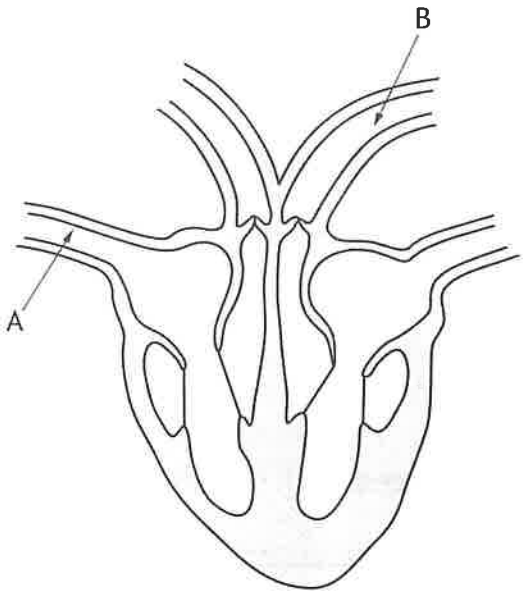
_____

_____

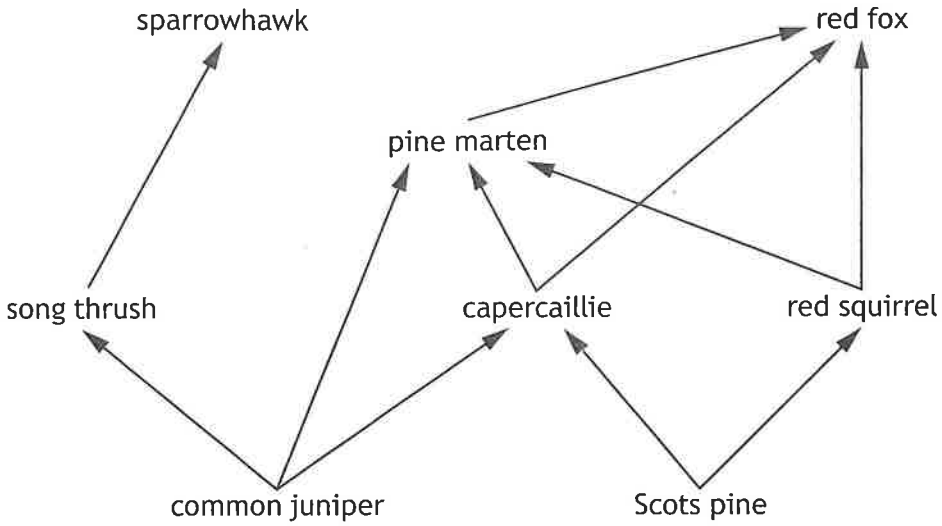
[Turn over

MARKS | DO NOT WRITE IN THIS MARGIN

11. Describe the pathway of blood through the heart and associated blood vessels starting at point A and finishing at point B. 5



12. The diagram shows the flow of energy through some organisms found in part of a food web in a pine forest ecosystem.



(a) (i) Give the term used to describe all of the organisms in this ecosystem. 1

_____

(ii) Complete the table using information from **this** food web. 2

Term	Named example
Carnivore	
Omnivore	

(iii) Name the process in which the capercaillie uses energy, which will then be available to the pine marten. 1

_____

(iv) Explain why the red fox population has the least energy. 1

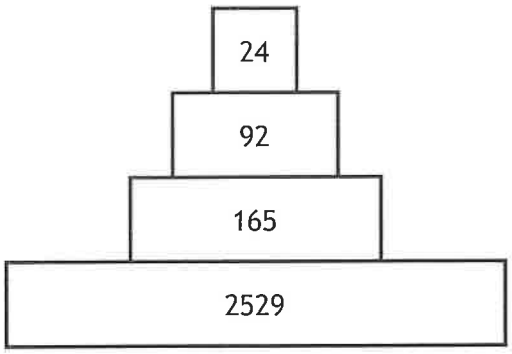
_____

_____

[Turn over

12. (continued)

(b) The diagram shows a pyramid of numbers for a food chain from a pine forest.



Calculate the percentage of organisms in this food chain that are consumers. 1

Space for calculation

_____ %

MARKS | DO NOT WRITE IN THIS MARGIN

13. Fertilisers can be added to soil to increase crop yield.

(a) Explain why crop yields need to be increased. 1

_____

(b) Excess fertilisers can leach into freshwater ecosystems causing algal blooms.

Describe the effect an algal bloom will have on the number of bacteria and give the reason why. 2

Effect on number _____

Reason _____

_____

(c) Explain why an algal bloom would cause a decrease in the concentration of oxygen in the water. 1

_____

(d) Suggest an alternative that could be used to reduce the use of fertilisers. 1

_____

[Turn over

14. An experiment was set up to investigate the effect of changing temperature on the rate of photosynthesis in a plant by measuring the volume of oxygen produced per minute.

The results are shown in the table.

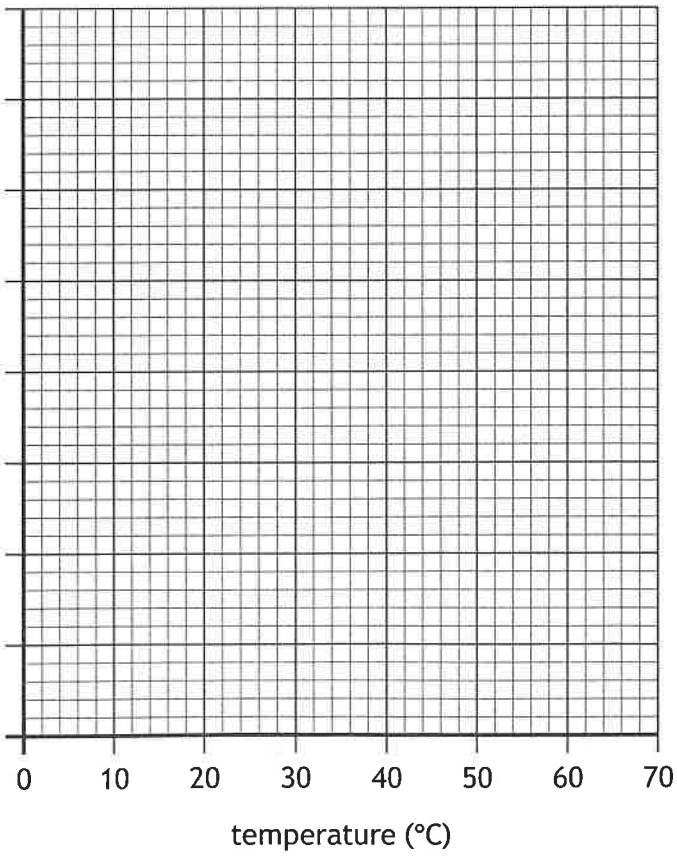
Temperature (°C)	Volume of oxygen produced (cm^3/minute)
10	1.3
20	2.5
30	3.8
50	0.7
70	0.0

(a) Name the stage of photosynthesis that produces oxygen. 1

_____

(b) On the grid complete the vertical axis and plot a line graph to show the effect of temperature on the volume of oxygen produced.

(An additional grid, if required, can be found on *page 26*.) 2



MARKS | DO NOT WRITE IN THIS MARGIN

14. (continued)

(c) Describe the relationship between temperature and the rate of photosynthesis. 2

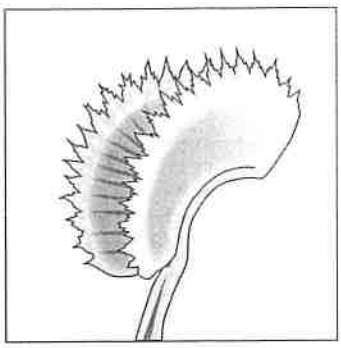
(d) Explain why no oxygen is produced at 70 °C. 2

[Turn over

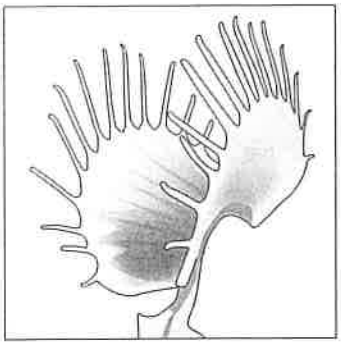
15. Venus flytrap plants grow in wetlands where the soil nitrate content is low.

The leaves of these plants have evolved into traps allowing them to capture and digest invertebrates, which provides a source of nitrates.

Two varieties are shown.



Shark's Tooth



South West Giant

(a) The plants' traps are an inherited characteristic that makes each plant well suited to survive in its environment.

Give the term used to describe this characteristic. 1

_____

(b) Shark's Tooth and South West Giant varieties can interbreed to produce fertile offspring.

Give a conclusion that can be made from this information. 1

_____

_____

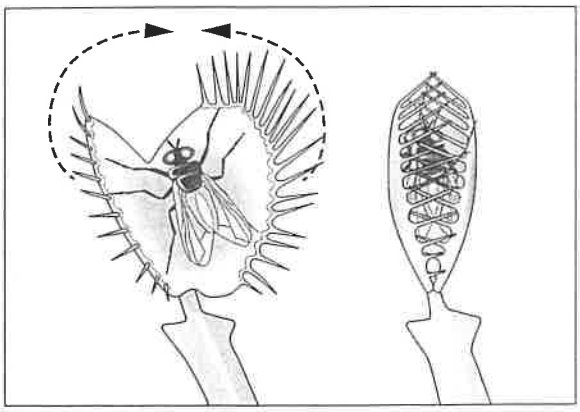
(c) During the evolution of these Venus flytrap plants, low soil nitrate content has acted as a selection pressure.

Name the process by which the plants best adapted to this environment survive and pass on favourable alleles to their offspring. 1

_____

15. (continued)

(d) In an average trap, each side travels a distance of 12 mm when closing.



Calculate the time taken for a trap to close if each side closes at a speed of 40 mm per second. **1**

Space for calculation

_____ seconds

[END OF QUESTION PAPER]