N5 National Qualifications 2026

X807/75/02

Biology
Section 1 — Questions

TUESDAY, 28 APRIL

1:00 PM – 3:30 PM

Instructions for the completion of Section 1 are given on *page 02* of your question and answer booklet X807/75/01.

Record your answers on the answer grid on *page 03* of your question and answer booklet.

You must leave your answer booklet on your desk; if you do not, you could lose all the marks for this paper.

X8077502

Qualifications Scotland
Teisteanasan Alba

SECTION 1 — 25 marks

Attempt ALL questions

1. Which of the following cell structures contains chlorophyll?

   A Cell wall
   B Chloroplast
   C Cytoplasm
   D Mitochondrion

2. A piece of potato that was left in a solution for 24 hours was found to have increased in mass.

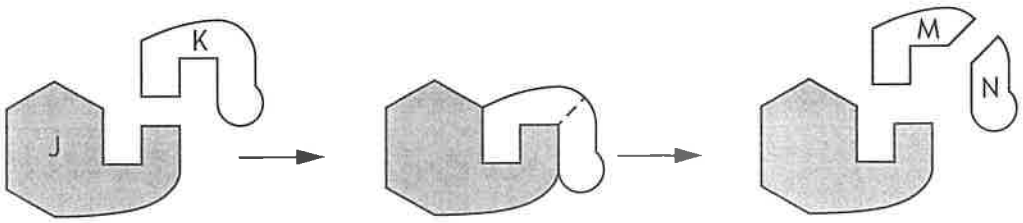
   The cells of the potato had

   A burst
   B become plasmolysed
   C become turgid
   D shrunk.

3. Messenger RNA (mRNA) is produced in the

   A nucleus and is complementary to the DNA strand
   B nucleus and is identical to the DNA strand
   C ribosome and is complementary to the DNA strand
   D ribosome and is identical to the DNA strand.

4. The diagram represents three stages in an enzyme-controlled reaction.



Which row in the table identifies the labelled structures?

	Substrate	Enzyme	Product
A	K	N	J
B	M	J	K
C	J	K	M
D	K	J	N

5. After the process of genetic engineering, a host bacterial cell will

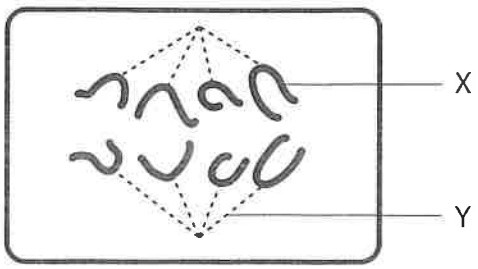
A have a required gene extracted
B be missing a plasmid
C contain a modified plasmid
D have a source chromosome inserted.

6. Which type of proteins control respiration?

A Antibodies
B Structural
C Receptors
D Enzymes

[Turn over

7. The diagram represents a stage in the process of mitosis.



Which row in the table identifies structures X and Y?

	X	Y
A	chromatid	spindle fibre
B	chromosome	equator
C	chromatid	equator
D	chromosome	spindle fibre

8. The flowchart shows how water concentration is controlled in the human body.

brain detects a decrease in water concentration

↓

hormone is released

↓

kidneys regulate water concentration

↓

brain detects that water concentration returns to normal

The receptors for this hormone would be found in

A the brain
B the blood
C the kidney
D an endocrine gland.

9. Which of these cells is haploid?

A Red blood cell
B Ovum
C Zygote
D Companion cell

10. Which of these characteristics are both examples of continuous variation?

A Leaf length and seed mass
B Leaf length and blood group
C Seed mass and eye colour
D Blood group and eye colour

11. In pea plants, the allele for hairy stems is dominant and the allele for smooth stems is recessive.

Two heterozygous pea plants were crossed, and 180 offspring were produced.

What would be the expected number of pea plants with smooth stems?

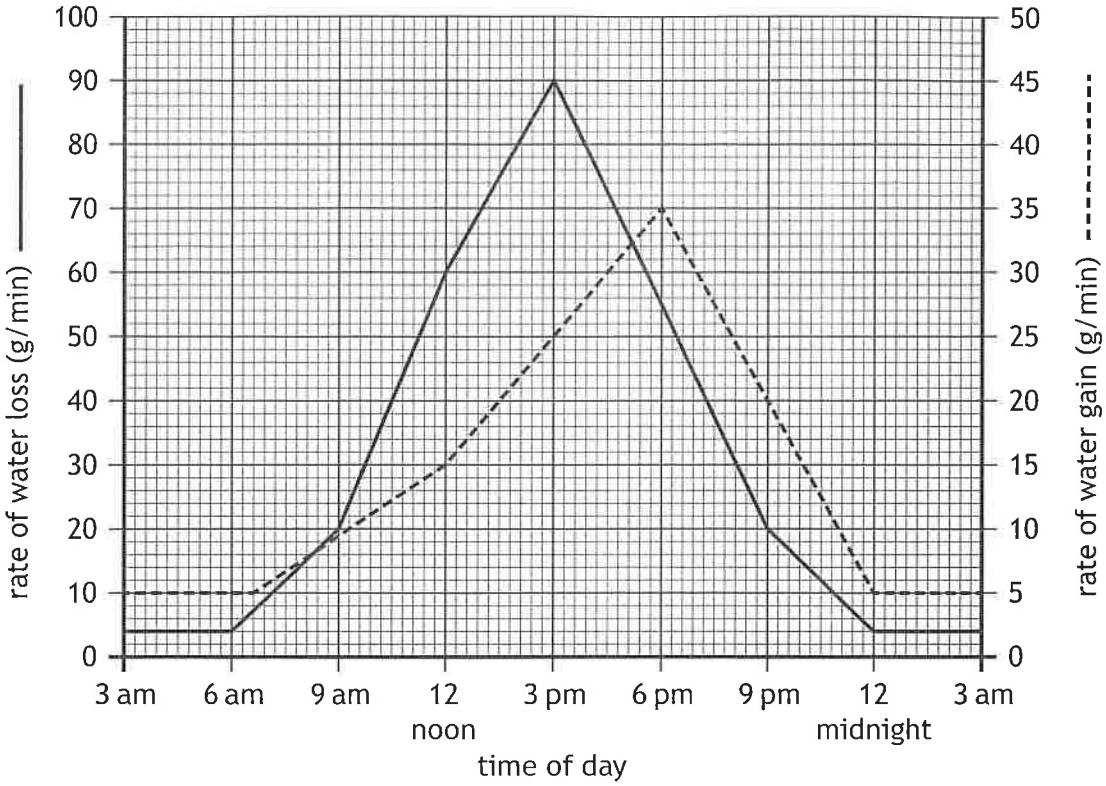
A 45
B 60
C 90
D 135

12. In plants, sugar is transported

A up and down in dead phloem cells
B up and down in living phloem cells
C only down in living phloem cells
D only up in dead phloem cells.

[Turn over

13. The graph shows the rate of water loss and water gain by a plant in 24 hours.



What was the rate of water gain at 3 pm?

A 25 g/min
B 45 g/min
C 50 g/min
D 90 g/min

14. The table shows the average blood pressure measurement in three different blood vessels.

Blood vessel	Blood pressure (units)
Artery	90
Capillary	15
Vein	3

The percentage decrease in blood pressure when blood flows from a capillary into a vein is

A 12
B 20
C 80
D 400

15. Three athletes followed a 6-month training programme. On the first day of each month, they took a fitness test in which their rate of oxygen absorption was measured.

An increase in fitness is shown by an increase in the rate of oxygen absorption.

The results of these tests are shown in the table.

Month of training programme	Rate of oxygen absorption (units)		
	Athlete W	Athlete X	Athlete Y
1	59.0	39.1	45.0
2	62.5	45.0	47.5
3	67.4	50.0	51.5
4	70.1	53.2	54.2
5	70.4	53.2	55.7
6	70.8	53.6	57.1

Which of the following statements is **not** correct?

A Athlete W's fitness improved the least over the 6-month training programme.

B Athlete X's fitness improved the most over the 6-month training programme.

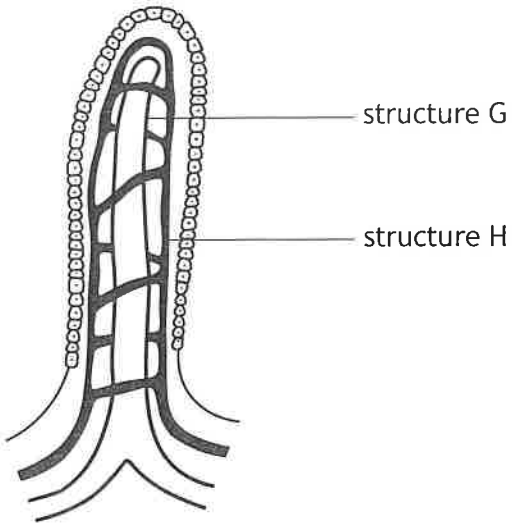
C Athlete Y's fitness improved the least in the first 3 months of the training programme.

D All the athletes' fitness had improved by more than 25% by the end of the training programme.

[Turn over

16. Nutrients from food are absorbed by the villi in the small intestine.

The diagram shows a villus.



Which row in the table identifies a substance absorbed by each of the labelled structures?

	Structure G	Structure H
A	glucose	amino acids
B	fatty acids	glycerol
C	fatty acids	amino acids
D	glucose	glycerol

17. Interspecific competition occurs between individuals of

A the same species for a few of the resources they require
B the same species for all the resources they require
C different species for a few of the resources they require
D different species for all the resources they require.

18. An example of an abiotic factor affecting a population of fish in a river could be

A a fungal infection on their skin
B predation from large birds
C competition between them for food
D decreasing water pH due to pollution.

19. The table shows the number of different invertebrates collected from several pitfall traps in a woodland ecosystem.

Invertebrates	Number
Earthworm	8
Woodlice	10
Spiders	12
Beetles	34
Flatworms	16

What percentage of all the invertebrates were earthworms?

A 8
B 10
C 16
D 20

20. The table shows the effects of grazing intensity on the number of plant species.

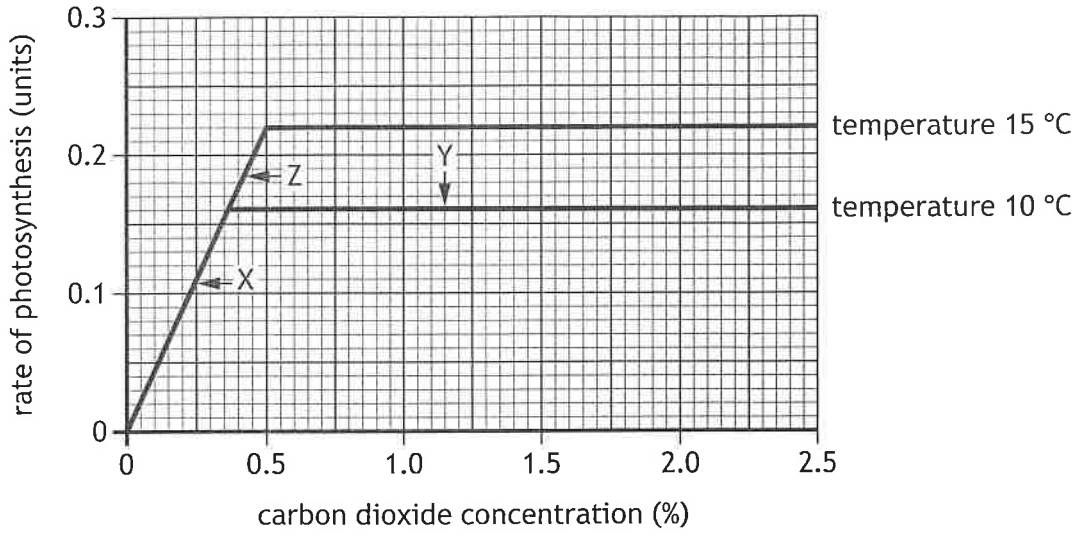
Grazing intensity	Number of annual plant species	Number of perennial plant species
Low	1	8
Moderate	9	11
High	0	7

Which statement is correct for the data shown?

A The population of annual plant species is lowest when grazing intensity is low.
B Plant biodiversity increases when grazing intensity is increased from low to high.
C The population of perennial plant species is highest when grazing intensity is moderate.
D Plant biodiversity increases when grazing intensity is increased from low to moderate.

[Turn over

21. The graph shows the effects of increasing temperature and carbon dioxide concentration on the rate of photosynthesis.



Which statement is correct for the data shown?

A Temperature is the limiting factor at point X.

B Carbon dioxide concentration is the limiting factor at point X.

C Carbon dioxide concentration is the limiting factor at point Y.

D Temperature is the limiting factor at point Z.

22. Indicator species in an ecosystem can provide information about

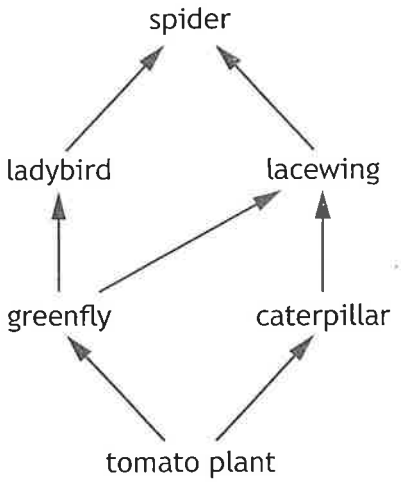
A levels of pollution

B levels of competition

C number of predator species present

D the total numbers of organisms present.

Questions 23 and 24 refer to the following food web.



23. Pesticides enter the food chain when they are sprayed on tomato plants.

Identify the organism that would accumulate the greatest concentration of pesticides in its tissues over a period of time.

A Tomato plant

B Greenfly

C Lacewing

D Spider

24. A gardener noticed an increase in caterpillar damage to their tomato plants and decided to use biological control to deal with this.

Which species should the gardener introduce more of?

A Greenfly

B Lacewing

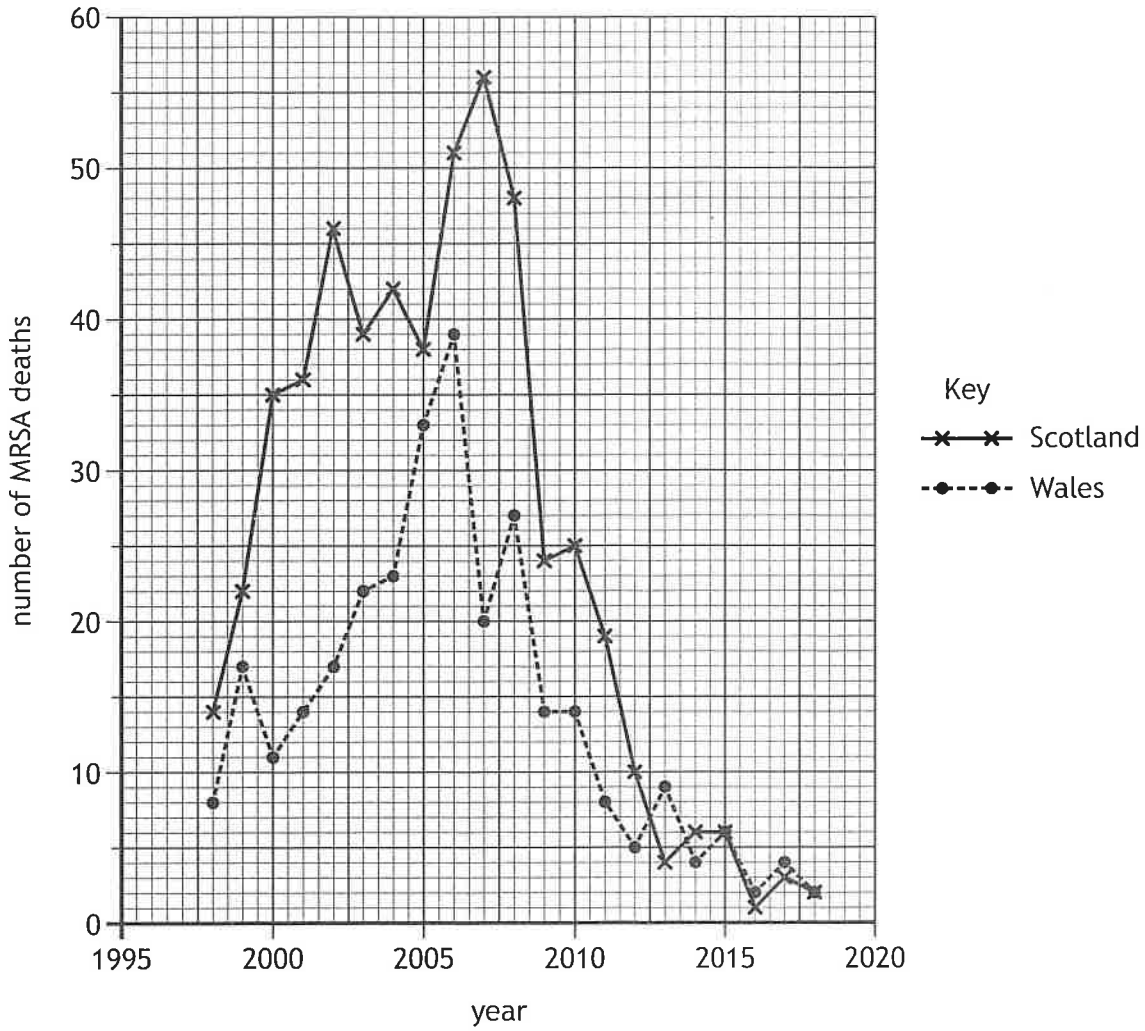
C Ladybird

D Spider

[Turn over

25. MRSA is a type of bacterial pathogen resistant to some common antibiotics.

The graph shows the number of MRSA deaths in Scotland and Wales over a 20-year period.



Which of the following is correct for this data?

The number of MRSA deaths

A in Scotland and Wales increased every year up to 2007

B in Scotland were three times higher than in Wales in 2007

C in Scotland were twice as high as in Wales in 2012

D in Scotland and Wales decreased every year from 2008 to 2018.

[END OF SECTION 1. NOW ATTEMPT THE QUESTIONS IN SECTION 2 OF YOUR QUESTION AND ANSWER BOOKLET.]

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.

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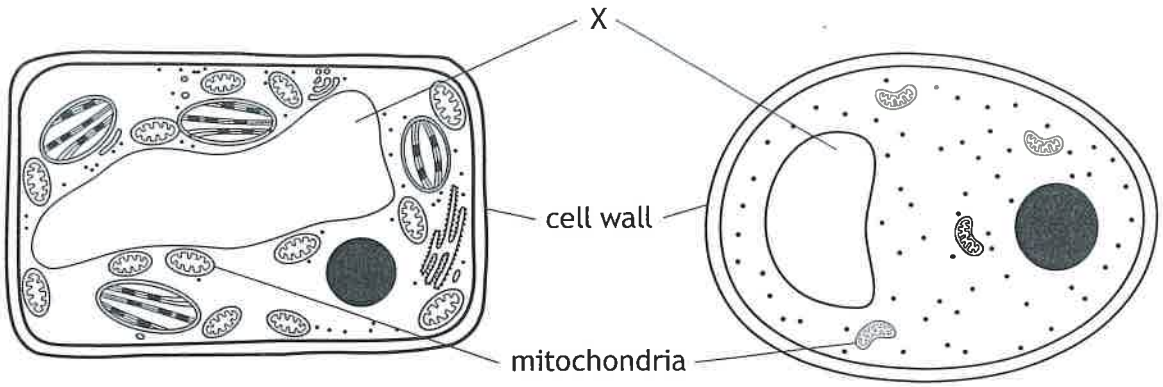
SECTION 2 — 75 marks

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

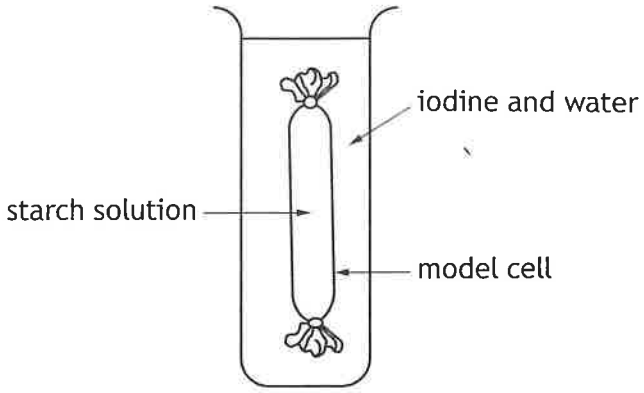
Nucleus	Cytoplasm	Ribosome	Mitochondrion

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

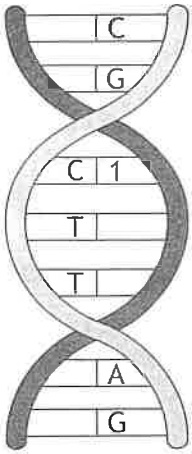
_____

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

_____

3. The diagram represents a section of DNA.

MARKS | DO NOT WRITE IN THIS MARGIN



(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.

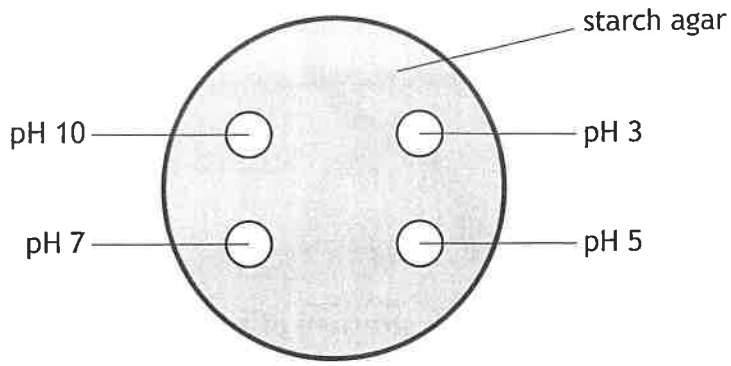
Explain why this mutation would result in a change to the protein's shape and function. 1

_____

_____

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

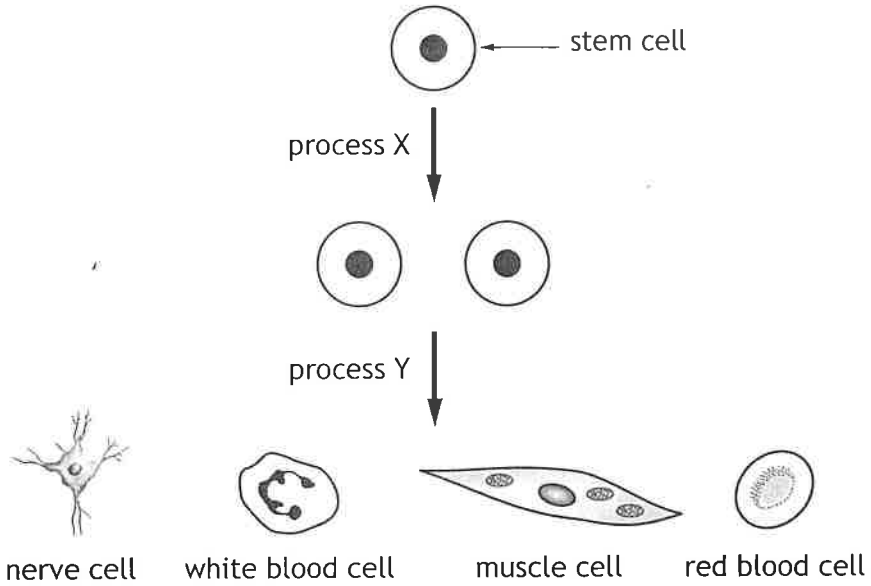
Calculate the simple whole number ratio for these results. **1**

Space for calculation

_____ : _____ : _____
A B C

MARKS | DO NOT WRITE IN THIS MARGIN

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

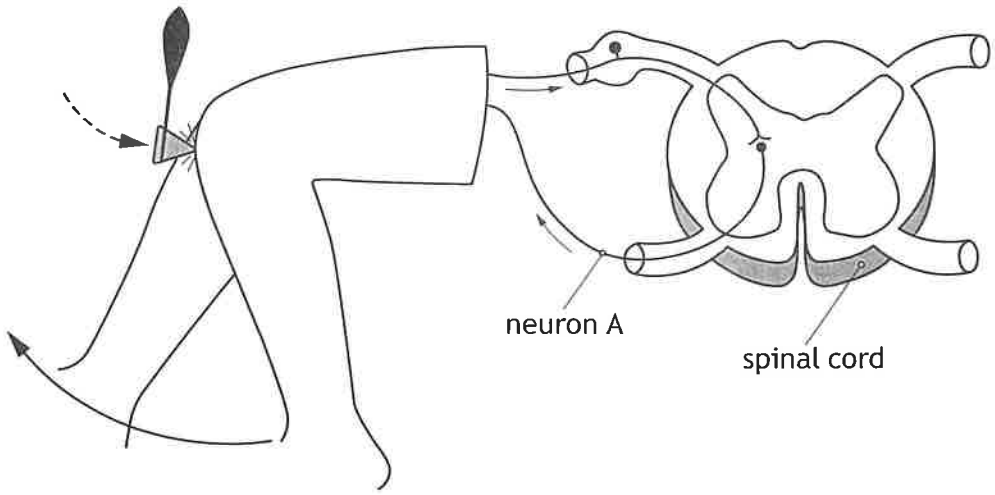
Space for calculation

_____ 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

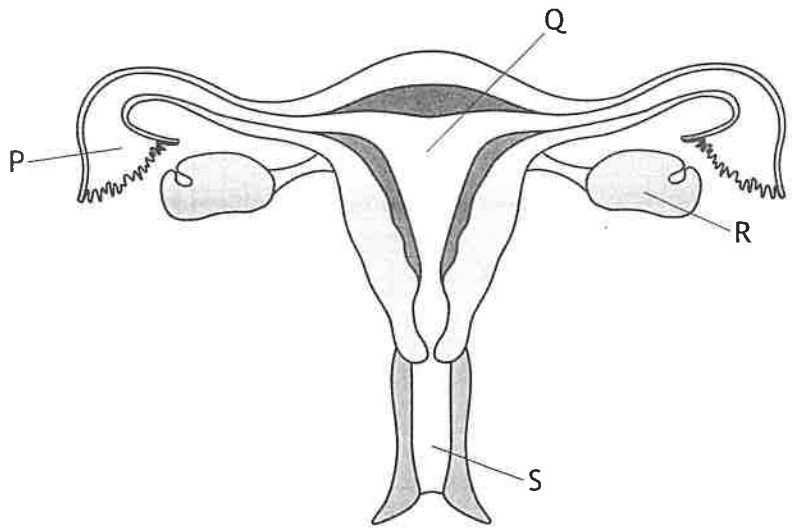
_____ metres per second

(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.

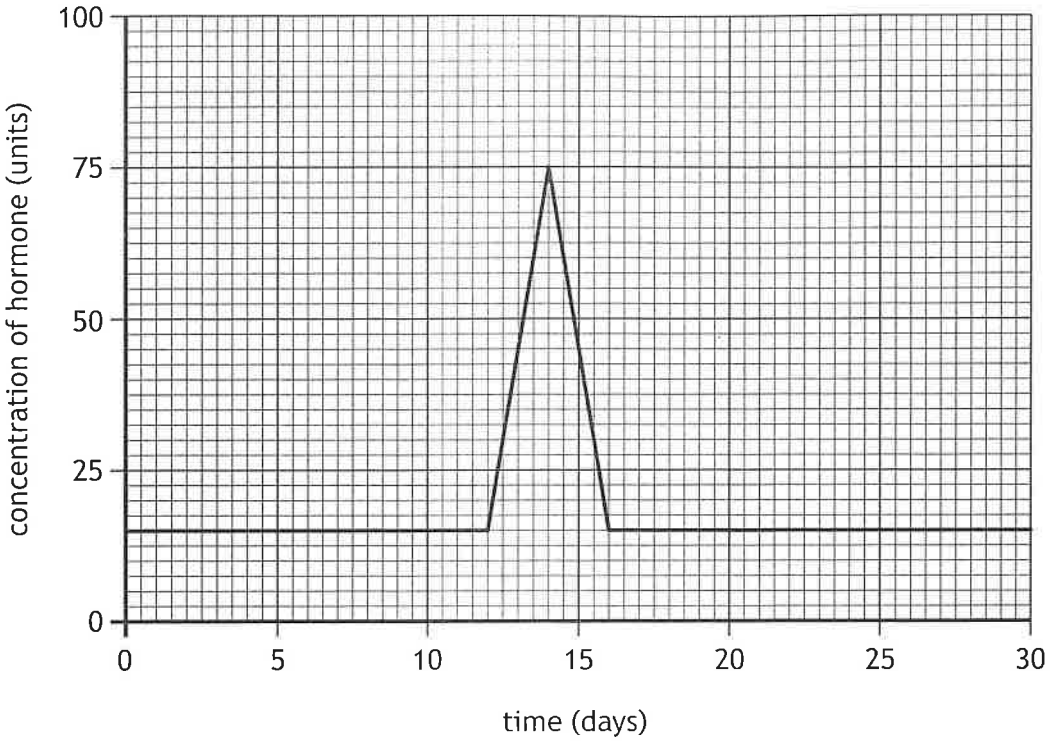
Describe how this hormone travels from the brain to the female reproductive system. 1

_____

[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

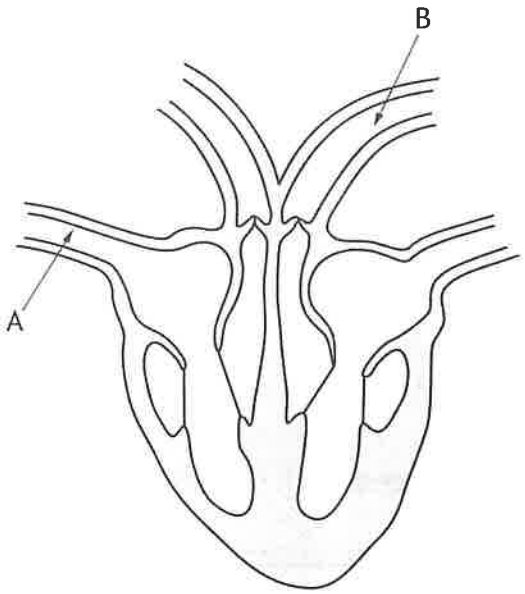
(d) Suggest why it may **not** be necessary to take this protein supplement. 1

_____

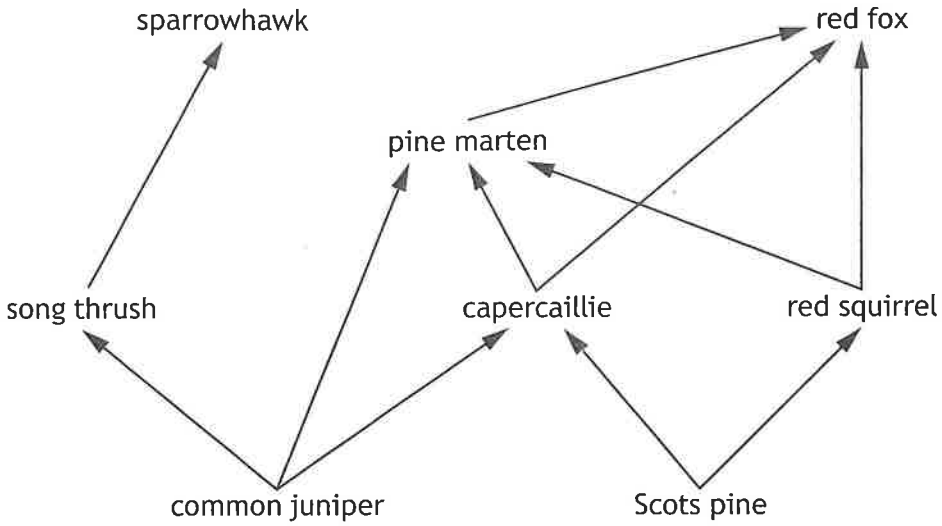
_____

[Turn over

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

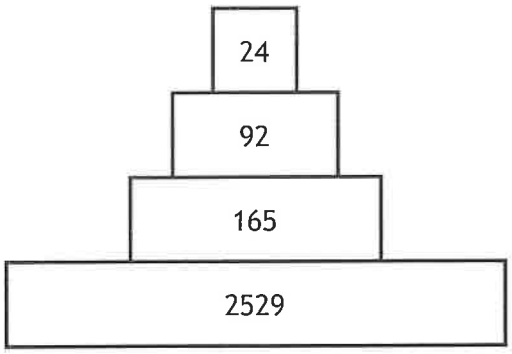
_____

_____

[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.

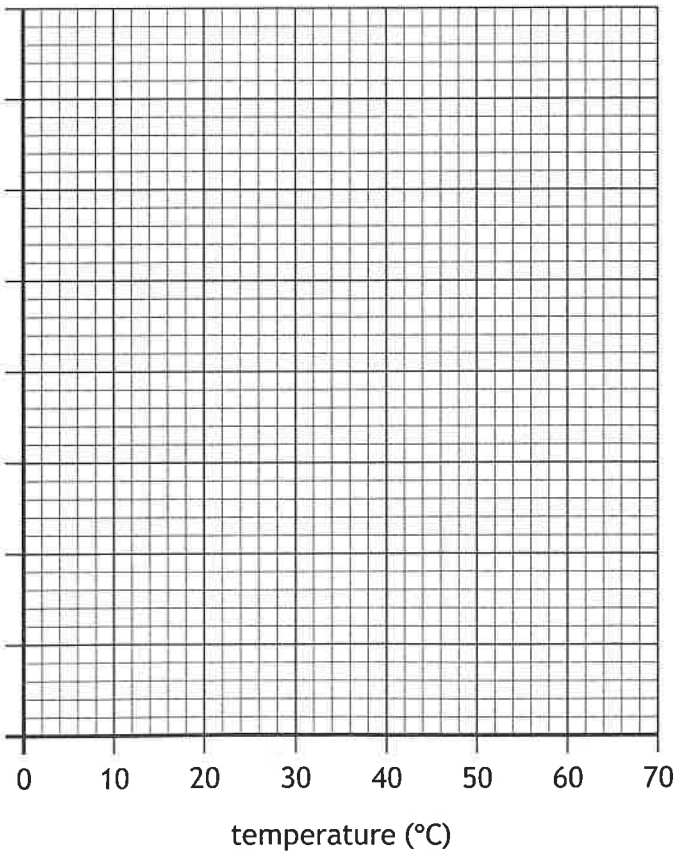
Temperature (°C)	Volume of oxygen produced (cm^3/minute)
10	1.3
20	2.5
30	3.8
50	0.7
70	0.0

(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



14. **(continued)**

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

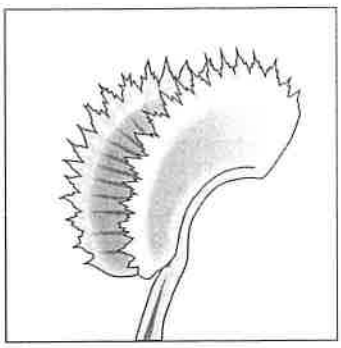
(d) Explain why no oxygen is produced at 70 °C. 2

[Turn over

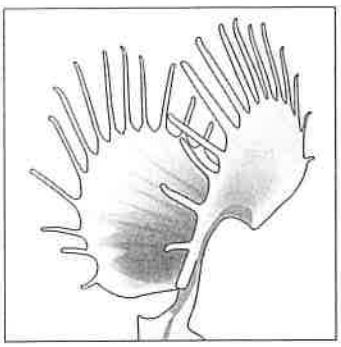
15. Venus flytrap plants grow in wetlands where the soil nitrate content is low.

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

_____

_____

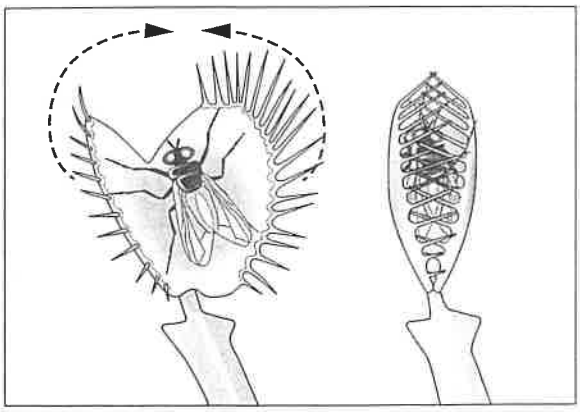
(c) During the evolution of these Venus flytrap plants, low soil nitrate content has acted as a selection pressure.

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]