National Qualifications 2022

X807/75/02

Biology
Section 1 — Questions

THURSDAY, 19 MAY

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.

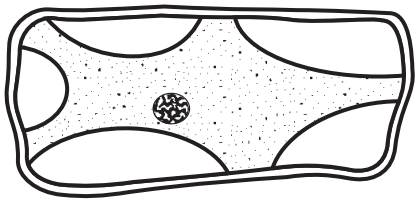
Before leaving the examination room you must give your question and answer booklet to the Invigilator; if you do not, you may lose all the marks for this paper.

SQA ©

SECTION 1 — 25 marks

Attempt ALL questions

1. The diagram shows a plant cell after being placed in a liquid for 30 minutes.



This cell has become:

A plasmolysed due to water loss

B plasmolysed due to water gain

C turgid due to water loss

D turgid due to water gain.

2. The following statements relate to the transport of molecules across membranes:

1. Energy is required.
2. Molecules move from an area of high concentration to an area of low concentration.
3. Membrane proteins are involved.

Which of the statements apply to active transport?

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

3. In an investigation into the effects of different solutions on plant cells, a beetroot cylinder was dried with a paper towel, weighed, and placed in a concentrated salt solution.

After 30 minutes, the beetroot cylinder was removed from the salt solution, dried and reweighed. It was then placed in water for 30 minutes, removed, dried and reweighed.

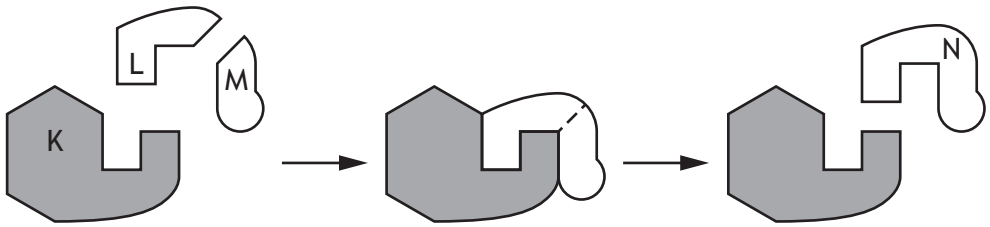
Which row in the table shows the most likely results?

	Initial mass (g)	Mass after 30 minutes in salt solution (g)	Mass after 30 minutes in water (g)
A	2.5	3.0	3.5
B	3.0	3.5	2.5
C	3.0	2.5	3.5
D	3.5	3.0	2.5

4. Where in a cell would mRNA **not** be found?

A Cell membrane
B Cytoplasm
C Nucleus
D Ribosome

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



Which row in the table identifies the labelled structures?

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

[Turn over

6. The following statements relate to cellular processes:

1. Completed in the mitochondria.
2. Affected by temperature.
3. Release oxygen.

Which of the statements are correct for aerobic respiration?

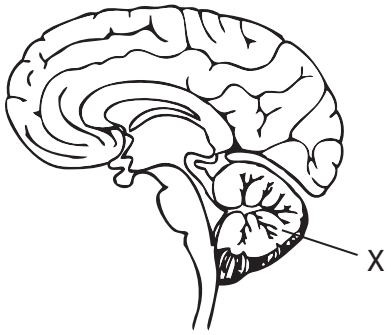
A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

7. A patient is diagnosed with a tumour in the part of the brain labelled X.



Which of the following effects on brain function might the patient experience due to the tumour?

A Memory loss

B Irregular heart rate

C Increased breathing rate

D Loss of balance

8. Which of the following shows the pathway involved in a reflex arc after a person touches a very hot object?

A Sensory neuron ⟶ brain ⟶ motor neuron

B Sensory neuron ⟶ inter neuron ⟶ motor neuron

C Motor neuron ⟶ brain ⟶ sensory neuron

D Motor neuron ⟶ inter neuron ⟶ sensory neuron

9. The flowchart shows how the water concentration of blood in the human body is controlled by a hormone.

brain detects a decrease in the water concentration of blood



a hormone is released from an endocrine gland and travels in the blood



kidneys regulate water concentration of blood



water concentration of blood returns to normal

The target tissue for this hormone is the:

A brain

B endocrine gland

C kidneys

D blood.

10. Insulin is involved in the regulation of blood glucose.

Which row in the table describes the response to an increased concentration of insulin in the blood?

	Concentration of glycogen in the liver	**Concentration of glucose in the bloodstream**
A	increases	increases
B	increases	decreases
C	decreases	increases
D	decreases	decreases

11. A recessive allele is expressed in an individual's phenotype when the:

A dominant allele has not been inherited from either parent

B dominant allele has been inherited from only one parent

C recessive allele has been inherited from only one parent

D recessive allele has not been inherited from either parent.

12. The human body can be defended against disease by:

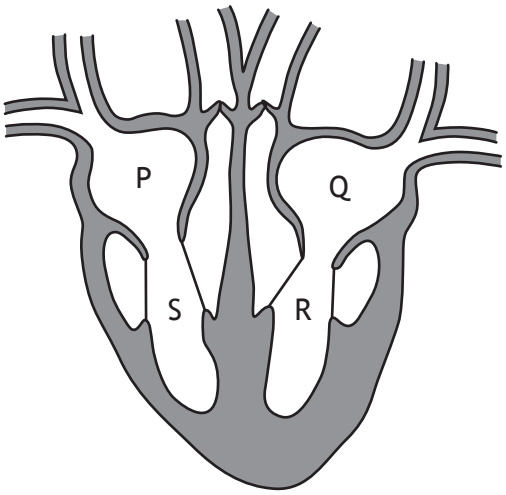
A lymphocytes producing phagocytes

B phagocytes producing antibodies

C antibodies producing lymphocytes

D lymphocytes producing antibodies.

13. The diagram represents the human heart.



Starting where **oxygenated** blood first enters the heart, identify the order of blood flow through the heart.

A Q ⟶ R ⟶ S ⟶ P

B P ⟶ S ⟶ R ⟶ Q

C Q ⟶ R ⟶ P ⟶ S

D P ⟶ S ⟶ Q ⟶ R

14. A heart attack can be caused by a blockage to a blood vessel that supplies the heart tissue with oxygen.

In which blood vessel does this blockage occur?

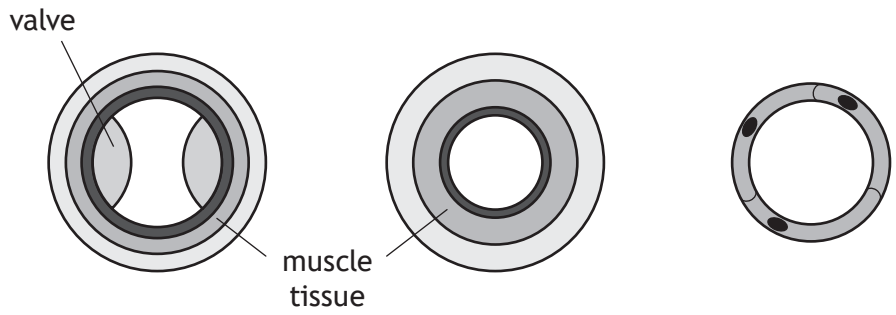
A Vena cava

B Pulmonary artery

C Coronary artery

D Pulmonary vein

15. The diagrams represent cross sections of three types of blood vessel.



Which row in the table identifies the blood vessels shown in the diagrams?

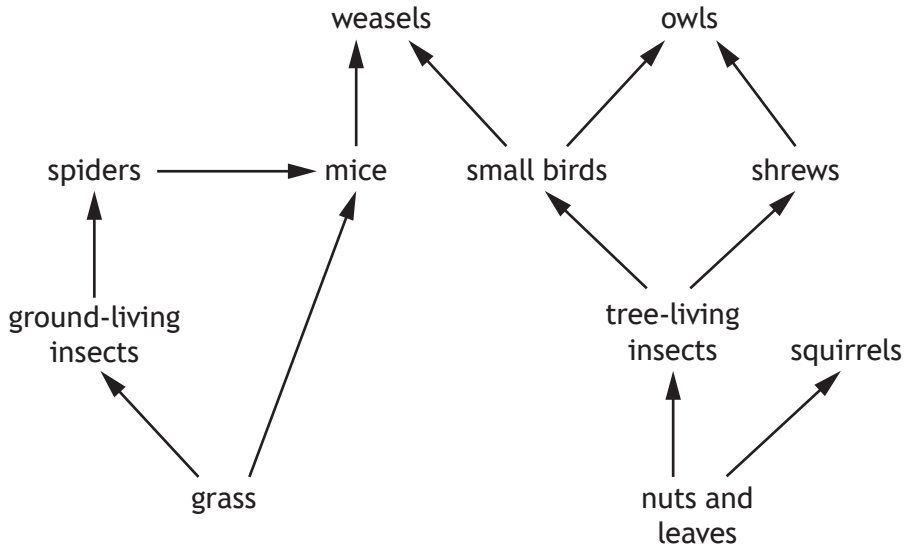
	Vessel 1	**Vessel 2**	**Vessel 3**
A	artery	vein	capillary
B	vein	artery	capillary
C	vein	capillary	artery
D	capillary	artery	vein

16. Nutrients from food are absorbed into the villi in the small intestine.
Which of the following statements is correct?

A Glucose and fatty acids are absorbed into the lacteals.
B Glucose and amino acids are absorbed into the capillaries.
C Glycerol and fatty acids are absorbed into the capillaries.
D Glycerol and amino acids are absorbed into the lacteals.

[Turn over

17. Some feeding relationships of organisms in a woodland ecosystem are shown in the food web.



Due to extreme weather conditions, the populations of tree-living and ground-living insects were greatly reduced.

This could lead to:

A an increase in small birds and a decrease in spiders

B an increase in squirrels and a decrease in spiders

C a decrease in nuts and leaves and an increase in small birds

D a decrease in weasels and an increase in owls.

18. When investigating the distribution of bluebell plants in a woodland, five quadrats were thrown randomly.

Soil moisture and bluebell abundance values were recorded for each quadrat.

The results are shown in the table.

Quadrat	Soil moisture (%)	Bluebell abundance
1	10	5
2	36	25
3	22	14
4	31	20
5	14	7

Predict the bluebell abundance if the soil moisture was 34%.

A 13

B 19

C 23

D 27

19. The following paired statement key can be used to identify some birds.

1. Has webbed feet ..... go to 2
   Does not have webbed feet ..... go to 3
2. Has a black head ..... puffin
   Has a white head ..... swan
3. Has a curved beak ..... go to 4
   Has a straight beak ..... rook
4. Has a brown head ..... curlew
   Has a black head ..... avocet

Use the information in the key to identify two features of a curlew.

A Curved beak and a brown head

B Straight beak and a white head

C Brown head and webbed feet

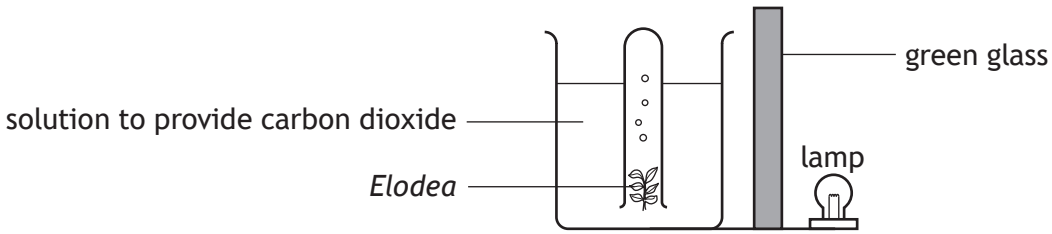
D Straight beak and webbed feet

[Turn over

20. Which row in the table describes changes in conditions that may improve the growth of plants in a greenhouse?

	Light intensity	**Carbon dioxide concentration**
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

21. An experiment was carried out to investigate the effect of green light on the rate of photosynthesis in the pondweed, *Elodea*.



Which of the following changes would provide a suitable control for this experiment?

A Replace the solution with water.

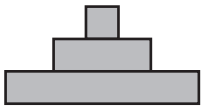
B Increase the brightness of the lamp.

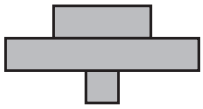
C Use a different species of pondweed.

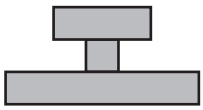
D Replace green glass with clear glass.

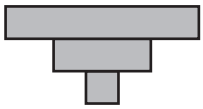
22. Identify the pyramid of energy that would represent the following food chain.

Oak tree ⟶ squirrel ⟶ fox

A 

B 

C 

D 

23. An investigation was carried out to measure the change in body mass in a population of adult locusts kept in a tank at 25 °C. The percentage of food converted into body mass was recorded over a three-week period.

The reliability of the results could be improved by:

A decreasing the length of time of the investigation

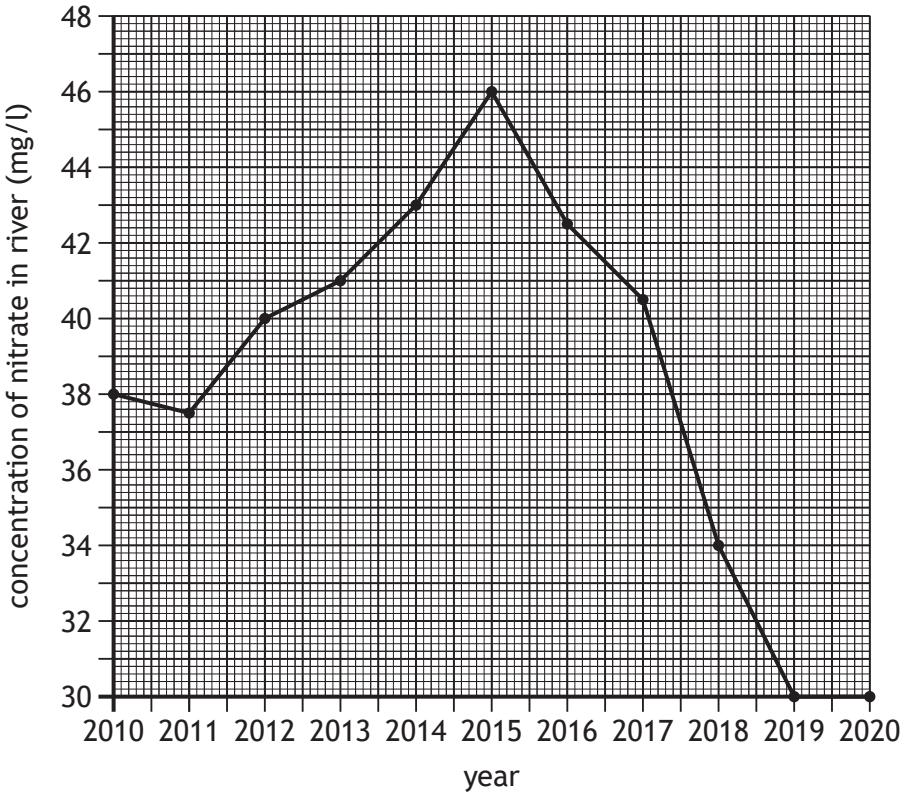
B increasing the mass of food given to the locusts

C increasing the number of locusts in the tank

D decreasing the temperature in the tank.

[Turn over

24. The graph shows the concentration of nitrate in a river measured on the first day of each year.



A valid conclusion from this data would be:

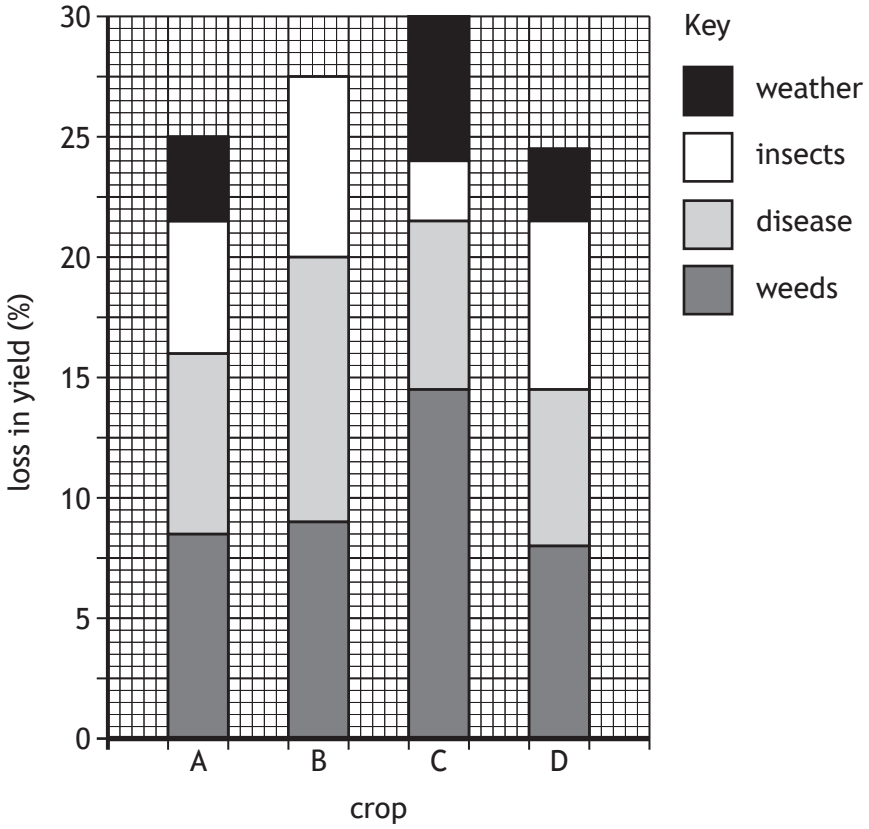
A nitrate concentration increased every year between 2010 and 2014

B there was a greater increase in nitrate concentration between 2011–2012 compared to between 2014–2015

C no nitrates were present in river water between 2019 and 2020

D the greatest decrease in nitrate concentration was between 2017 and 2018.

25. The bar chart shows the percentage loss in yield of four crops and the cause of loss.



To reduce losses, pesticides can be sprayed onto the crops to kill weeds and insects.

Predict which crop is most likely to show the greatest percentage increase in yield, when the crops are sprayed with pesticides.

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

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