

N5

National Qualifications

2023

Biology

Section 1

Thursday, 27 April

Instructions to Candidates

Candidates should enter their surname, forename(s), date of birth, Scottish candidate number and the name and level of the subject at the top of their first answer sheet.

Section 1 — 25 marks

Attempt ALL questions

The answer to each question is either A, B, C or D. There is only one correct answer to each question. Decide what your answer is, then write the question number and the letter eg 1. D, 2. A.

Sample question

ow 1. The thigh bone is called the

A. Humerus

B. Femur

C. Tibia

D. Fibula

The correct answer is B. Femur. You write Question 1. B

If you decide to change your answer, **[Braille page 2]** cancel your first answer by brailleing it out and write the answer you want.

An ow in the margin indicates a new question.

Questions marked with an asterisk differ in some respect from those in the printed paper.

You must clearly identify the question number you are attempting on your answer sheet.

Marks are shown in square brackets at the end of each question or part question.

Tactile diagrams are produced in a separately bound booklet.

[Braille page 3] SECTION 1 — 25 marks

Attempt ALL questions

ow * 1. Refer to the diagram for question 1. The diagram shows a typical plant cell. Which of the labelled structures would also be found in a typical animal cell?

- A. J and K only
- B. J and M only
- C. L and K only
- D. L and M only

ow * 2. Four equal sized cubes of potato were weighed and each placed into a different concentration of sugar solution. They were dried and weighed again after one hour.

The results are shown in the table below. Which solution had the highest sugar concentration?

[In the table, Solution is followed by: Mass of potato at start (g); Mass of potato after one hour (g).]

- A: 4.5; 3.9.
- B: 4.5; 4.3.
- C: 4.5; 4.5.
- D: 4.5; 5.5.

[Braille page 4] ow * 3. Refer to the diagram for question 3. The diagram shows the sequence of bases in a strand of DNA. Which of the following shows the complementary base sequence for this strand of DNA?

- A. GCATTGCC
- B. CGTAACGG
- C. TACGGTAA
- D. TAGCCTAA

ow 4. Which of the following four statements is true for proteins?

1. They are made in the nucleus.
2. They are affected by temperature.
3. They can be found in the cell membrane.
4. They all function as enzymes.

- A. 2 and 3 only
- B. 2 and 4 only
- C. 1, 3 and 4 only
- D. 2, 3 and 4 only

ow 5. A sample of 350 bacterial cells were modified to produce a human protein.

Only 210 of these cells successfully produced the protein. The percentage success was

- A. 60%
- B. 67%
- C. 140%
- D. 167%

[Braille page 5] ow 6. Fermentation in yeast cells occurs in the

- A. cytoplasm
- B. mitochondria
- C. plasmids
- D. ribosomes.

ow 7. An earthworm with a mass of 7 g uses up 3.5 cm^3 of oxygen in 25 minutes.

Calculate the volume of oxygen used by this earthworm in 1 minute.

- A. 0.02 cm^3
- B. 0.14 cm^3
- C. 0.5 cm^3
- D. 1.02 cm^3

ow 8. A role of stem cells in the human body is to produce

- A. antibodies for defence
- B. new skin tissue to repair a cut
- C. enzymes for digestion
- D. hormones for communication.

[Braille page 6] ow * 9. Which row in the table shows the functions controlled by each part of the brain?

[In the table below, row is followed by: Cerebrum; Medulla; Cerebellum.]

- A: coordination and balance; breathing and heart rate; conscious thought.
- B: breathing and heart rate; conscious thought; coordination and balance.
- C: conscious thought; breathing and heart rate; coordination and balance.
- D: conscious thought; coordination and balance; breathing and heart rate.

ow 10. Hormones are

- A. electrical messengers that travel along neurons
- B. chemical messengers that travel along neurons
- C. electrical messengers that travel in the bloodstream
- D. chemical messengers that travel in the bloodstream.

[Braille page 7] ow 11. A man is fertile if his semen contains a minimum of 20 million sperm per cm^3 and at least 75% of the sperm cells are active. The table below shows the results of semen analysis from four sperm samples. Identify the sample that was from an infertile man.

[In the table, sample is followed by: Number of sperm in sample (million/ cm^3); Inactive sperm (%).]

- A: 25; 20.
- B: 23; 30.
- C: 22; 25.
- D: 20; 15.

ow 12. In mice, the dominant form of one gene (B) determines black coat colour and the recessive form (b) determines brown coat colour. If two heterozygous mice were crossed, the expected phenotypes of the offspring would be

- A. 3 black: 1 brown
- B. 1 black: 1 brown
- C. all black
- D. all brown.

ow * 13. A cross section is taken through a leaf. The following describes this cross section from the upper to lower leaf **[Braille page 8]** surface and 4 different cell types, W, X, Y and Z.

The upper surface is covered with a waxy cuticle.

Cells W are found immediately below the waxy cuticle in a single layer.

Cells X are found below W. These are a densely packed layer of rectangular shaped cells arranged vertically. They contain a large number of chloroplasts.

Cells Y are found below X. These have a round shape and a loose arrangement with air spaces between cells. They also contain chloroplasts.

Cells Z surround a stoma. The cells have a thick inner cell wall.

Which row in the table below identifies the parts of the leaf?

[In the table, row is followed by: Palisade mesophyll; Spongy mesophyll; Upper epidermis; Guard cell.]

- A: X; Y; Z; W.
- B: Y; X; W; Z.
- C: W; X; Z; Y.
- D: X; Y; W; Z.

[Braille page 9] ow * 14. An investigation was carried out to compare transpiration in two different species of plant, G and H.

Transpiration was measured in species G. by placing a plant of species G growing in a plant pot on a balance. The plant had seven leaves. A sealed polythene bag enclosed the soil and plant roots in the plant pot. The plant stem and leaves were uncovered.

Which description of the set-up for species H, would allow a valid comparison in the rate of transpiration of the two species?

A. A plant of species H growing in a plant pot is placed on a balance. The plant had seven leaves. A sealed polythene bag enclosed the plant and plant pot.

B. A plant of species H growing in a plant pot is placed on a balance. The plant had five leaves. A sealed polythene bag enclosed the plant pot.

C. A plant of species H growing in a plant pot is placed on a balance. The plant had seven leaves. There is no sealed polythene bag enclosing the plant or pot.

[Braille page 10] D. A plant of species H growing in a plant pot is placed on a balance. The plant had seven leaves. A sealed polythene bag enclosed the plant pot.

ow 15. Which row in the table below describes some features of veins?

[In the table, row is followed by: Direction of blood flow; Blood pressure in vein; Width of central channel.]

A: away from the heart; high; narrow.

B: towards the heart; low; wide.

C: away from the heart; high; wide.

D: towards the heart; low; narrow.

ow * 16. Refer to the diagram for question 16. The diagram shows a villus.

Identify the nutrients from food that are absorbed into the lacteal.

A. Glucose and amino acids

B. Glucose and fatty acids

C. Glycerol and fatty acids

D. Glycerol and amino acids

ow 17. Three students carried out an investigation into the effect of exercise on heart rate. Each student measured their heart rate after completing the same exercises.

[Braille page 11] After each student's heart rate returned to its resting rate, they repeated the process. Which of the following would increase the reliability of the results?

- A. Increase the time spent exercising.
- B. Change the exercise location.
- C. Change the type of exercise each time.
- D. Increase the number of students exercising.

ow 18. In an ecosystem, a niche is defined as the

- A. place where an organism lives
- B. total number of one species living in a community
- C. role an organism plays within a community
- D. total number and variety of organisms.

ow 19. Which statement describes an abiotic factor?

- A. The spread of a disease.
- B. A period of very low temperatures.
- C. An increase in predation.
- D. An increase in competition for food.

ow * 20. Refer to the diagram for question 20. An experiment was set up to investigate the effect of changing **[Braille page 12]** carbon dioxide concentration on the rate of photosynthesis.

The results are shown in the diagram. Which of the following factors could be limiting the rate of photosynthesis at point X?

- A. Carbon dioxide concentration and light intensity
- B. Light intensity and temperature
- C. Temperature only
- D. Carbon dioxide concentration only

ow * 21. Refer to the diagram for question 21. The diagram represents a pyramid of numbers within an ecosystem.

Identify the total number of consumers.

A.....4

B...4029

C...4098

D..17606

[Braille page 13] ow * 22. The table below shows the concentration of different metal ions in the liver of a fish and in water.

[In the table, Metal is followed by: Concentration of metal ion in liver (mg/kg);
Concentration of metal ion in water (mg/l)]

Cadmium:...2.62;..0.004

Copper:.....13.28;..0.04

Iron:.....494.0;...0.76

Zinc:.....55.79;..0.07

The bioaccumulation factor (BAF) of metals can be calculated using the following formula:

$$\text{BAF} = \frac{\text{concentration of metal ion in liver}}{\text{concentration of metal ion in water}}$$

The metal with the highest bioaccumulation factor is

A. cadmium

B. copper

C. iron

D. zinc.

ow * 23. Refer to the graph for question 23. A weather event called El Niño occurs in the Galapagos Islands every three years.

[Braille page 14] During this event, the iguanas (a type of lizard) on the islands can decrease in body length due to lack of food.

Scientists calculated the decrease in body length of the iguanas and recorded their survival time. The results are shown in the graph.

Which of the following statements is true?

A. The iguanas that had the least decrease in body length survived for the longest time.

B. The decrease in body length made no difference to the survival time of the iguanas.

C. The iguanas that had the greatest decrease in body length survived for the longest time.

D. The iguanas that had the greatest decrease in body length survived for the shortest time.

ow 24. Which of the following is the only source of new alleles in a population?

A. Mutation

B. Natural selection

C. Isolation

D. Speciation

ow 25. Nematode worms can be used by farmers to decrease the number of insects that damage their crops.

[Braille page 15] This describes the use of

A. GM crops

B. biological control

C. pesticides

D. fertilisers.

[END OF SECTION 1]