



# Cambridge IGCSE™

## BIOLOGY

0610/21

Paper 2 Multiple Choice (Extended)

October/November 2023

45 minutes

You must answer on the multiple choice answer sheet.



You will need: Multiple choice answer sheet  
Soft clean eraser  
Soft pencil (type B or HB is recommended)

### INSTRUCTIONS

- There are **forty** questions on this paper. Answer **all** questions.
- For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

### INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.

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This document has **16** pages.

1 Some processes carried out by living organisms are listed.

- 1 egestion
- 2 excretion
- 3 reproduction
- 4 respiration

Which processes are carried out by **all** living organisms?

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

2 The scientific name for humans is *Homo sapiens*.

What does *Homo* refer to?

- A mammal
- B genus
- C kingdom
- D species

3 Some structures found in cells are listed.

- 1 cell membrane
- 2 cell wall
- 3 mitochondria
- 4 nucleus

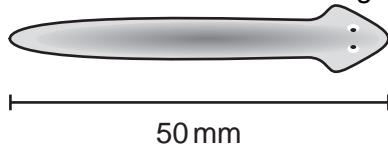
Which structures are found in prokaryotic cells?

- A 1 and 2
- B 1 and 4
- C 2 and 3
- D 3 and 4

4 In a mesophyll cell, where are chloroplasts found?

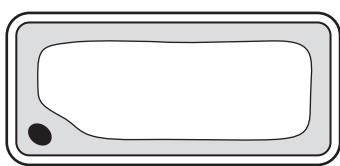
- A between the cell wall and the cell membrane
- B in the cytoplasm
- C in the nucleus
- D in the vacuole

- 5 The diagram shows a flatworm. The flatworm has been magnified by  $\times 100$ .

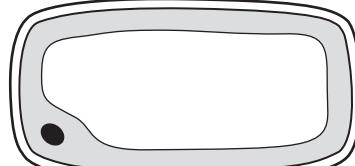


What is the actual size of the flatworm?

- A**  $0.5\text{ }\mu\text{m}$       **B**  $5\text{ }\mu\text{m}$       **C**  $50\text{ }\mu\text{m}$       **D**  $500\text{ }\mu\text{m}$
- 6 The diagrams show how a cell appears under the microscope at the start of an experiment and after it has been placed in a dilute solution of salts for 5 minutes.



start of the experiment



after placing in a dilute solution of salts

- Which statement explains what happens?
- A** Dissolved salts enter the cell by diffusion.  
**B** Dissolved salts leave the cell by diffusion.  
**C** Water enters the cell by osmosis.  
**D** Water leaves the cell by osmosis.
- 7 The concentration of nitrate ions is higher inside a root hair cell than in the soil.

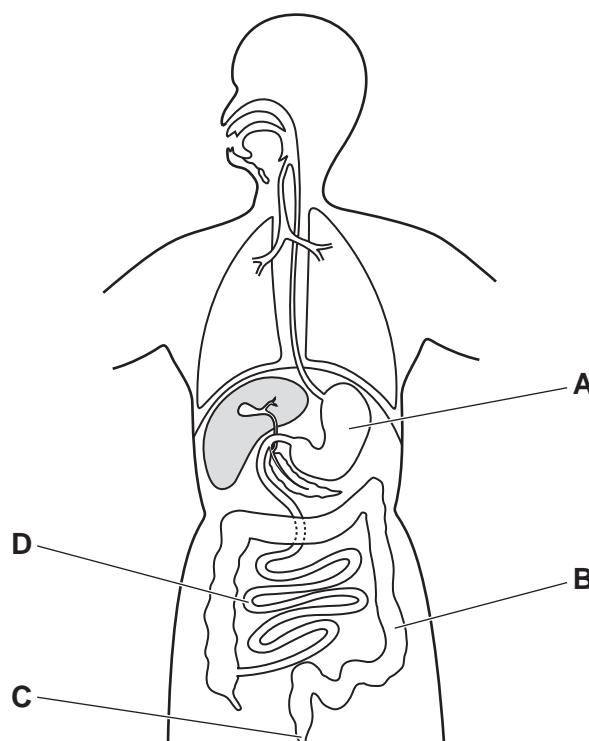
What would be required for the absorption of nitrate ions into the root hair cell?

- 1 mitochondria
  - 2 oxygen
  - 3 membrane proteins
  - 4 cell wall
- A** 1, 2, 3 and 4  
**B** 1, 2 and 3 only  
**C** 1 and 2 only  
**D** 1 only

- 8 What is the colour change shown by Benedict's solution when heated with a reducing sugar?
- A blue to purple
  - B blue to red
  - C brown to blue-black
  - D red to yellow

- 9 The diagram shows the digestive system.

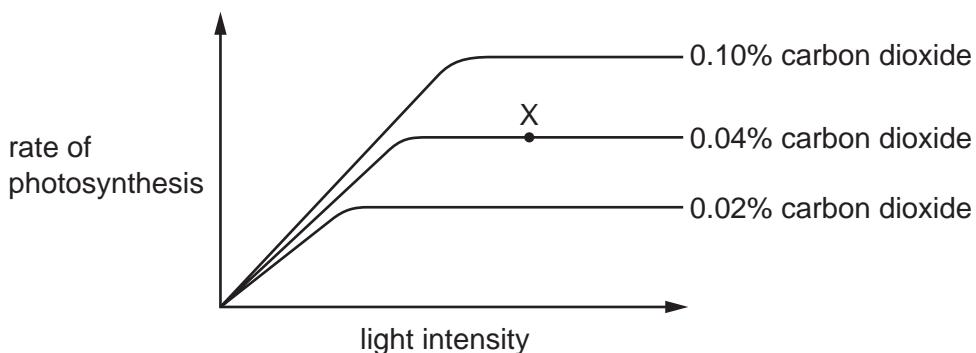
Which part absorbs the most water?



- 10 Which statement is correct?

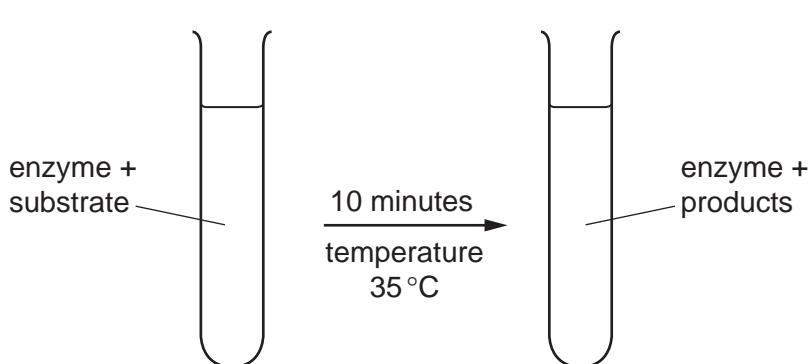
- A The active site of an enzyme has the same shape as the substrate.
- B The active site is not affected by changes in temperature.
- C The shape of the active site of an enzyme is complementary to its substrate.
- D The substrate and product combine at the active site.

- 11 The graph shows how the rate of photosynthesis of a plant changes with light intensity, at three different carbon dioxide concentrations. In each case the temperature is 15°C.



What is the limiting factor for the rate of photosynthesis at point X on the graph?

- A carbon dioxide concentration
  - B light intensity
  - C surface area of the plant
  - D temperature
- 12 The diagram shows a test-tube at the start and at the end of an enzyme experiment.



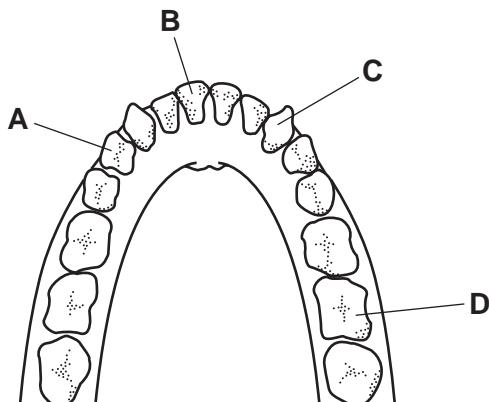
At the end of the experiment, the mixture in the test-tube contains glycerol.

Which row correctly identifies the enzyme and the substrate it acts on?

	enzyme	substrate it acts on
<b>A</b>	amylase	fat
<b>B</b>	amylase	glucose
<b>C</b>	lipase	fat
<b>D</b>	lipase	glucose

13 The diagram shows the teeth in the lower jaw of a human.

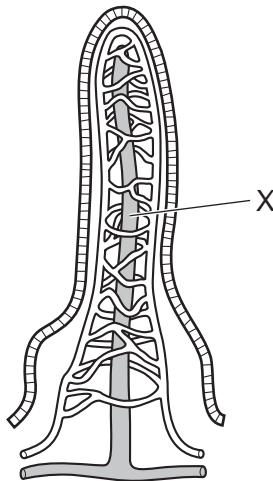
Which tooth is a molar?



14 What is meant by chemical digestion?

- A Large insoluble molecules are broken down into small soluble molecules.
- B Large soluble molecules are broken down into small insoluble molecules.
- C Small insoluble molecules are built up into large soluble molecules.
- D Small soluble molecules are built up into large insoluble molecules.

15 The diagram shows a villus in the small intestine.



What is absorbed at X?

- A fatty acids
- B glucose
- C glycogen
- D starch

**16** What is a description of transpiration?

- A** exchange of gases between the leaf and the atmosphere
- B** loss of water vapour from the leaves of a plant
- C** movement of water from the roots to the leaves
- D** movement of water through the cells of the leaf

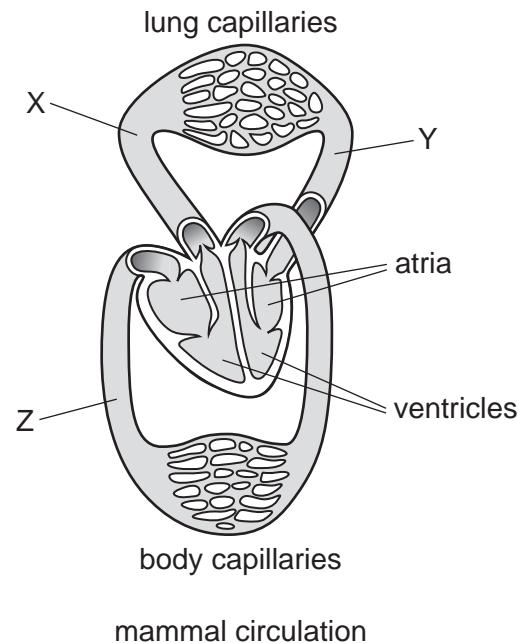
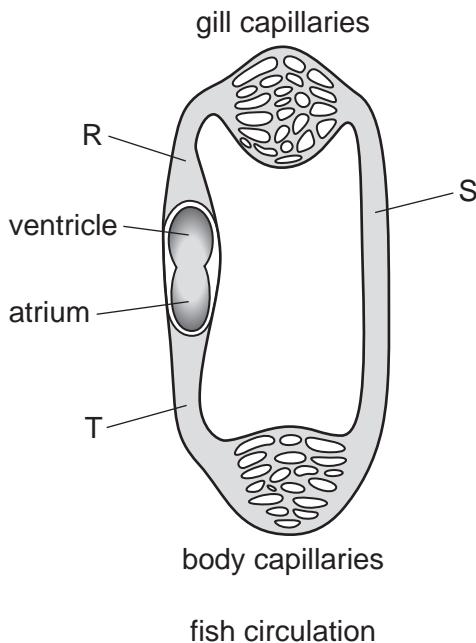
**17** Parts of a plant are listed.

- 1 mesophyll cells
- 2 root cortex cells
- 3 root hair cells
- 4 xylem vessels

What is the pathway taken by water in the plant?

- A**  $1 \rightarrow 4 \rightarrow 2 \rightarrow 3$
- B**  $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$
- C**  $3 \rightarrow 1 \rightarrow 4 \rightarrow 2$
- D**  $3 \rightarrow 2 \rightarrow 4 \rightarrow 1$

**18** The diagrams show the single circulation of a fish and the double circulation of a mammal.



Which letters represent areas with the most oxygenated blood?

- A** R and X
- B** S and Y
- C** T and Y
- D** T and Z

**19** What is the role of lymphocytes in the blood?

- A** antibody production
- B** blood clotting
- C** phagocytosis
- D** oxygen transport

**20** A patient was injected with antibodies after being bitten by a poisonous snake. The patient recovered and survived.

What describes the effect of the injection in the patient's body?

	active immunity	passive immunity	memory cells produced	
<b>A</b>	✓	✗	✓	key
<b>B</b>	✓	✗	✗	✓ = yes
<b>C</b>	✗	✓	✓	✗ = no
<b>D</b>	✗	✓	✗	

**21** Which table correctly shows the difference in composition of inspired air compared with expired air?

**A**

	inspired air	expired air
oxygen	less	more
carbon dioxide	less	more

**B**

	inspired air	expired air
oxygen	less	more
carbon dioxide	more	less

**C**

	inspired air	expired air
oxygen	more	less
carbon dioxide	less	more

**D**

	inspired air	expired air
oxygen	more	less
carbon dioxide	more	less

- 22** Which row shows the correct combination of muscle contractions and the pressure in the thorax when breathing out?

	internal intercostal muscles	external intercostal muscles	diaphragm	pressure in thorax
<b>A</b>	contracted	contracted	contracted	high
<b>B</b>	contracted	relaxed	relaxed	high
<b>C</b>	relaxed	contracted	contracted	high
<b>D</b>	relaxed	relaxed	relaxed	low

- 23** Three statements about anaerobic respiration are listed.

- 1 In humans, the product is lactic acid.
- 2 In yeast, the product is lactic acid.
- 3 It releases more energy per glucose molecule than aerobic respiration.

Which statements are correct?

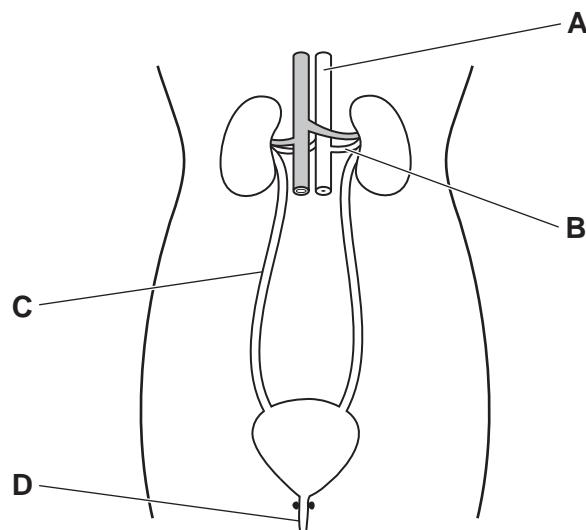
- A** 1, 2 and 3      **B** 1 and 2 only      **C** 1 only      **D** 2 and 3 only

- 24** What is the balanced chemical equation for a type of respiration that occurs in yeast?

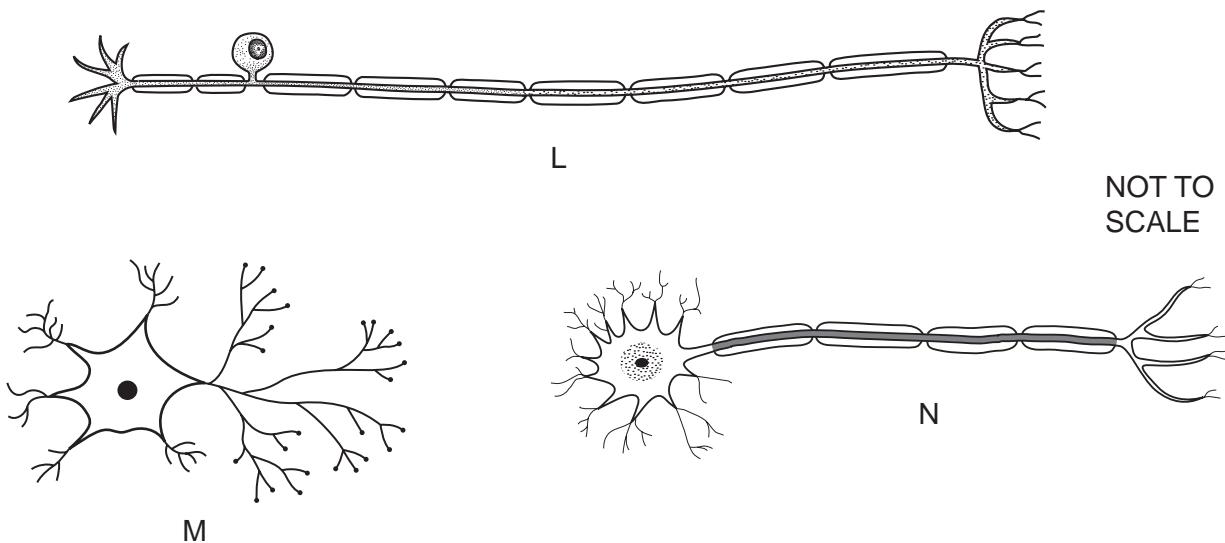
- A**  $\text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 \rightarrow \text{CO}_2 + 6\text{H}_2\text{O}$
- B**  $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
- C**  $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$
- D**  $2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2 \rightarrow \text{C}_6\text{H}_{12}\text{O}_6$

**25** The diagram shows the human excretory system.

Which labelled structure is the urethra?



**26** The diagrams show three types of neurones.



Which sequence shows the direction that impulses will travel during a reflex action?

- A** L → M → N
- B** M → L → N
- C** M → N → L
- D** N → M → L

**27** Which statement about rods and cones in the eye is correct?

- A** Both rods and cones detect different colours of light.
- B** Only cones are present in the blind spot.
- C** Rods are more sensitive than cones in low light intensity.
- D** There are three types of rods but only one type of cone.

**28** Which diseases can be successfully treated with antibiotics?

	diseases caused by bacteria	rickets	diseases caused by viruses	
<b>A</b>	✓	✓	✓	key
<b>B</b>	✓	✗	✗	✓ = can be treated
<b>C</b>	✗	✓	✗	✗ = cannot be treated
<b>D</b>	✗	✗	✓	

**29** Which statement about human sexual reproduction is correct?

- A** All gametes are haploid.
- B** Fertilisation occurs when two diploid nuclei fuse.
- C** The sperm is the male zygote.
- D** Sexual reproduction results in haploid offspring.

**30** Where is oestrogen produced?

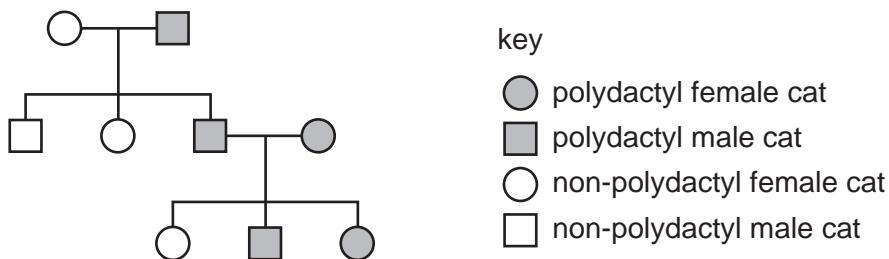
- A** cervix
- B** ovaries
- C** oviducts
- D** uterus

**31** Which row shows correct information about mitosis?

	cells produced by mitosis	number of chromosomes in the daughter cells compared to the parent cell
<b>A</b>	are genetically different to the parent cell	half the number
<b>B</b>	are genetically different to the parent cell	the same number
<b>C</b>	are genetically identical to the parent cell	half the number
<b>D</b>	are genetically identical to the parent cell	the same number

**32** Polydactyly is a condition that can occur in cats and results in affected individuals having extra toes.

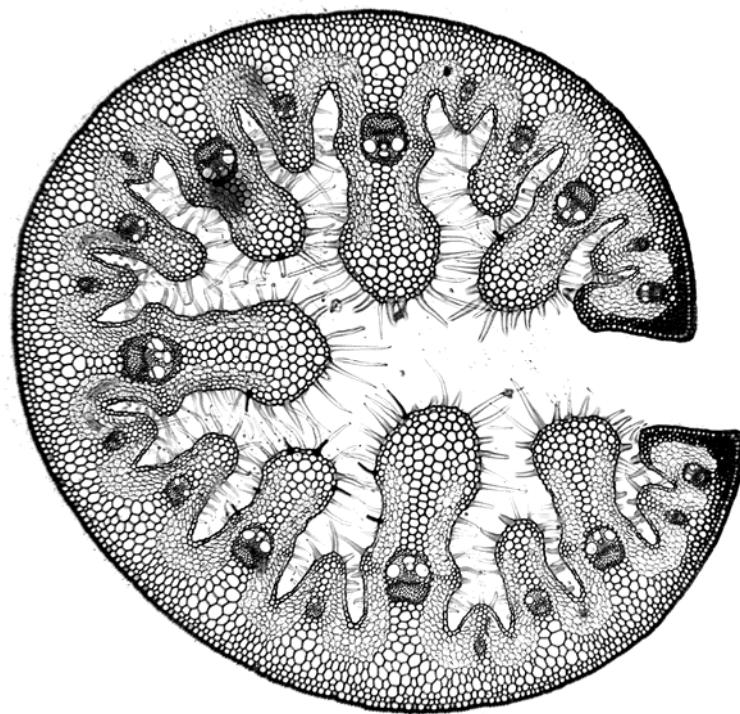
The diagram shows the inheritance of the condition in a family of cats.



What does the family tree show about the allele for polydactyly?

- A** It is codominant.
- B** It could be dominant or recessive.
- C** It is dominant.
- D** It is recessive.

- 33 The photomicrograph shows a cross-section through a marram grass leaf.



Which feature is an adaptation of a xerophyte?

- A the presence of chloroplasts
- B the presence of fine hairs
- C the presence of phloem tissue
- D the presence of xylem vessels

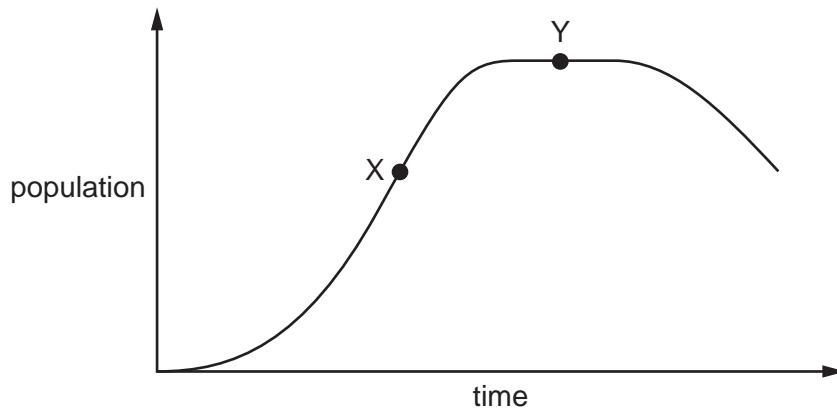
- 34 Some statements about mutations are given.

- 1 A random change in the amino acid sequence in DNA causes gene mutation.
- 2 A mutation is a genetic change.
- 3 Ionising radiation decreases the rate of mutation.
- 4 New alleles are formed by mutations.

Which statements are correct?

- A 1 and 3
- B 1 and 4
- C 2 and 3
- D 2 and 4

- 35 The graph shows the growth of a population of rabbits in one area.



Which statements are correct?

- 1 At X, the birth rate is higher than the death rate.
- 2 At X, there are no deaths and the population is limited by a lack of food.
- 3 At Y, the birth rate and death rate are equal.

- A** 1 and 2      **B** 1 and 3      **C** 1 only      **D** 2 only

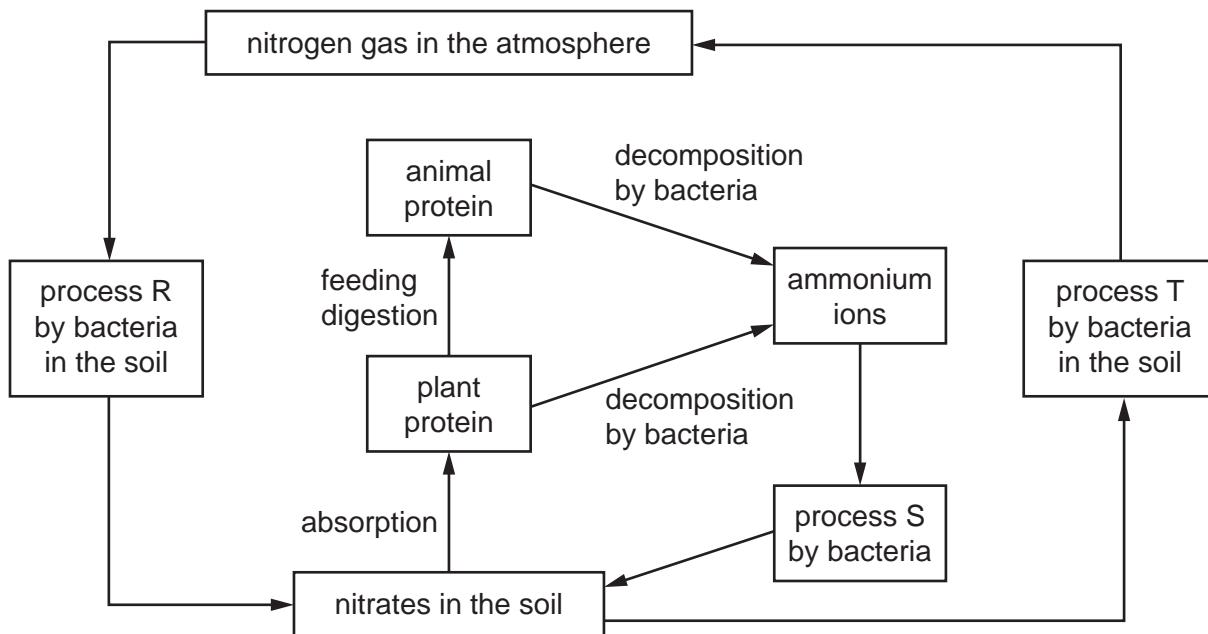
- 36 In guinea pigs, the allele for black fur is dominant and the allele for white fur is recessive.

A test cross can be used to determine the genotype of a guinea pig with black fur.

What would be the expected result of the test cross if the guinea pig with black fur was homozygous?

- A** 50% black, 50% white  
**B** 25% black, 75% white  
**C** 100% black  
**D** 100% white

37 The diagram shows part of the nitrogen cycle.



Which row shows the correct processes for R, S and T?

	denitrification	nitrogen fixation	nitrification
A	R	S	T
B	T	S	R
C	T	R	S
D	S	R	T

38 During eutrophication, what causes the death of fish?

- A increased growth of producers
- B increased photosynthesis by producers
- C decreased concentration of carbon dioxide in the water
- D decreased concentration of oxygen in the water

39 Which product is made using an enzyme rather than bacteria or fungi?

- A insulin
- B penicillin
- C lactose-free milk
- D mycoprotein

40 Some ways in which humans make use of organisms are listed.

- 1 using yeast to produce ethanol
- 2 artificial selection of sheep with thick wool
- 3 using bacteria to produce human substances

What are examples of genetic modification?

- A 1 and 3      B 1 only      C 2 and 3      D 3 only

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