Cambridge Assessment International Education

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.

This document has **16** pages.

[Turn over

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?

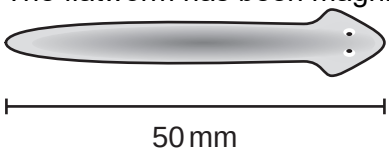
A between the cell wall and the cell membrane

B in the cytoplasm

C in the nucleus

D in the vacuole

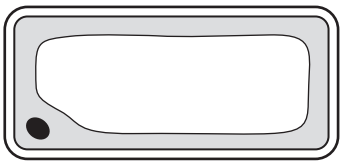
5 The diagram shows a flatworm. The flatworm has been magnified by ×100.



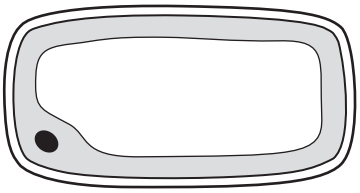
What is the actual size of the flatworm?

A 0.5 μm **B** 5 μm **C** 50 μm **D** 500 μm

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

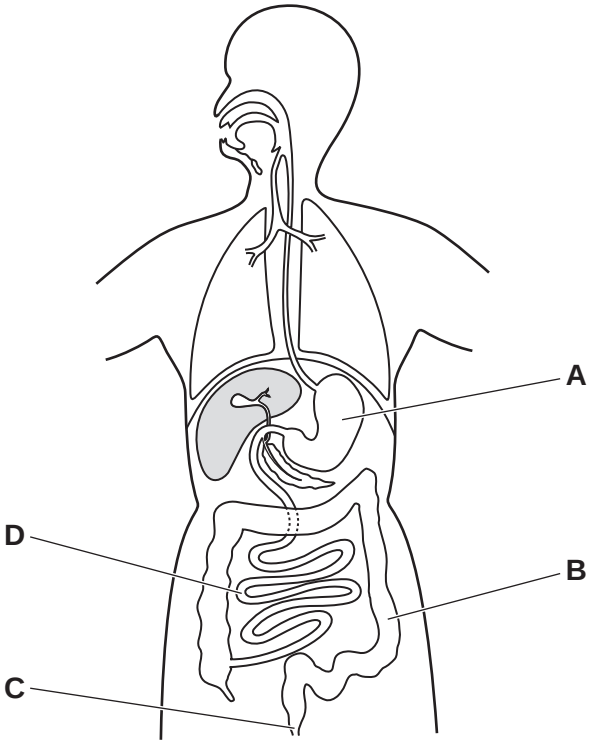
B blue to red

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?

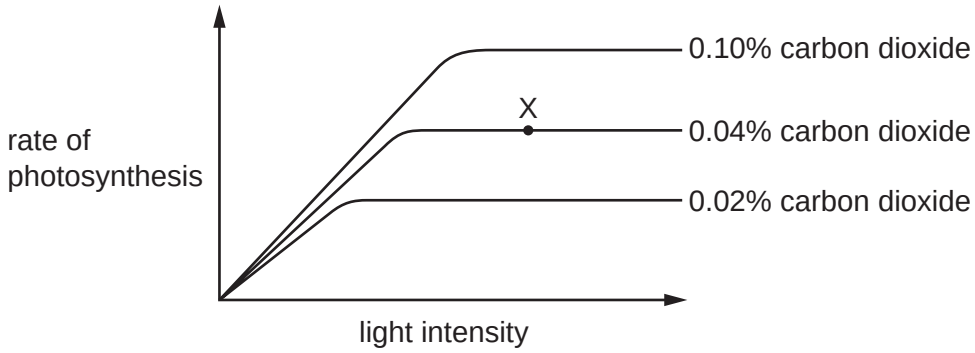
A The active site of an enzyme has the same shape as the substrate.

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?

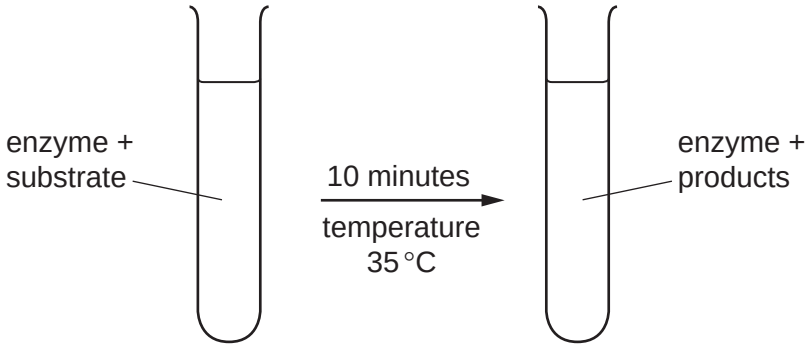
A carbon dioxide concentration

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.



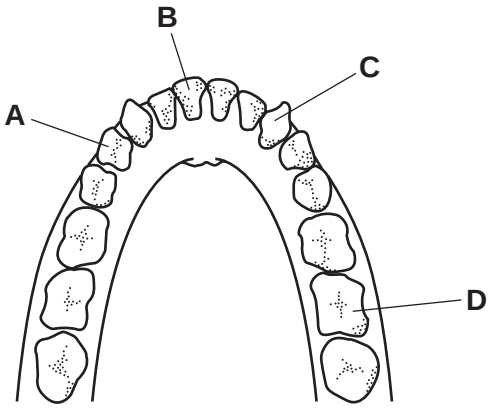
At the end of the experiment, the mixture in the test-tube contains glycerol.

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

	enzyme	substrate it acts on
A	amylase	fat
B	amylase	glucose
C	lipase	fat
D	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?

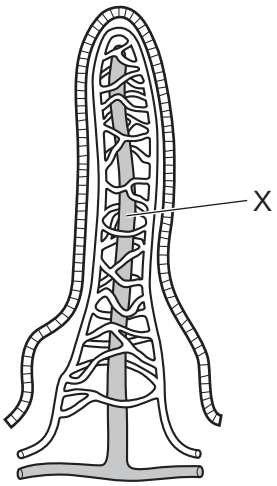
A Large insoluble molecules are broken down into small soluble molecules.

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?

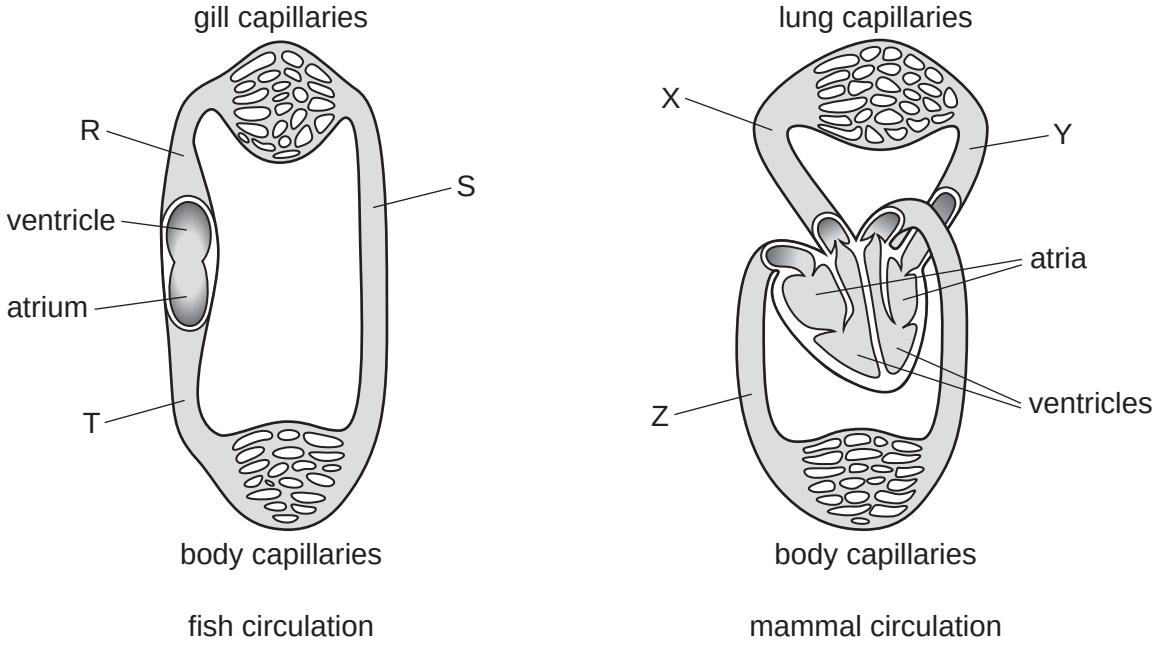
A $1 \rightarrow 4 \rightarrow 2 \rightarrow 3$

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
A	✓	✗	✓
B	✓	✗	✗
C	✗	✓	✓
D	✗	✓	✗

key

✓ = yes

✗ = no

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
A	contracted	contracted	contracted	high
B	contracted	relaxed	relaxed	high
C	relaxed	contracted	contracted	high
D	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 $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + 6H_2O$

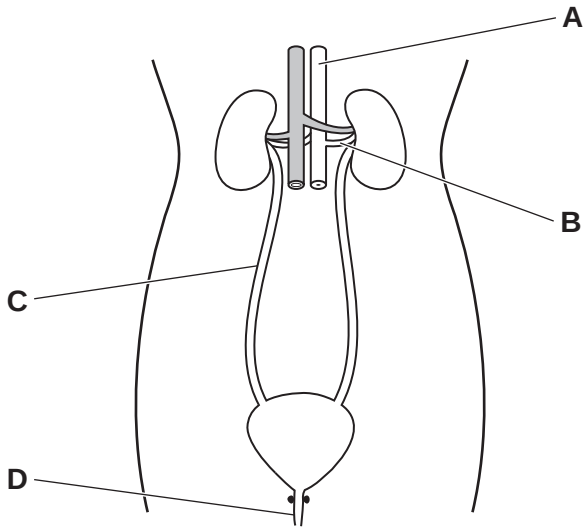
B $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

C $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$

D $2C_2H_5OH + 2CO_2 \rightarrow C_6H_{12}O_6$

25 The diagram shows the human excretory system.

Which labelled structure is the urethra?



26 The diagrams show three types of neurones.

L

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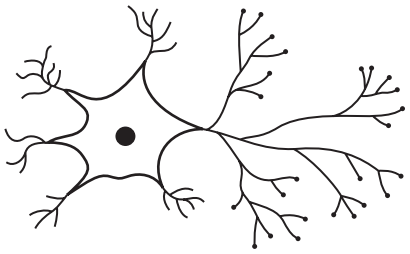
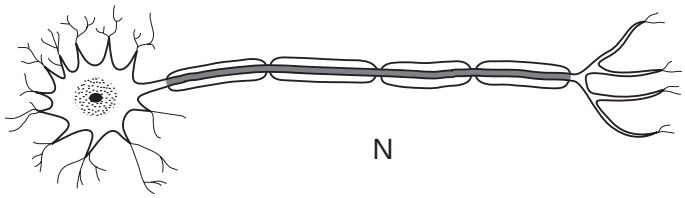


M



N

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
A	✓	✓	✓
B	✓	✗	✗
C	✗	✓	✗
D	✗	✗	✓

key

✓ = can be treated

✗ = cannot be treated

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

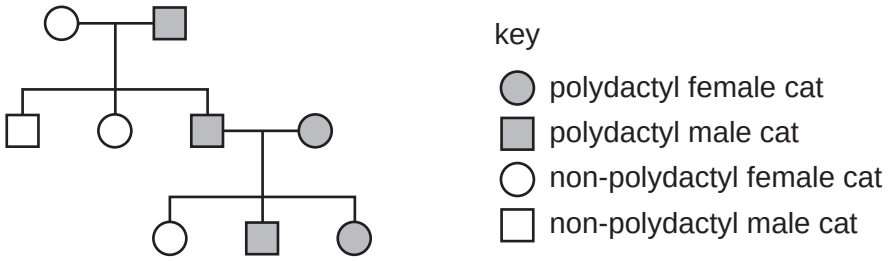
D uterus

31 Which row shows correct information about mitosis?

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

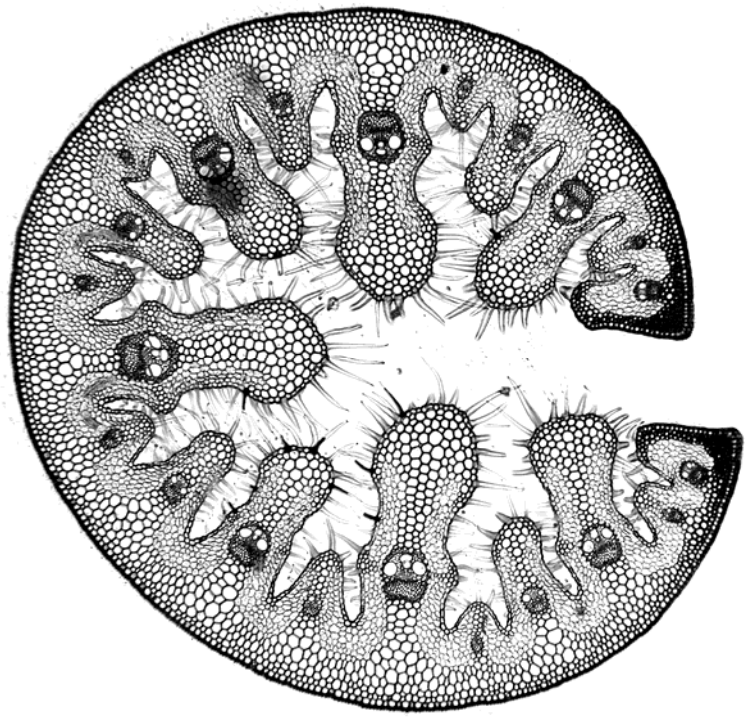
A It is codominant.

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.

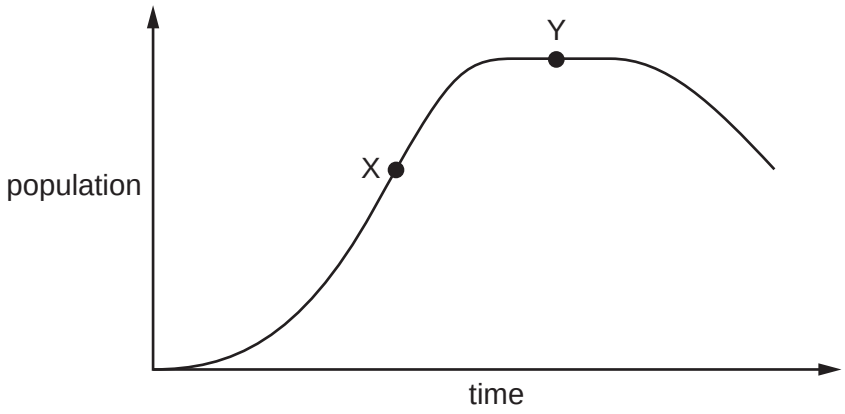
3 Ionising radiation decreases the rate of mutation.

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?

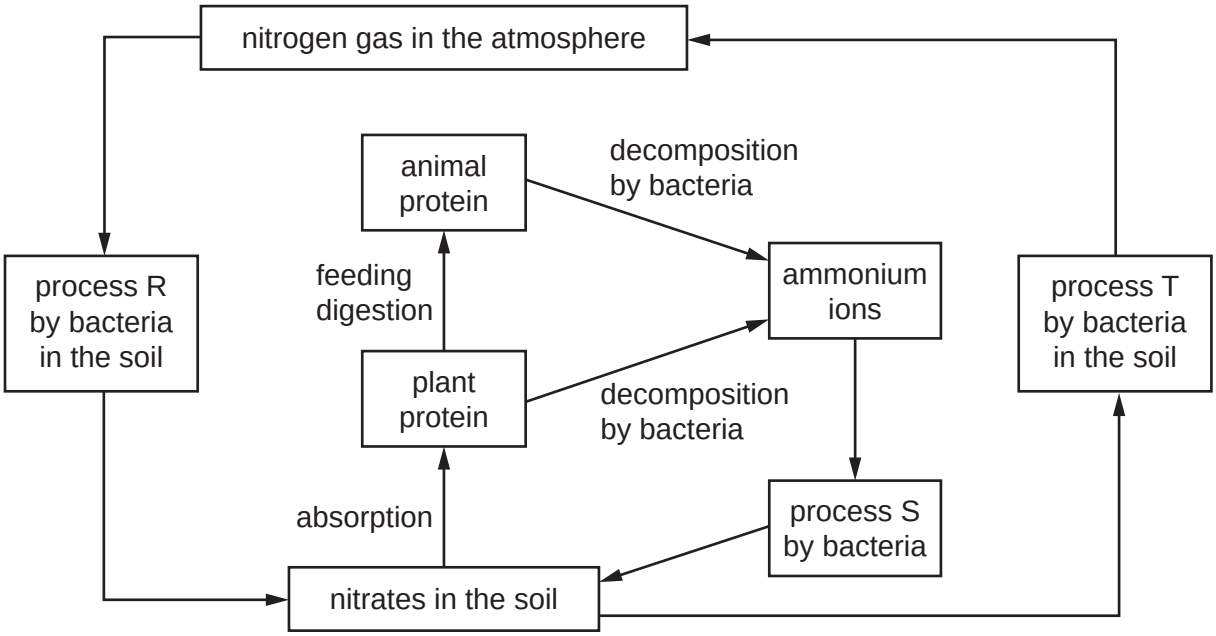
A 50% black, 50% white

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