Cambridge Assessment International Education

Cambridge IGCSE™

BIOLOGY **0610/21**

Paper 2 Multiple Choice (Extended) **October/November 2022**

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 **20** pages. Any blank pages are indicated.

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1 Which process provides an organism with the raw materials needed for tissue repair?

A excretion

B growth

C nutrition

D respiration

2 Which name is given to a group of individuals that can reproduce to produce fertile offspring?

A a genus

B a kingdom

C a species

D an organ system

3 Root hair cells are found on plant roots.

Which feature is present in a root hair cell but **not** in a sperm cell?

A cell membrane

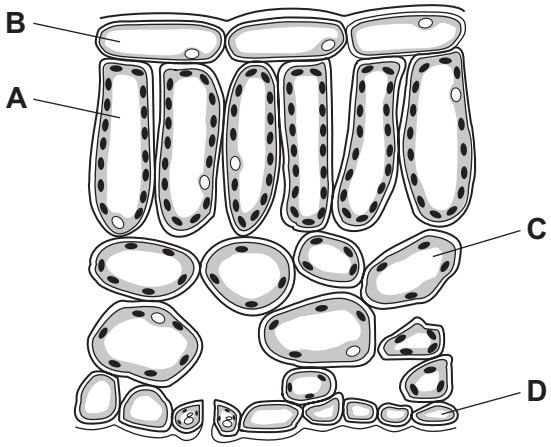
B cell wall

C chloroplasts

D cytoplasm

4 The diagram shows a cross-section of part of a leaf.

Which type of cell carries out the most photosynthesis?



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5 Some examples of substances moving across membranes are listed.

1 glucose molecules into the epithelium that lines the small intestine

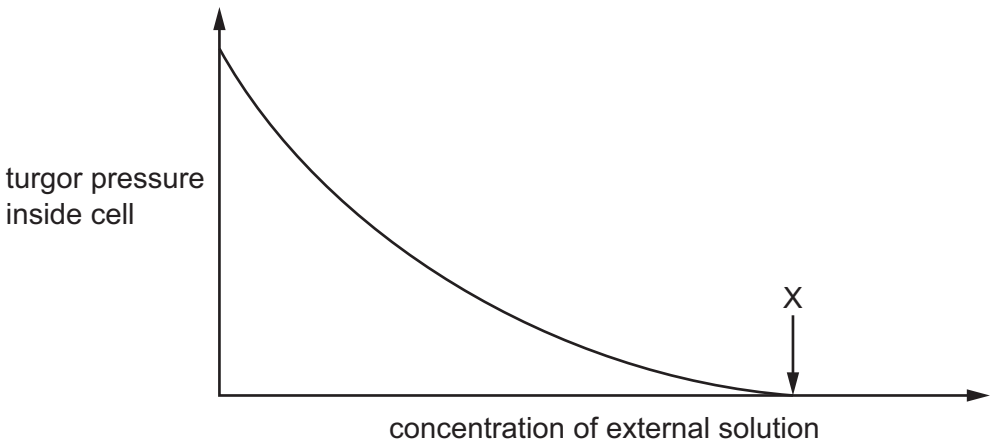
2 nitrate ions from a dilute solution in soil into a more concentrated solution in root hair cells

3 water molecules from mesophyll cells into the air spaces of a leaf

For which examples must oxygen be present?

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

6 The graph shows how the turgor pressure inside a plant cell varies when the cell is placed in external solutions of different concentrations.



What is the state of the cell at point X?

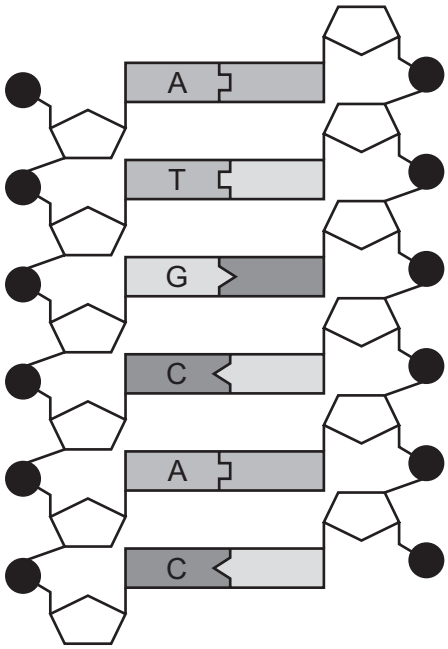
A It has gained water and is flaccid.

B It has gained water and is turgid.

C It has lost water and is flaccid.

D It has lost water and is turgid.

7 The diagram shows a length of DNA.



What is the sequence of bases in the unlabelled strand of DNA, starting from the top of the diagram?

A CGTACA **B** TACGTG **C** GCTAGA **D** ATGCAC

8 Amylase and pepsin are digestive enzymes. The shapes of their active sites are different.

What causes the difference in the shapes of their active sites?

A They are produced by different parts of the digestive system.

B They have different pH ranges.

C They contain different sequences of amino acids.

D They are made of different proportions of the bases A, T, C and G.

9 The rate of an enzyme-controlled reaction decreases when the temperature falls below the optimum.

Some possible reasons why it slows down are listed.

1 The enzyme molecules are denatured.

2 The molecules have less kinetic energy.

3 The shapes of the substrate molecules are changed.

4 There are less frequent collisions between molecules.

Which reasons cause the reaction to slow down?

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

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10 Which description of an enzyme-catalysed reaction is correct?

A The substrate binds to an enzyme with the same shape and a product is formed.

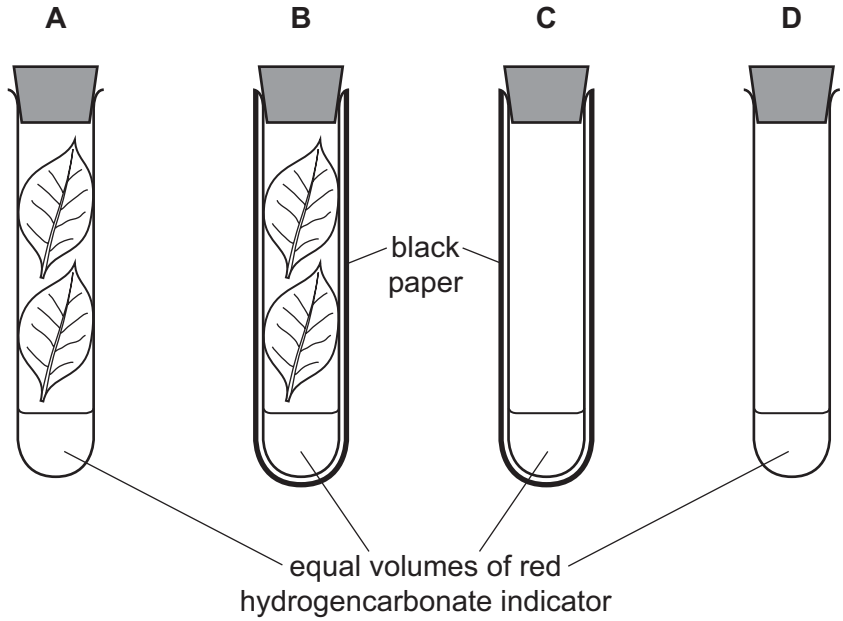
B The product binds to an enzyme with the same shape and a substrate is formed.

C The product binds to an enzyme with a complementary shape and a substrate is formed.

D The substrate binds to an enzyme with a complementary shape and a product is formed.

11 Four test-tubes are set up as shown. The test-tubes are kept at 20 °C in a water-bath, in the light, for two hours.

In which test-tube does the hydrogencarbonate indicator turn yellow?



12 The substances listed are found in the leaf of a plant.

Which substance is obtained from the soil?

A carbon dioxide

B chlorophyll

C glucose

D mineral ions

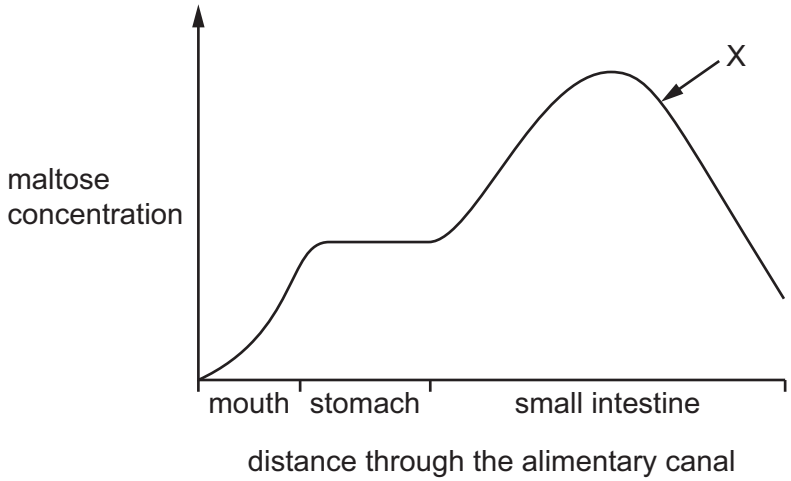
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13 The cholera bacterium produces toxins that cause chloride ions to be secreted into the small intestine.

What is the immediate effect of this on the water potential of blood in the intestinal capillaries, and on the water potential of the contents of the small intestine?

	water potential	
	blood in capillaries	contents of small intestine
A	lowered	lowered
B	lowered	raised
C	raised	lowered
D	raised	raised

14 The graph shows the concentration of maltose in different parts of the alimentary canal.



What causes the change in concentration at X?

A absorption of maltose

B action of amylase

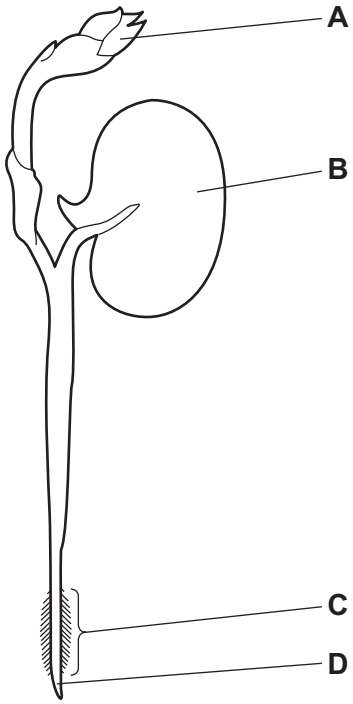
C action of maltase

D assimilation of maltose

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15 The diagram shows a bean seedling soon after it has germinated.

Where is most water absorbed?

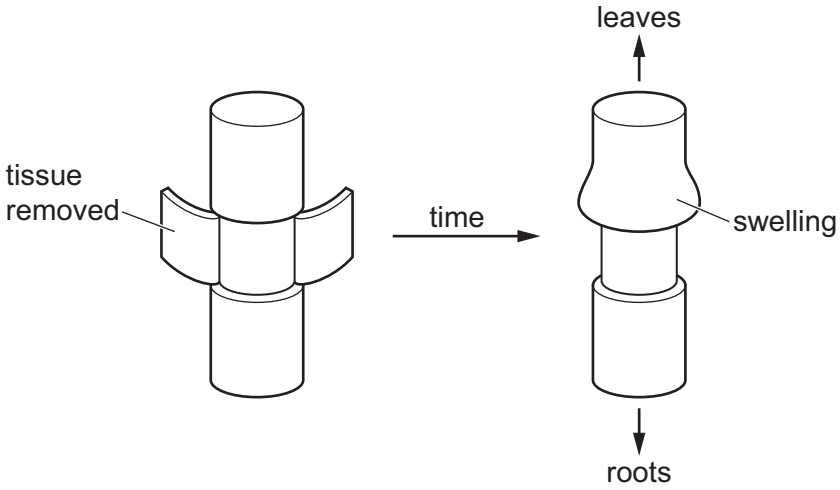


16 Scientists investigate the movement of substances in a plant.

They cut a ring of tissue from the stem.

Removing the tissue removes some of the transport vessels found around the edge of the stem.

A few days later they notice swelling above the area where the tissue has been removed.



What causes the swelling?

A Phloem vessels have been removed and sucrose cannot move to the sink.

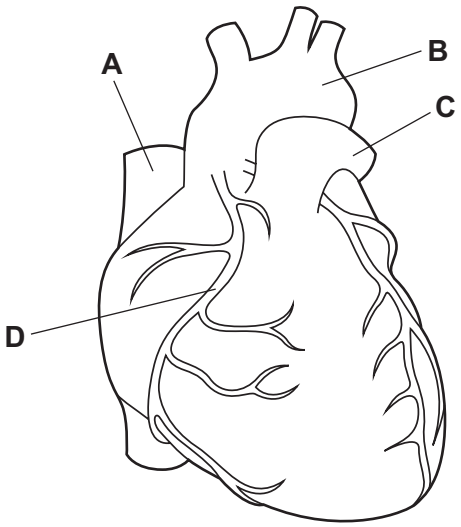
B Phloem vessels have been removed and sucrose cannot move to the source.

C Xylem vessels have been removed and minerals cannot move to the sink.

D Xylem vessels have been removed and minerals cannot move to the source.

17 The diagram shows the outside of a human heart.

Which structure is a coronary artery?



18 What happens in the heart when blood flows from the atria to the ventricles?

	atria muscles	atrioventricular valves	ventricle muscles
A	contract	close	relax
B	contract	open	relax
C	relax	close	contract
D	relax	open	contract

19 *Campylobacter* is a bacterium that can cause food poisoning.

Which word describes *Campylobacter*?

A antibody

B disease

C pathogen

D symptom

20 What is the approximate percentage of oxygen in expired air?

A 0.04% **B** 4% **C** 16% **D** 21%

21 Which row shows processes that all use energy from respiration?

	diffusion	cell division	osmosis	muscle contraction	passage of nerve impulses	active transport
A	✗	✓	✓	✓	✓	✓
B	✓	✗	✓	✗	✗	✗
C	✓	✗	✗	✓	✗	✗
D	✗	✓	✗	✓	✓	✓

key

✓ = uses energy from respiration

✗ = does not use energy from respiration

22 What is the word equation for anaerobic respiration in yeast?

A glucose → alcohol + carbon dioxide

B glucose → alcohol

C glucose → lactic acid + carbon dioxide

D glucose → lactic acid

23 Which substances are excreted from the human body?

1 carbon dioxide

2 urea

3 water

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

24 What is a response to a low concentration of glucose in the blood?

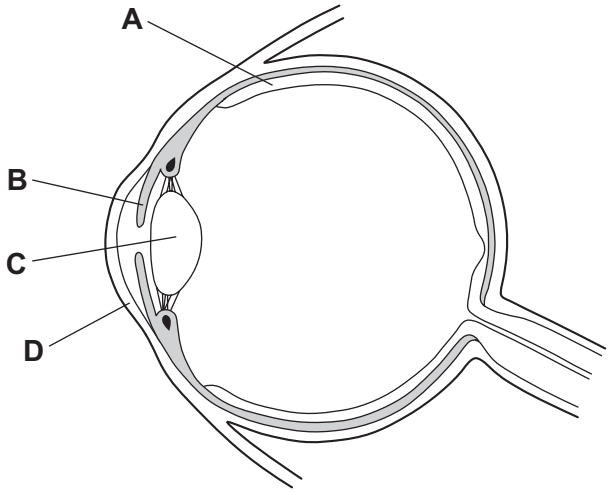
A Glucagon will cause the body to convert glucose into glycogen.

B Glucagon will cause the body to convert glycogen into glucose.

C Insulin will cause the body to convert glucose into glycogen.

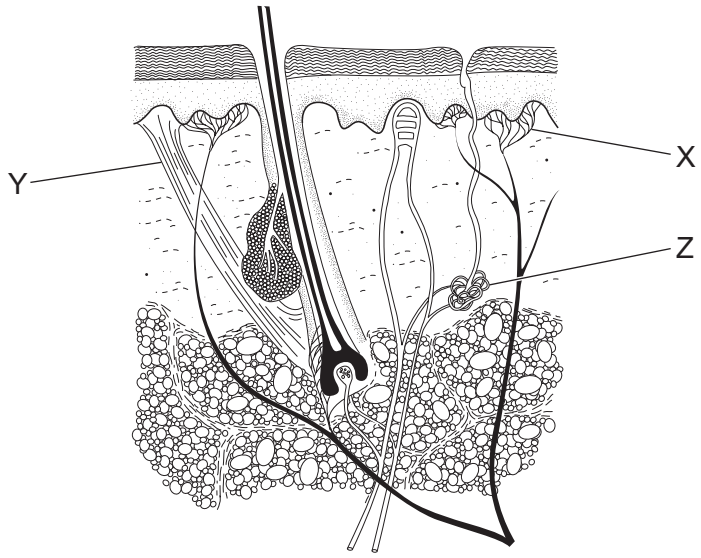
D Insulin will cause the body to convert glycogen into glucose.

25 Which structure can reduce how much light enters the eye?



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26 The diagram shows a section through human skin.



What are the structures labelled X, Y and Z?

	X	Y	Z
A	receptor	sweat gland	hair erector muscle
B	receptor	hair erector muscle	sweat gland
C	sweat gland	receptor	hair erector muscle
D	sweat gland	hair erector muscle	receptor

27 A disease cannot be treated with antibiotics.

What could be the reasons for this?

1 It is not a bacterial disease.

2 The pathogen is a virus.

3 The patient has become resistant to the antibiotic.

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

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[Turn over

28 The diagram shows a strawberry plant. These plants can reproduce asexually by producing 'plantlets'.



Why is this method of reproduction useful to strawberry farmers?

A Plantlets are produced by meiosis and are genetically different.

B Plantlets are produced by meiosis and are genetically identical.

C Plantlets are produced by mitosis and are genetically different.

D Plantlets are produced by mitosis and are genetically identical.

29 Which statement about human gametes is correct?

A The female gamete has an acrosome and is non-motile.

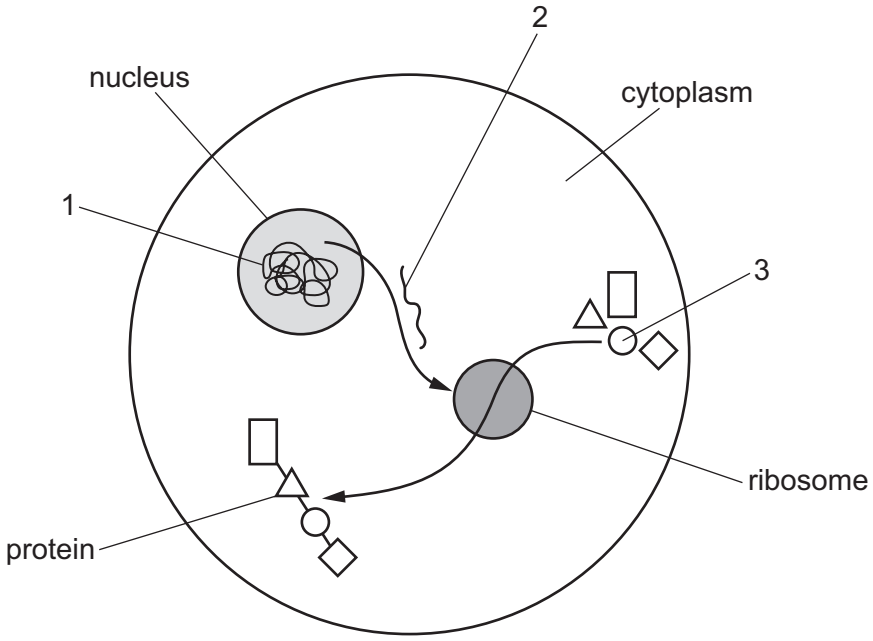
B The female gamete has a jelly coating and is motile.

C The male gamete has a flagellum and is non-motile.

D The male gamete has an acrosome and is motile.

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30 The diagram shows the stages of protein synthesis in a cell.



Which row identifies molecules 1, 2 and 3?

	1	2	3
A	DNA	amino acid	mRNA
B	amino acid	DNA	mRNA
C	DNA	mRNA	amino acid
D	mRNA	DNA	amino acid

31 Which description of stem cells is correct?

A unspecialised cells that divide by meiosis to produce daughter cells that may become specialised for specific functions

B specialised cells that divide by mitosis to produce daughter cells that may become further specialised for specific functions

C unspecialised cells that divide by mitosis to produce daughter cells that may become specialised for specific functions

D specialised cells that divide by meiosis to produce daughter cells that may become specialised for specific functions

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[Turn over

32 In some breeds of cattle, hair colour shows codominance. The coats may be red, white or roan (a mixture of red and white hairs).

What are the expected phenotypes when a parent with a red coat (H^RH^R) is crossed with a parent with a roan coat (H^RH^W)?

A 50% red : 50% roan

B 75% red : 25% roan

C 75% red : 25% white

D 50% red : 50% white

33 Which statement is correct?

A Discontinuous variation is mainly caused by environmental factors.

B Ionising radiation and some chemicals decrease the rate of mutation.

C A gene mutation is a change in the base sequence of a DNA molecule.

D Small variations in height within a human population are an example of discontinuous variation.

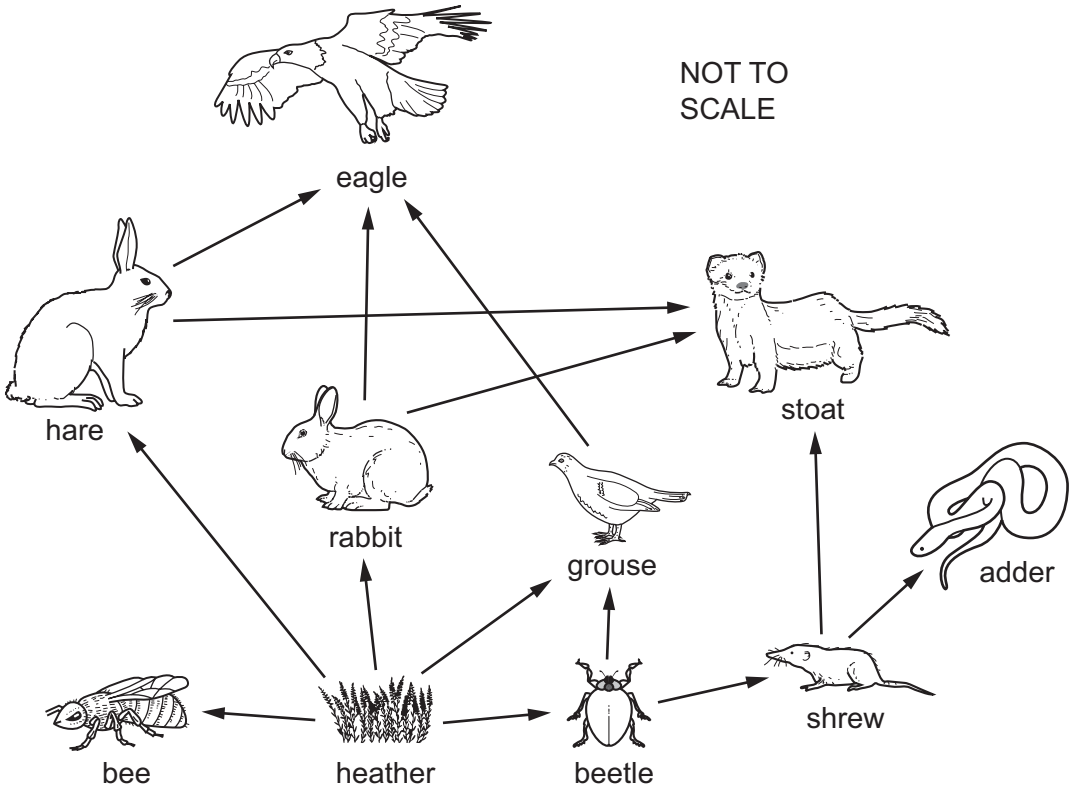
34 A person who is homozygous for the sickle cell allele has a child with a person that is heterozygous.

What is the likelihood that the offspring would be homozygous for the sickle cell allele?

A 100% **B** 75% **C** 50% **D** 25%

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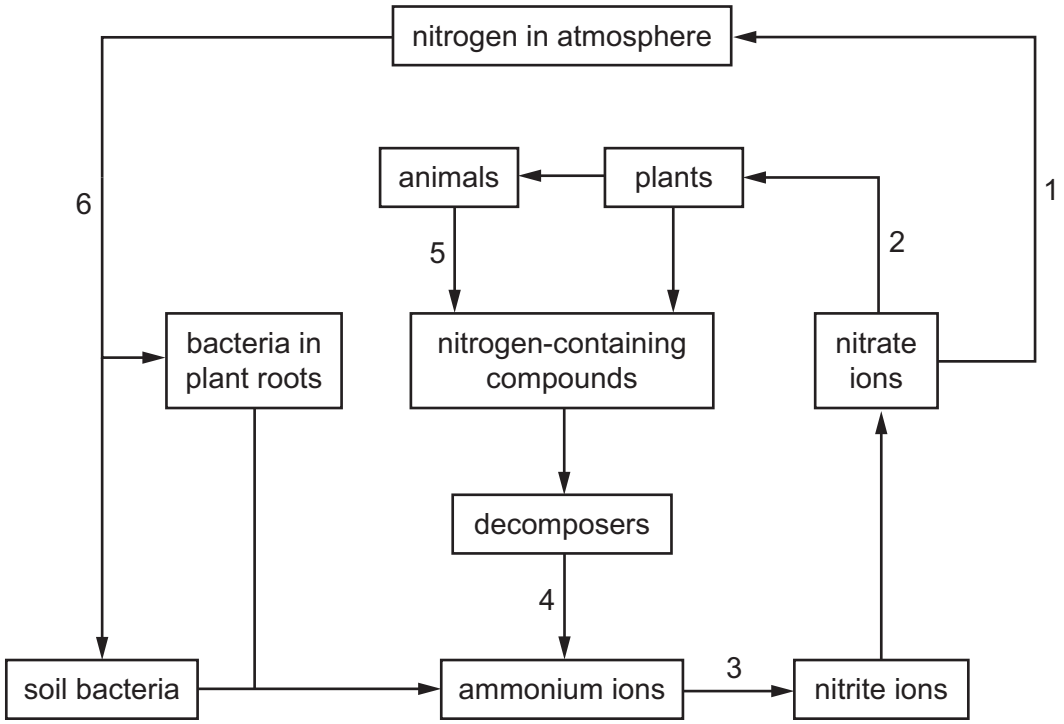
35 The diagram shows a food web.



How many organisms are feeding at more than one trophic level?

A 0 **B** 1 **C** 2 **D** 3

36 The diagram shows part of the nitrogen cycle.



Which row shows the correct labels?

	denitrification	absorption	nitrification	nitrogen fixation
A	3	2	4	6
B	3	5	4	1
C	1	2	3	6
D	1	5	3	4

37 Which statement explains why bacteria are used in genetic engineering?

A Bacteria can only manufacture simple molecules.

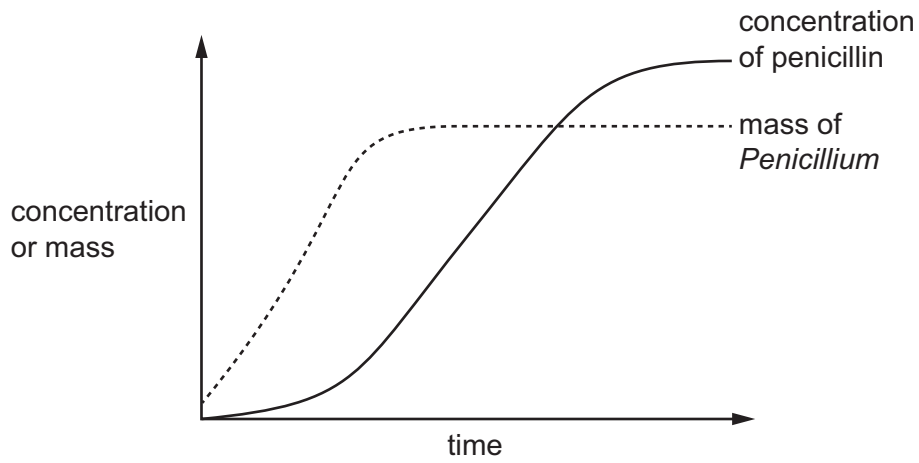
B Bacteria growing in a laboratory cause ethical concerns.

C Bacteria have a slow reproduction rate.

D Bacteria have plasmids.

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38 The graph shows the growth of the fungus *Penicillium* and its production of the antibiotic penicillin in a fermenter.



Which stage of the *Penicillium* growth curve produces the highest concentration of penicillin?

A lag phase

B exponential phase

C stationary phase

D death phase

39 Which statement about sustainable resources is correct?

A They include fossil fuels.

B They include non-renewable resources.

C Their production rate is equal to their removal rate.

D Their production rate is smaller than their removal rate.

40 What is the **least** sustainable method of helping to maintain a population of fish in a lake?

A Only allow female fish to be caught and eaten.

B Only allow fishing at certain times of the year.

C Only allow fishing in certain areas of the lake.

D Only allow the largest fish to be caught and eaten.

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