Cambridge Assessment International Education

Cambridge IGCSE™

BIOLOGY **0610/22**

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.

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1 Which processes are characteristics of **all** living organisms?

1 digestion

2 respiration

3 excretion

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

2 Using the binomial system, the Arctic fox is called *Vulpes lagopus*.

Which row is correct?

	Vulpes	*lagopus*
A	genus	kingdom
B	genus	species
C	species	genus
D	species	kingdom

3 Which feature is found in viruses?

A cell wall

B mitochondria

C nucleus

D protein coat

4 Which features are possessed by **all** plant cells?

	a cell wall	chloroplasts
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = yes

✗ = no

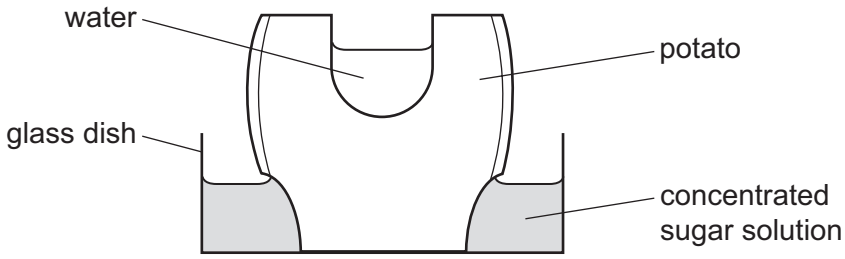
5 The length of a bacterium in a diagram is 50 mm. The magnification of the diagram is ×5000.

What is the actual length of the bacterium?

A 1 μm **B** 10 μm **C** 100 μm **D** 1000 μm

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6 The diagram shows an experiment to investigate osmosis in living cells.



What happens to the volumes of water and sugar solution after 12 hours?

	volume of water	volume of sugar solution
A	decreases	increases
B	increases	increases
C	increases	remains the same
D	remains the same	decreases

7 Which statements about active transport are correct?

1 It transports particles from a low concentration to a high concentration.

2 It always transports particles into cells.

3 It involves protein molecules in the cell membrane.

4 It uses energy from respiration.

A 1, 2, 3 and 4

B 1, 3 and 4 only

C 1 and 2 only

D 3 and 4 only

8 Which row identifies the chemical elements in proteins?

	carbon	hydrogen	oxygen	nitrogen
A	✓	✓	✓	✓
B	✓	✗	✓	✗
C	✗	✓	✓	✓
D	✓	✓	✗	✗

key

✓ = present

✗ = absent

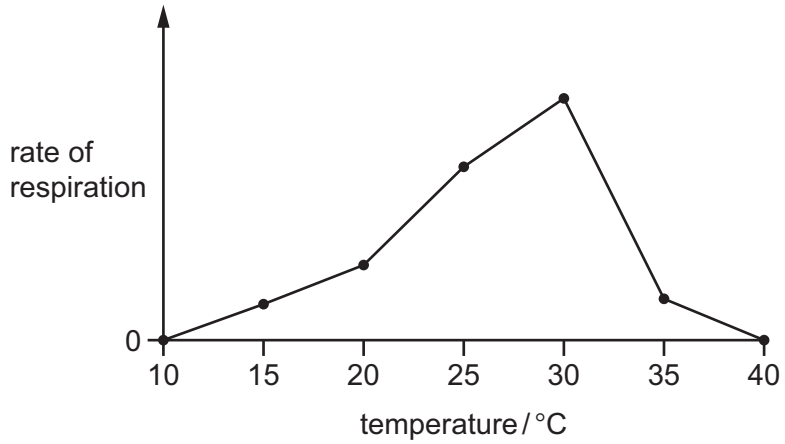
9 The table shows some large biological molecules and some small biological molecules.

	large biological molecules	small biological molecules
1	cellulose	glucose
2	oil	amino acids
3	glycogen	glucose
4	protein	ethanol

Which rows correctly pair large molecules with the smaller molecules used to make them?

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

10 The graph shows the results of an experiment to investigate the rate of respiration in an organism in different environmental temperatures.



What explains the increase in the rate of respiration between 10 °C and 30 °C?

A The enzymes are denaturing.

B There are more frequent effective collisions between enzyme and substrate molecules.

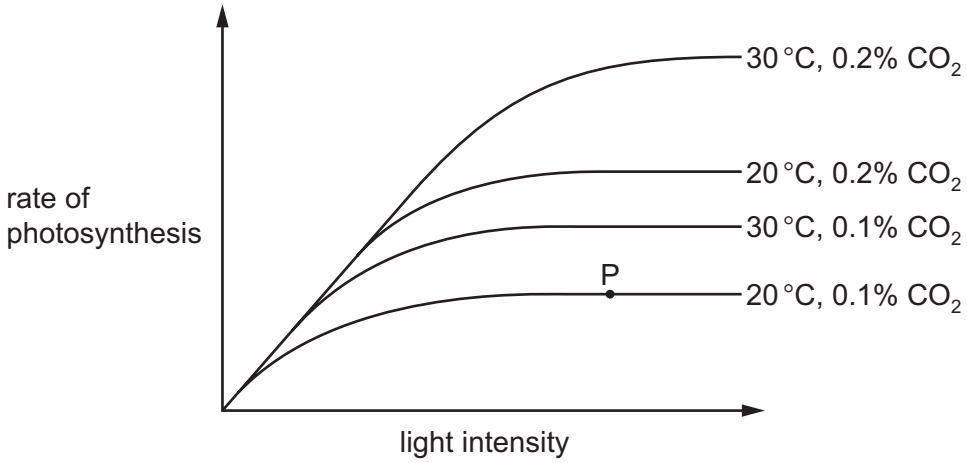
C There are fewer enzyme-substrate complexes formed.

D There is less kinetic energy.

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11 The diagram shows how the rate of photosynthesis varies with light intensity.

The four curves show different conditions of temperature and carbon dioxide concentration.

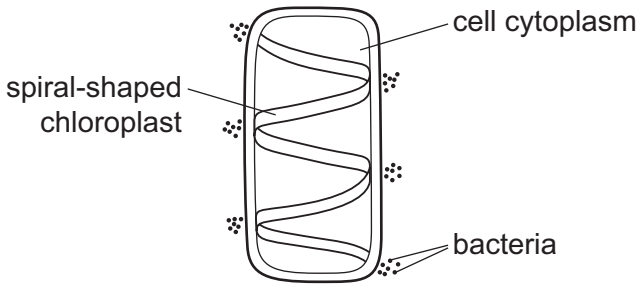


What limits the rate of photosynthesis at point P?

	light intensity	carbon dioxide concentration	temperature
A	✓	✓	✗
B	✓	✗	✗
C	✗	✓	✓
D	✗	✗	✓

key
✓ = yes
✗ = no

12 The diagram shows a cell with groups of bacteria around its edge.



The bacteria have moved to areas of high oxygen concentration.

Which process in the cell causes the bacteria to form these groups?

A digestion

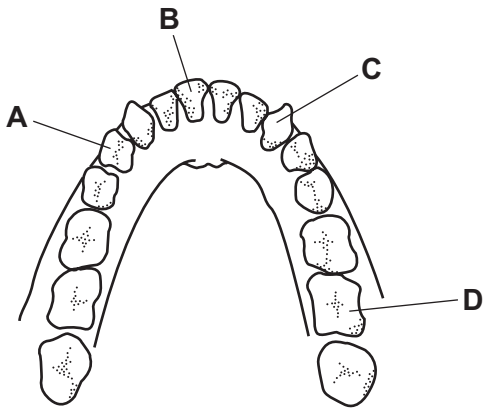
B photosynthesis

C reproduction

D respiration

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

Which tooth is a premolar?



14 Some medicines are made into tablets which are coated in a starch-like substance.

The coating protects the medicine from the effects of gastric juice.

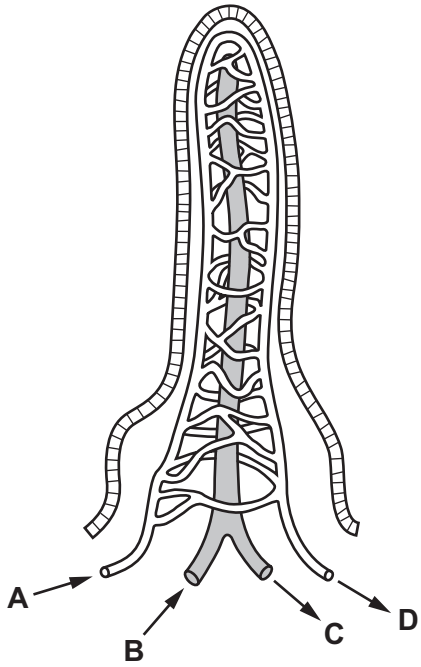
Which enzyme digests the coating and what is produced by this action?

	enzyme	products
A	amylase	fatty acids and glycerol
B	amylase	simple reducing sugars
C	lipase	fatty acids and glycerol
D	lipase	simple reducing sugars

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15 The diagram shows a villus. The arrows show the direction of flow within vessels associated with the villus.

Which vessel carries blood to the liver?



16 From which part of a leaf does **most** water evaporate during transpiration?

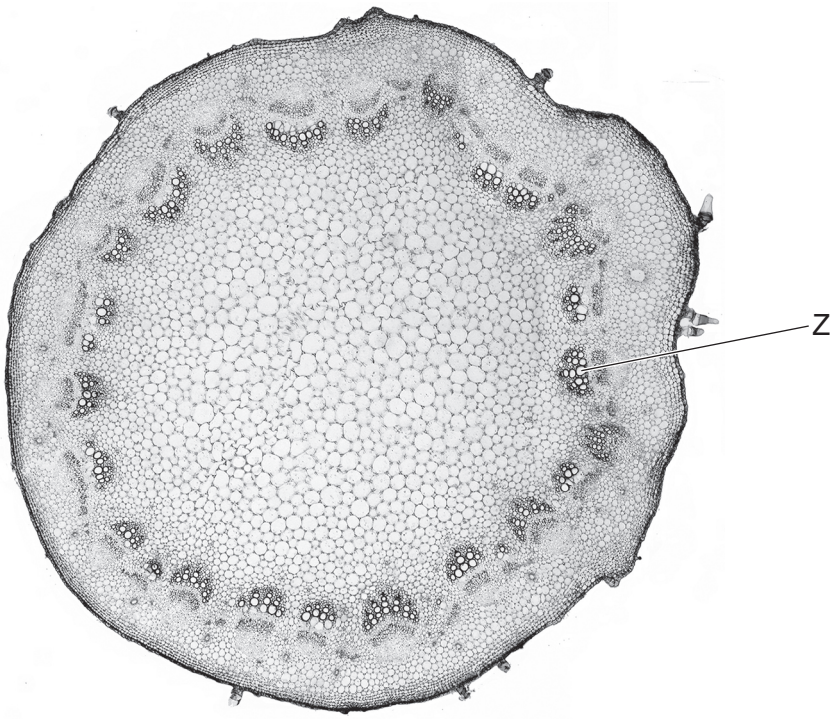
A the cuticle

B the guard cells

C the spongy mesophyll cells

D the xylem vessels

17 The photograph shows a cross-section through a sunflower stem.

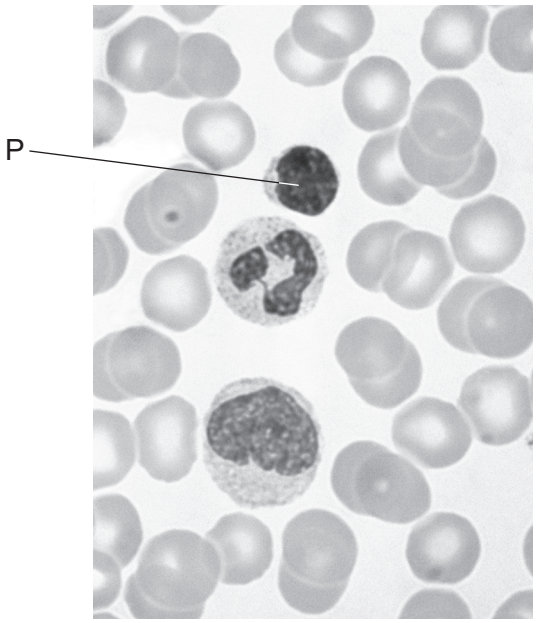


What is the name and function of the tissue labelled Z?

	name of tissue	function of tissue
A	phloem	transport of mineral ions
B	phloem	transport of sucrose
C	xylem	transport of mineral ions
D	xylem	transport of sucrose

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18 The photomicrograph shows some blood cells.



What is the function of cell P?

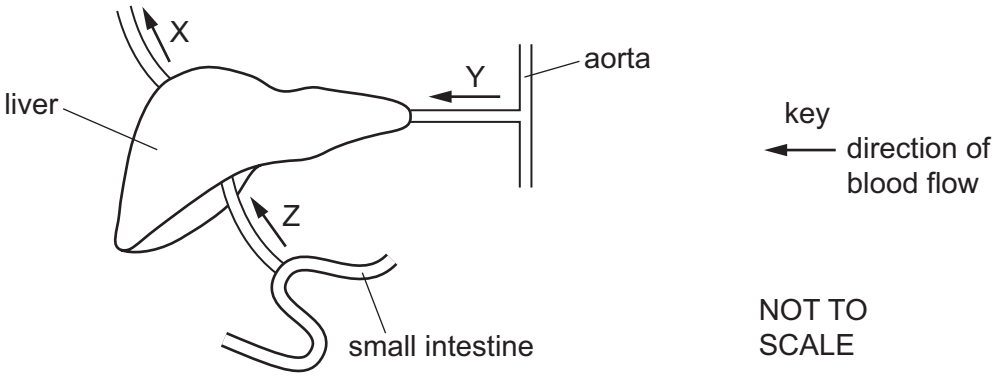
A It carries carbon dioxide.

B It carries oxygen.

C It helps to clot blood.

D It produces antibodies.

19 The diagram shows the blood vessels associated with the liver.



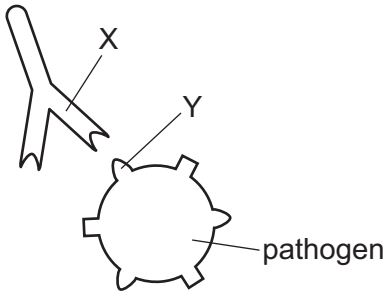
What are the blood vessels labelled X, Y and Z?

	X	Y	Z
A	hepatic artery	hepatic portal vein	hepatic vein
B	hepatic portal vein	hepatic artery	hepatic vein
C	hepatic vein	hepatic artery	hepatic portal vein
D	hepatic vein	hepatic portal vein	hepatic artery

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20 When a pathogen enters the blood, the immune system uses different mechanisms to destroy the pathogen.

The diagram shows one of these mechanisms.



Which row describes the structures involved?

	structure X	X is made by	structure Y
A	antigen	lymphocytes	antibody
B	antigen	phagocytes	antibody
C	antibody	lymphocytes	antigen
D	antibody	phagocytes	antigen

21 What is the composition of expired air compared with inspired air?

	carbon dioxide	oxygen	water vapour
A	decreased	increased	increased
B	decreased	decreased	increased
C	increased	decreased	decreased
D	increased	decreased	increased

22 During exercise, receptors detect a change in the blood and cause the breathing rate to increase.

Which change do the receptors detect and where are they found in the body?

	change detected in the blood	location of receptors
A	carbon dioxide increases	brain
B	carbon dioxide increases	lung
C	carbon dioxide decreases	brain
D	carbon dioxide decreases	lung

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23 Yeast cells can convert glucose into alcohol and carbon dioxide.

Which statement about this process is correct?

A The alcohol produced can be used to make bread rise.

B The carbon dioxide produced can be burnt as a biofuel.

C The yeast cells are using oxygen for this process.

D The yeast cells are carrying out anaerobic respiration.

24 What is the correct balanced equation for one type of respiration?

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

B $2C_2H_5OH \rightarrow C_6H_{12}O_6 + 2H_2O$

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

D $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2H_2O$

25 Which row shows an organ and the substance it excretes?

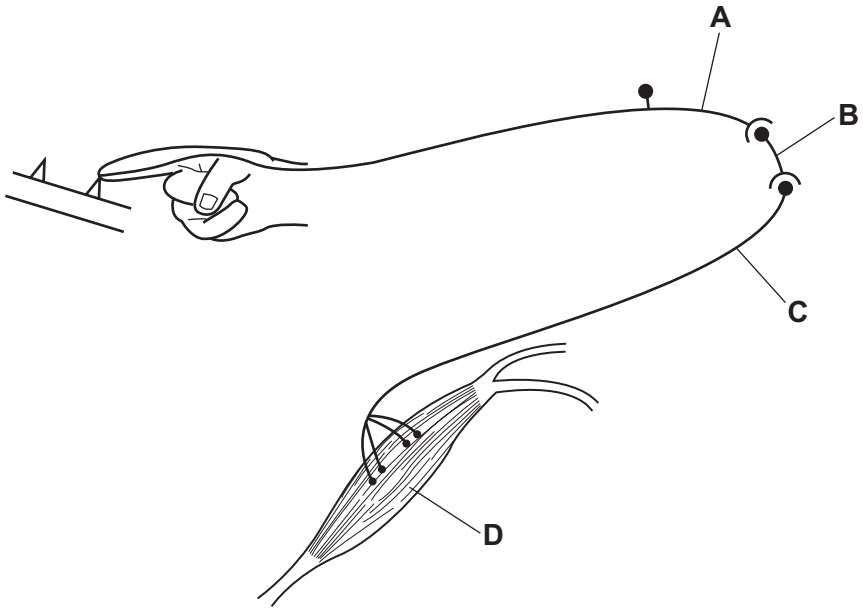
	organ	substance excreted
A	bladder	water
B	kidney	ions
C	lung	oxygen
D	urethra	urea

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[Turn over

26 The diagram shows a reflex arc in a human nervous system. The person's finger has just made contact with a sharp object.

Which part is the motor neurone?



27 Which hormones can increase blood glucose concentration?

A adrenaline and insulin

B adrenaline and glucagon

C adrenaline only

D glucagon only

28 What is defined as a substance that is taken into the body and modifies or affects chemical reactions in the body?

A antibody

B drug

C hormone

D pathogen

29 What is a disadvantage of sexual reproduction for a population in the wild?

A a reduction in genetic diversity

B a decreased ability to adapt to changes in the environment

C a reduction in reproduction if individuals are isolated

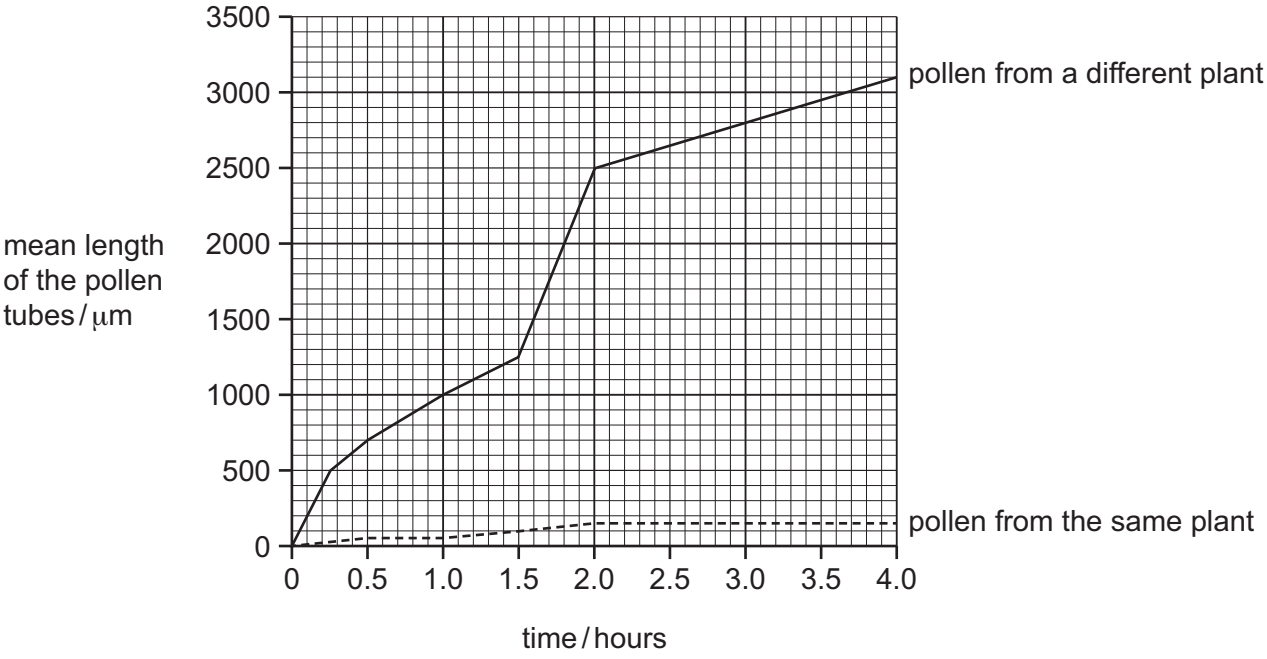
D an increased likelihood of a disease affecting all individuals

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30 Pollen grains from a plant were placed onto the stigma of a flower of the same plant. The lengths of the pollen tubes were measured for four hours. (The mean length of the style in this species of plant is 2 mm.)

This was repeated using pollen from a different plant.

The results are shown.



Which statements are correct?

1 Self-pollination does **not** lead to fertilisation.

2 The difference in growth of the two types of pollen is an adaptation to increase variation.

3 The pollen tubes from a different plant grew fastest between 2.0 hours and 4.0 hours.

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

31 Which hormones are released by the placenta during pregnancy?

A FSH and LH

B FSH and progesterone

C oestrogen and LH

D progesterone and oestrogen

32 Why are cells in the pancreas the only body cells that produce insulin?

A All of the genes in the nucleus of a cell in the pancreas are expressed.

B Other body cells do **not** have the gene for insulin.

C The cells in the pancreas have twice as many genes as the other body cells.

D The gene for insulin is only expressed by cells in the pancreas.

33 Which statement is correct?

A Mitosis always produces offspring that are homozygous.

B Mitosis produces cells that are genetically identical.

C Mitosis produces gametes in animals.

D Mitosis only produces haploid cells.

34 What are sources of genetic variation in populations?

1 meiosis

2 random mating

3 random fertilisation

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

35 Which row shows features of xerophytes that reduce water loss?

	green colour from chlorophyll	leaves reduced to spines	presence of stomata	thick cuticle
A	✓	✗	✓	✗
B	✓	✓	✗	✗
C	✗	✓	✗	✓
D	✗	✗	✓	✓

key

✓ = reduces water loss

✗ = does **not** reduce water loss

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36 The diagram shows a food chain.

tree → insect → blue tit → hawk

Which statement about a pyramid based on this food chain is correct?

A Drawn as a pyramid of biomass, the hawk would have the largest bar size.

B Drawn as a pyramid of energy, the tree would have the largest bar size.

C Drawn as a pyramid of energy, the tree would have the smallest bar size.

D Drawn as a pyramid of numbers, the hawk would have the largest bar size.

37 During the nitrogen cycle, which process releases nitrogen gas into the air?

A decomposition

B denitrification

C nitrification

D nitrogen fixation

38 Red-green colour blindness is a sex-linked characteristic caused by a recessive allele.

Which prediction can be made about the children of a woman who is colour-blind and a man with normal vision?

A Boys will be colour-blind, and girls will have a 50% chance of being colour-blind.

B Boys will be colour-blind, and girls will have normal vision.

C Girls will be colour-blind, and boys will have a 50% chance of being colour-blind.

D Girls will be colour-blind, and boys will have normal vision.

39 One method of conserving fish stocks is to have a minimum mesh size for fishing nets.

How is the mesh size chosen to conserve a particular fish species?

A The holes in the net must be small enough to catch only young fish.

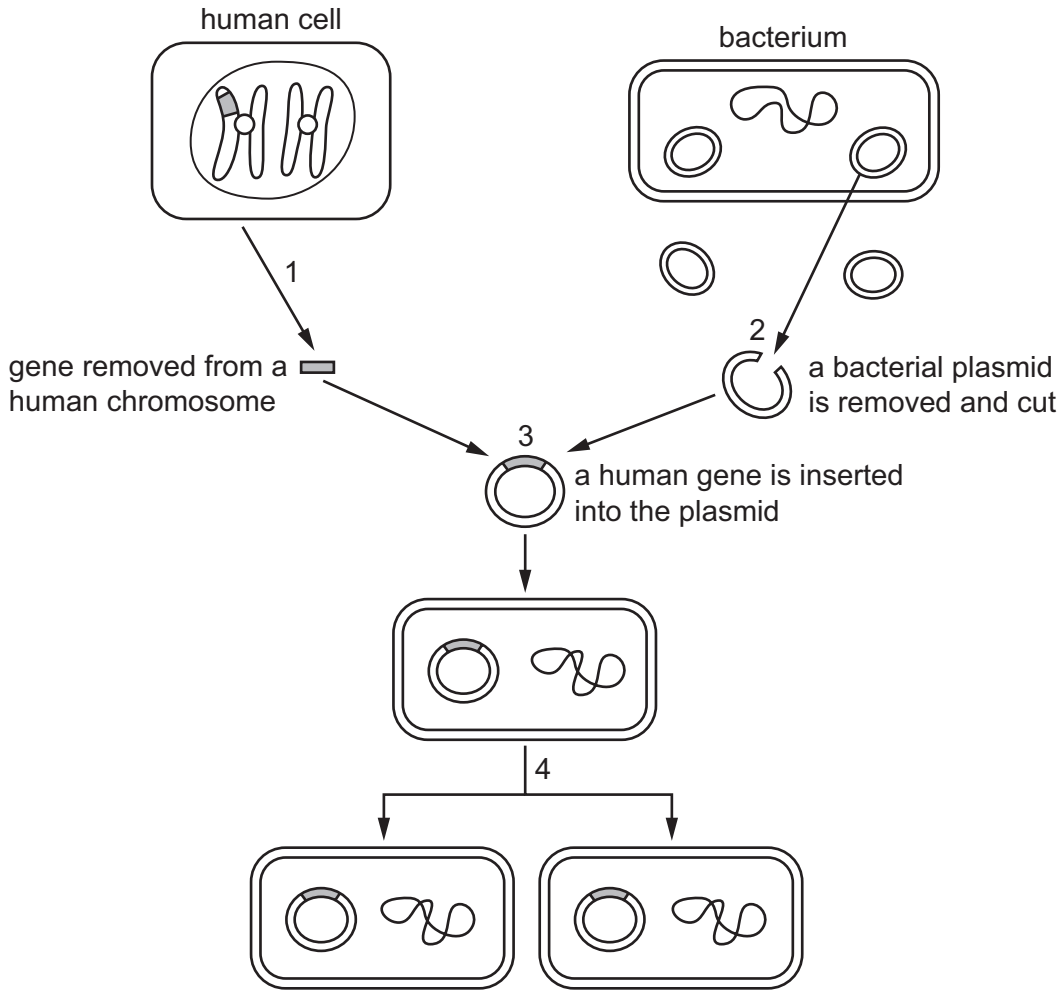
B The holes in the net must be small enough to catch all fish old enough to reproduce.

C The holes in the net must be large enough to catch some fish of all ages.

D The holes in the net must be large enough to allow young fish to escape.

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40 The diagram shows how a human gene can be inserted into a bacterium.



Which row shows the correct processes at 1, 2, 3 and 4?

	using restriction enzymes	using ligase enzymes	multiplication of bacteria
A	1	2	3
B	1 and 2	3	4
C	1 and 3	2	4
D	4	1 and 2	3

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