Cambridge Assessment International Education

Cambridge O Level

BIOLOGY **5090/12**

Paper 1 Multiple Choice **May/June 2021**

1 hour

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 row is correct?

	cell	tissue	organ	organ system
A	chloroplast	mesophyll	liver	digestive
B	sap vacuole	red blood cell	blood	nervous
C	red blood cell	sap vacuole	stomach	liver
D	neurone	vascular bundle	leaf	excretory

2 A piece of plant tissue is transferred from a beaker of water into a concentrated sugar solution.

Which row describes what happens?

	movement of water	volume of tissue cells
A	into the cells	decreases
B	into the cells	increases
C	out of the cells	decreases
D	out of the cells	increases

3 The following statements refer to the movement of substances into and out of cells.

1 Energy from respiration is required.

2 Energy from respiration is not required.

3 Movement occurs down a concentration gradient.

4 Net movement is from a region of higher concentration to a region of lower concentration.

5 Net movement is from a region of lower concentration to a region of higher concentration.

Which statements apply to **active transport**?

A 1 and 3 **B** 1 and 5 **C** 2 and 4 only **D** 2, 4 and 5

4 Which word describes an enzyme that has its active site changed by high temperature?

A denatured

B destroyed

C deleted

D distorted

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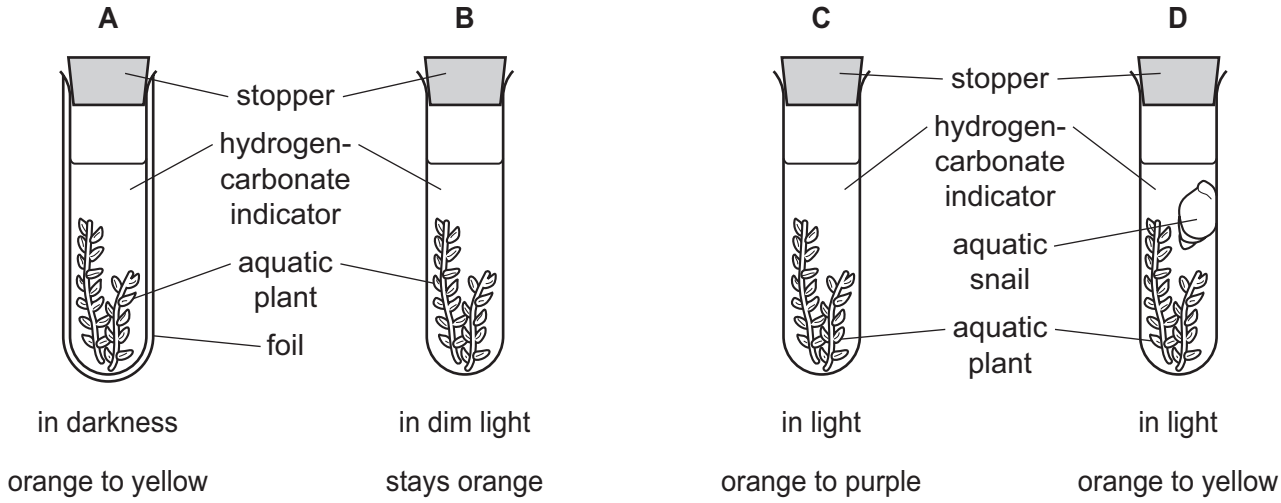
5 Hydrogencarbonate indicator changes colour according to the concentration of carbon dioxide present.

The table shows how hydrogencarbonate indicator changes colour.

colour of hydrogencarbonate indicator	concentration of carbon dioxide
orange	atmospheric carbon dioxide concentration
yellow	higher than atmospheric carbon dioxide concentration
purple	lower than atmospheric carbon dioxide concentration

Four test-tubes were set up under different conditions. The colour of hydrogencarbonate indicator in each test-tube at the start of the experiment and after 1 hour is also shown.

Which test-tube shows that the rates of photosynthesis and respiration are the same?



6 What describes the upper cuticle of a leaf?

A a permeable layer allowing water to enter the leaf

B a single layer of cells containing many chloroplasts

C a single layer of transparent cells allowing light to enter the leaf

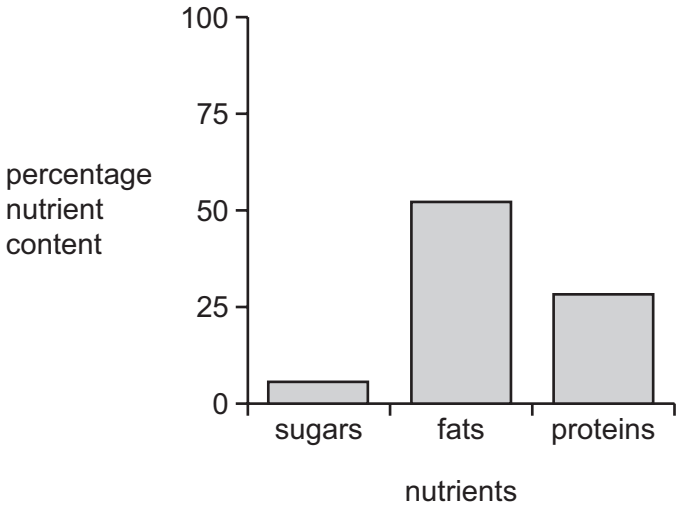
D a thin non-cellular layer preventing water loss from the leaf

7 A lack of certain mineral ions affects the growth of young plants.

Which effects are caused by a lack of magnesium ions and a lack of nitrate ions?

	lack of magnesium ions	lack of nitrate ions
A	the leaves become dark green	overall growth is stunted
B	the leaves go yellow in patches	the plant is unable to form proteins
C	the plant is unable to form enzymes	the plant is unable to form starch
D	the plant is unable to form root hairs	the leaves become bright green

8 The graph shows some of the nutrients found in peanuts.



A student tested peanuts with four food tests.

Which row shows the results?

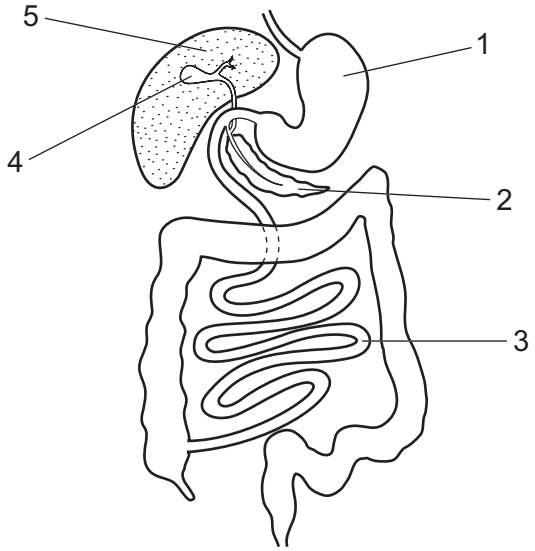
	Benedict's test	biuret test	ethanol emulsion test	iodine test
A	yellow	purple	white	brown
B	black	blue	white	black
C	red	purple	clear	blue
D	blue	blue	clear	brown

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9 Which row shows factors that may contribute to famine?

	climate change causing drought	destruction of tropical forest	flooding	increased human population	increased use of fertilisers
A	yes	yes	yes	no	no
B	yes	no	yes	yes	no
C	no	yes	no	yes	yes
D	yes	no	no	yes	yes

10 The diagram shows part of the human alimentary canal and associated organs.



Which row describes the functions of parts shown in the diagram?

	structure	function	structure	function
A	1	digestion of protein	3	absorption of the products of digestion
B	2	emulsifying fats	3	absorption of amino acids and glucose
C	4	production of bile	5	making digestive enzymes
D	4	storing digestive enzymes	2	making digestive enzymes

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11 How does water enter root hair cells?

A from high to low water potential by active transport

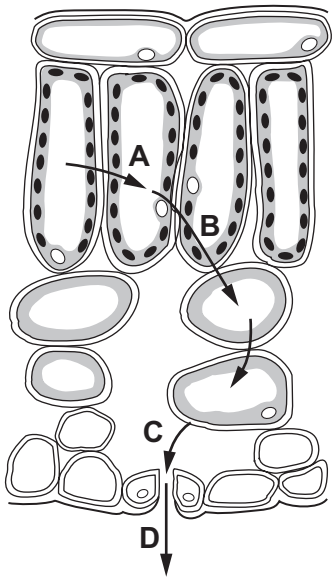
B from high to low water potential by osmosis

C from low to high water potential by active transport

D from low to high water potential by osmosis

12 The diagram shows the pathway of water molecules through part of a leaf, seen under a microscope, in transverse section.

Where does water evaporate?



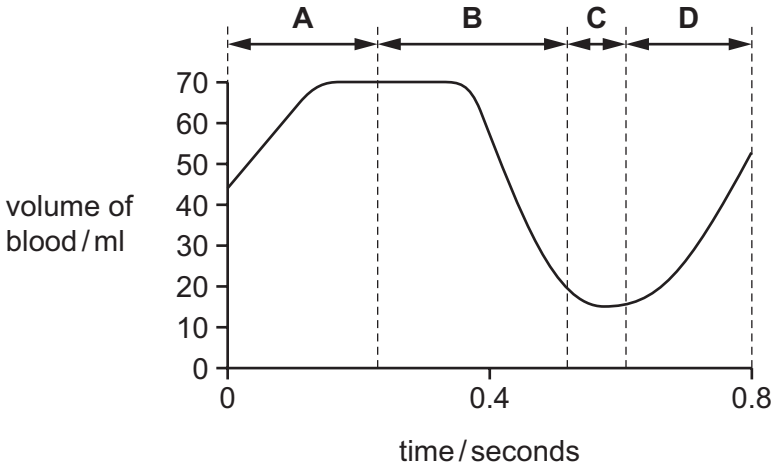
13 Which row describes the functions of the blood components?

	plasma	platelets	white blood cells
A	antibody formation	clotting	transport of nutrients
B	clotting	transport of nutrients	antibody formation
C	clotting	antibody formation	transport of nutrients
D	transport of nutrients	clotting	antibody formation

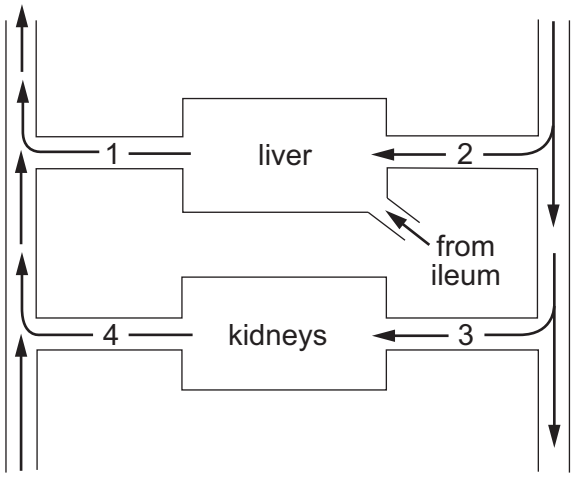
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14 The diagram shows how the volume of blood in the left ventricle of a human heart changes during one heart beat.

When is the left ventricle contracting?



15 The diagram represents the blood supply to the liver and to the kidneys.



Which vessels contain blood with the highest and lowest concentrations of urea?

	highest	lowest
A	1	2
B	1	4
C	3	2
D	3	4

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[Turn over

16 Which statement is true for aerobic respiration?

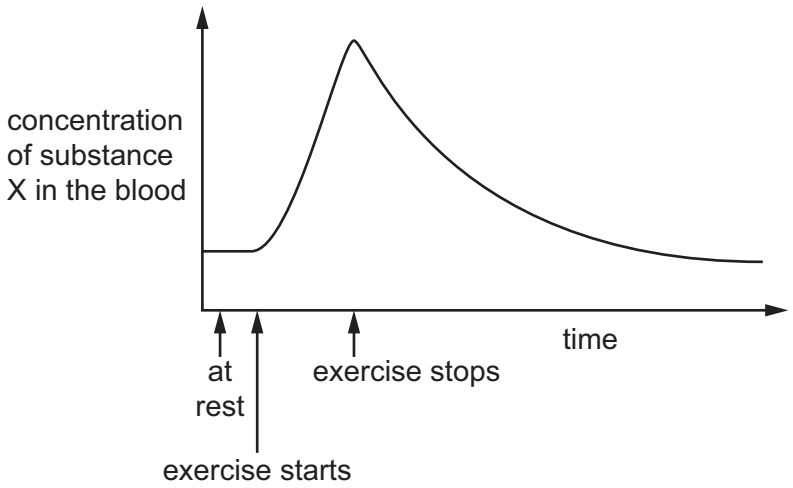
A Aerobic respiration in humans occurs mainly in the alveoli.

B Aerobic respiration releases less energy than anaerobic respiration.

C Glucose is broken down to smaller molecules in aerobic respiration.

D Oxygen is broken down to release energy in aerobic respiration.

17 The graph shows the concentration of substance X in a person's blood, before, during and after exercise.



What is substance X?

A alcohol

B glycogen

C lactic acid

D urea

18 During exercise, a person breathes more deeply and more frequently.

Which is a result of this?

A Carbon dioxide is removed more rapidly.

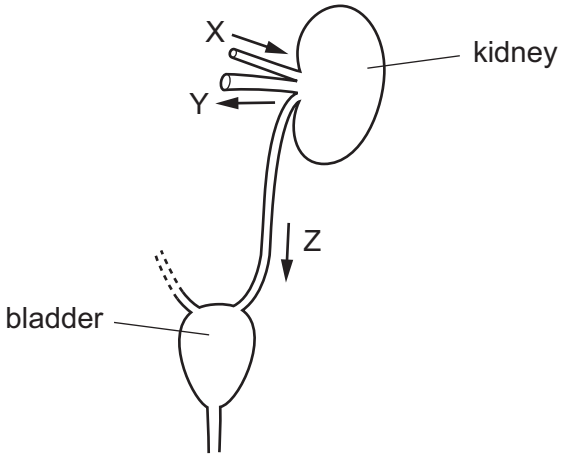
B Heat loss is decreased.

C Less glucose is delivered to the working muscles.

D Less oxygen diffuses into the blood.

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19 The diagram shows structures in a human which form and store urine. Liquids pass through tubes X, Y and Z in the directions shown by the arrows.



Which statement about the volume of liquid passing through Y in one day is correct?

A It is greater than that passing through X.

B It is less than that passing through Z.

C It is much less than that passing through X but slightly greater than that passing through Z.

D It is slightly less than that passing through X but much greater than that passing through Z.

20 Which response will happen if a person walks into a cold environment?

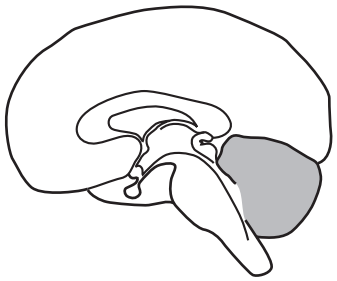
A Hair erector muscles cause the body hairs to lay flat on the skin.

B More blood flows in the capillaries near the surface of the skin.

C Large body muscles contract and relax rapidly.

D The sweat glands produce a larger amount of sweat.

21 The diagram shows the human brain.



What is the name of the shaded part of the brain?

A cerebellum

B cerebrum

C hypothalamus

D medulla

22 What happens in the eye to produce the pupil reflex to bright light?

1 ciliary muscle contraction

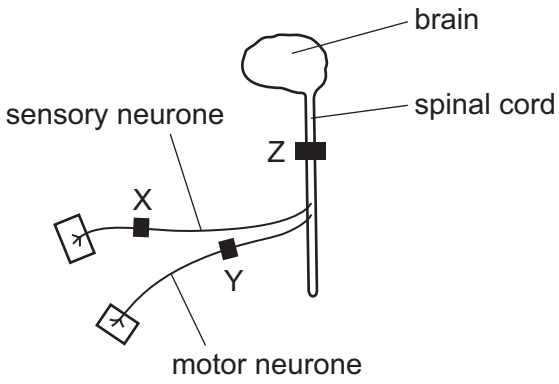
2 circular muscle contraction

3 radial muscle relaxation

4 suspensory ligaments pulled tight

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

23 The diagram shows three positions, X, Y and Z, where nerve impulses are blocked by a drug.



Which person listed below moves their leg in response to a pinprick, but does **not** feel it?

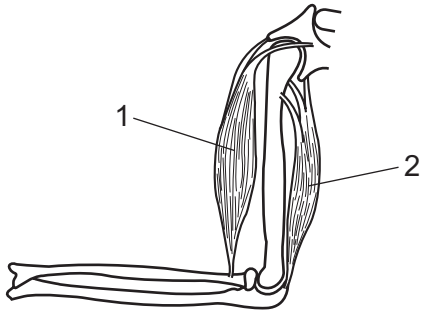
A a person with a block at X

B a person with a block at Y

C a person with a block at Z

D a person with no block

24 The diagram shows how antagonistic muscles are arranged in the arm.



Which row describes the muscle action when the arm is straightened?

	muscle 1	muscle 2
A	contracts	expands
B	contracts	relaxes
C	expands	contracts
D	relaxes	contracts

25 Electronic cigarettes are a cigarette substitute allowing nicotine to be inhaled without the other components found in cigarette smoke.

Which effects of cigarette smoking will also be effects of using electronic cigarettes?

A Smoking increases heart rate, narrows the arterioles and increases blood pressure.

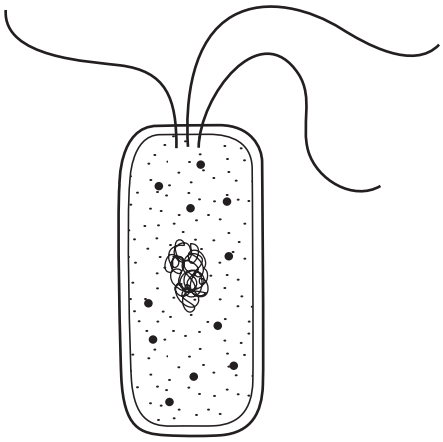
B Smoking irritates the airways and increases mucus production.

C Smoking reduces oxygen carried by red blood cells and reduces oxygen delivered to the tissues.

D Smoking narrows the airways and increases coughing.

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26 The diagram shows the structure of a bacterium.



In what way does this differ from a cell of a fungus?

A The bacterium has a cell membrane.

B The bacterium has a cell wall.

C The bacterium has cytoplasm.

D The bacterium has no true nucleus.

27 Which microorganisms are involved in the decomposition of dead plant material?

	bacteria	fungi	viruses
A	yes	no	yes
B	yes	yes	no
C	no	yes	yes
D	yes	no	no

28 What is the reason for describing the flow of energy through an ecosystem as non-cyclic?

A The energy cannot be returned to its original source.

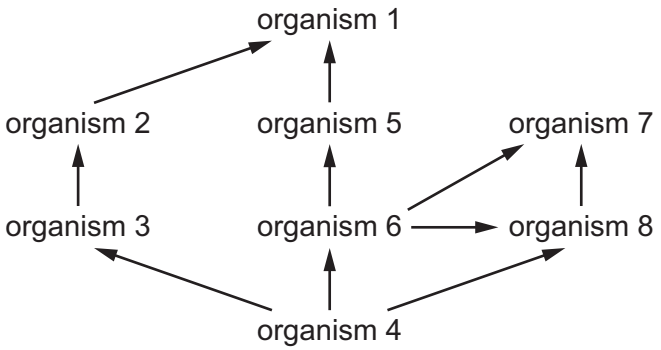
B The energy cannot have its form changed within an organism.

C The energy can only be passed on in its original form.

D The energy can only be transferred to a larger organism.

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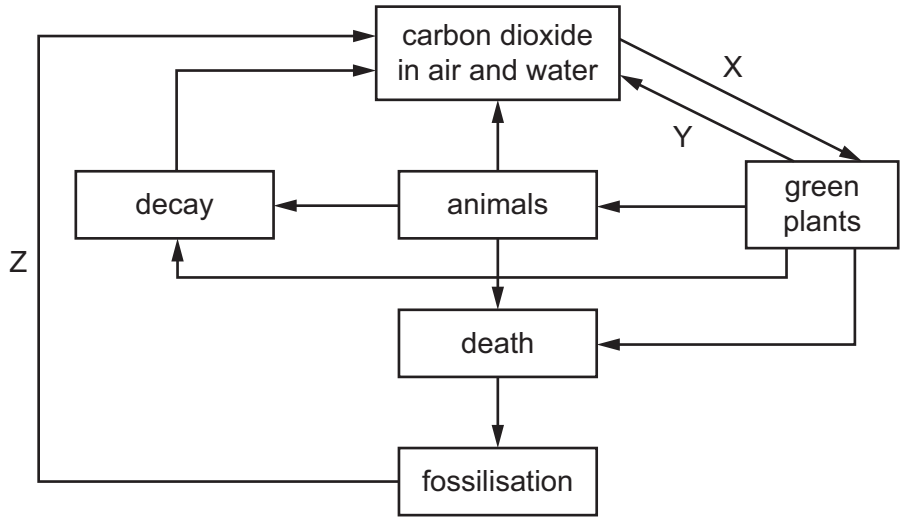
29 The diagram shows a complete food web.



Which row identifies examples of the types of organisms in this food web?

	carnivore	consumer	herbivore	producer
A	2	7	8	4
B	4	2	3	1
C	6	4	8	1
D	7	3	2	4

30 The diagram shows part of the carbon cycle.



What do X, Y and Z represent?

	X	Y	Z
A	combustion	respiration	ingestion
B	combustion	ingestion	respiration
C	photosynthesis	respiration	combustion
D	photosynthesis	combustion	respiration

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[Turn over

31 Coastal marine regions are environments with a rich plant and animal diversity.

Which process would reduce the biodiversity of these environments?

A banning fishing during the fish breeding season

B increasing the mesh size for any fishing nets used

C stopping the release of raw sewage into the sea

D allowing fishing methods that disturb the seabed

32 Hardwood trees in tropical rainforests are often harvested for timber. A single quick-growing crop, such as palm oil, is then grown on the same land.

What effect will removing the rainforest have on the environment?

A decreased run off into rivers and flooding

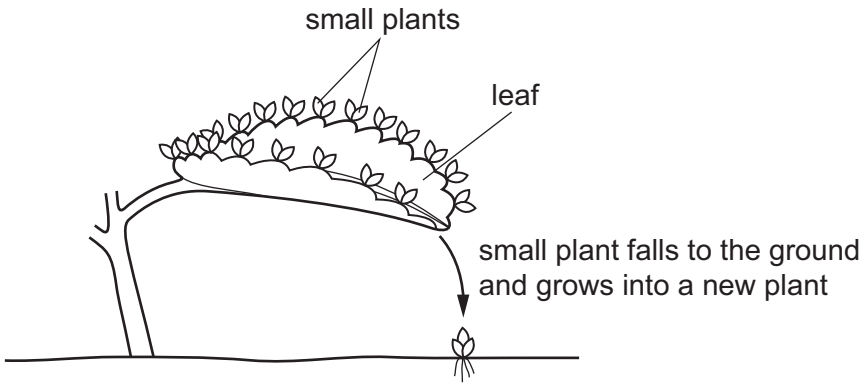
B improved soil structure and soil nutrients

C reduced soil erosion by wind and rain

D reduced biodiversity of the area

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33 The diagram shows part of a *Bryophyllum* plant.



Which best describes how the new plants are produced?

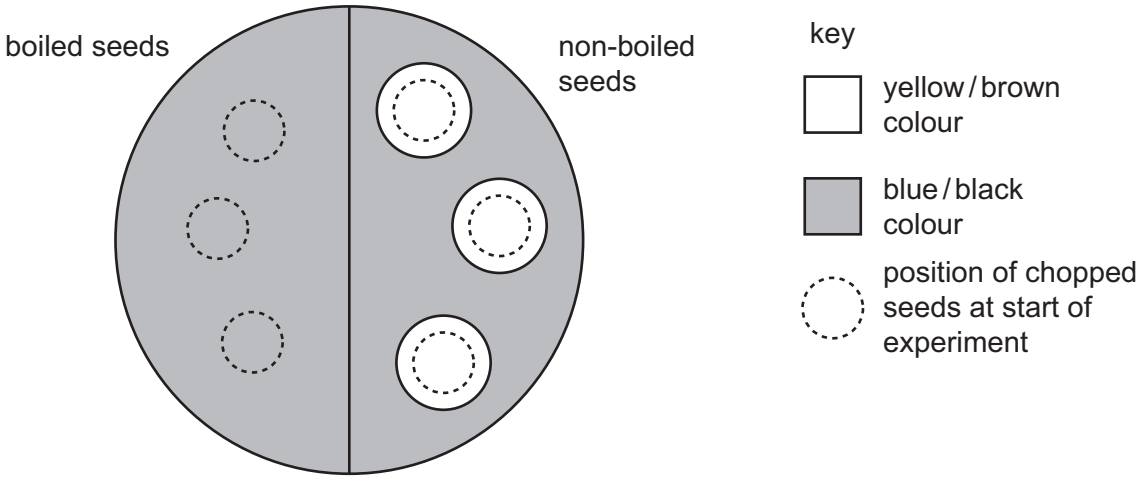
	type of reproduction		type of cell division	
	asexual reproduction	sexual reproduction	meiosis	mitosis
A	✓	✗	✓	✗
B	✓	✗	✗	✓
C	✗	✓	✓	✗
D	✗	✓	✗	✓

key
✓ = yes
✗ = no

34 Six bean seeds were soaked in cold water. Three of them were boiled and cooled. The boiled and the non-boiled seeds were chopped up and then placed on the surface of agar jelly containing starch.

After two days, all the seeds were removed and the jelly was tested with iodine solution.

The diagram shows the result of the experiment.



What is the explanation for the results with the non-boiled bean seeds?

A They absorb iodine.

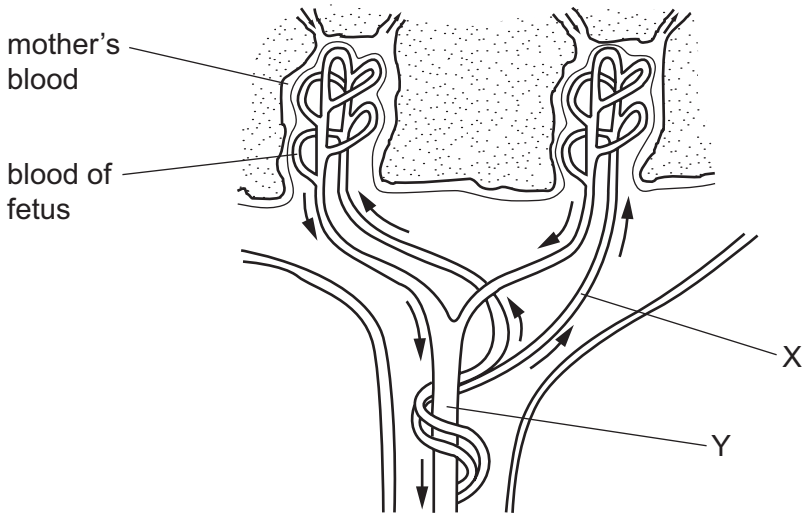
B They absorb starch.

C They contain acid.

D They contain amylase.

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35 The diagram shows how the blood of a human fetus flows close to the mother's blood in the placenta.



Which substances are present at X in higher concentrations than at Y?

A carbon dioxide and glucose

B carbon dioxide and urea

C glucose and oxygen

D glucose and urea

36 The table shows four ways in which diseases may be passed from one human to another.

Which row shows the ways in which HIV may be transferred?

	transferred from person to person through			
	air	blood	saliva	semen
A	yes	no	yes	no
B	yes	no	no	yes
C	no	yes	yes	no
D	no	yes	no	yes

37 Which sex chromosomes are present in every sperm cell?

A X chromosome only

B Y chromosome only

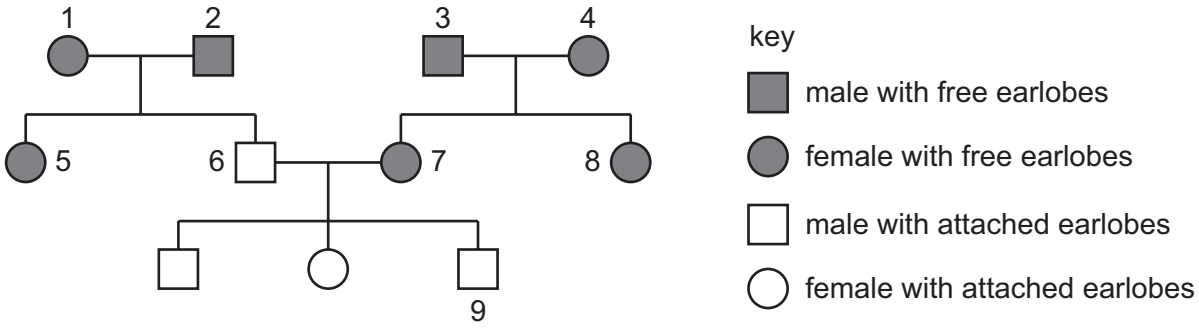
C X or Y chromosome only

D X and Y chromosomes

38 Earlobes can either be attached to the cheek or be 'free' (unattached). This characteristic is controlled by a single gene.

The allele for attached earlobes is recessive.

The diagram shows the inheritance of attached earlobes in one family.



Which two individuals **must** be heterozygous for earlobe attachment?

A 1 and 7 **B** 3 and 4 **C** 5 and 8 **D** 6 and 9

39 Which statements about natural selection are correct?

	natural selection can lead to better adapted species surviving	natural selection can lead to extinction of a species	natural selection can lead to gene mutations occurring
A	true	true	true
B	true	true	false
C	true	false	true
D	false	true	true

40 Some stages in the production of human insulin are listed.

1 Genetically modified *E. coli* bacteria are grown in large fermenters.

2 The gene for human insulin is inserted into the DNA of a bacterium called *E. coli*.

3 The gene for human insulin is obtained from human pancreas cells.

4 Human insulin is extracted and purified.

What is the correct sequence of these stages?

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

B $4 \rightarrow 3 \rightarrow 2 \rightarrow 1$

C $3 \rightarrow 2 \rightarrow 4 \rightarrow 1$

D $3 \rightarrow 2 \rightarrow 1 \rightarrow 4$

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