Cambridge Assessment International Education

Cambridge O Level

BIOLOGY **5090/12**

Paper 1 Multiple Choice **October/November 2022**

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

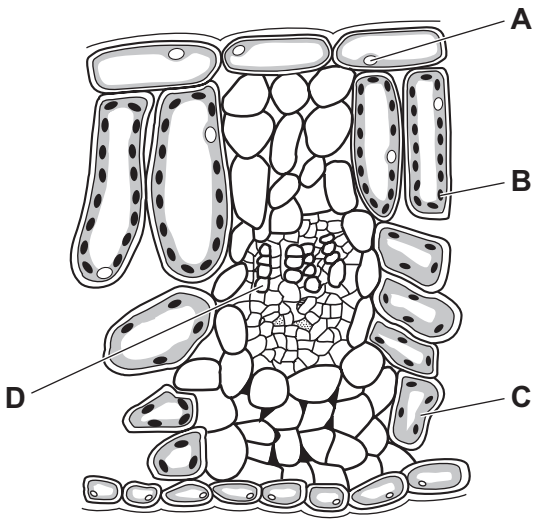
- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.

This document has **20** pages. Any blank pages are indicated.

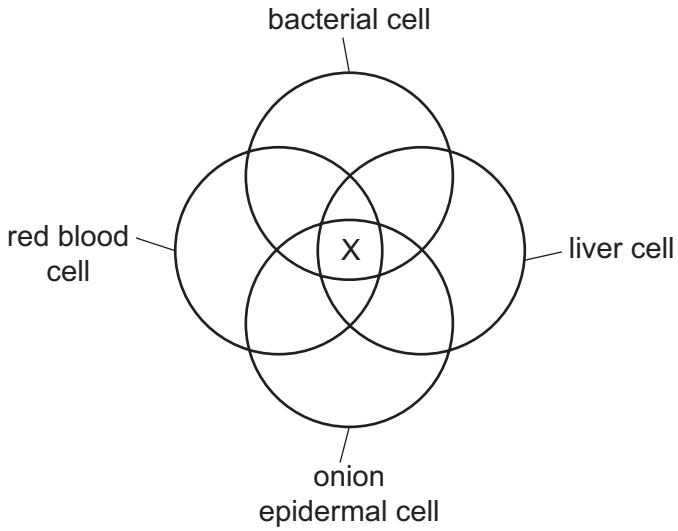
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1 The diagram shows cells from a plant leaf.

Which structure contains a high concentration of magnesium?



2 The diagram represents the cell structures of a bacterial cell, a liver cell, an onion epidermal cell and a red blood cell.



Which structure is represented by X?

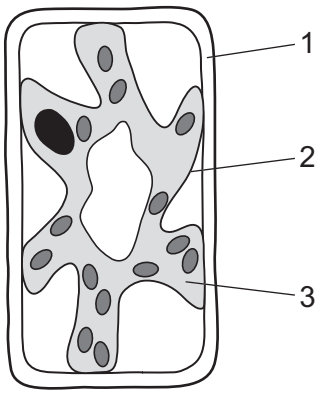
A cell membrane

B cellulose cell wall

C nucleus

D sap vacuole

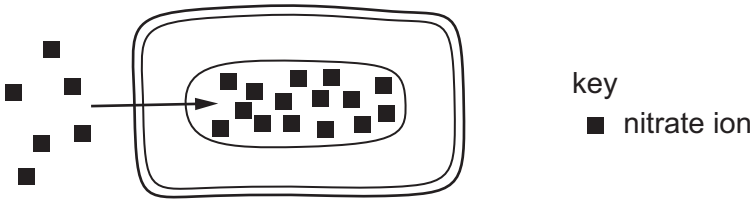
3 The diagram shows a typical plant cell which has been in a concentrated salt solution for 10 minutes.



Which numbered structures are partially permeable?

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

4 Which process is moving nitrate ions into the cell shown?



A active transport

B diffusion

C osmosis

D translocation

5 Fats are broken down by the enzyme lipase to produce fatty acids and glycerol.

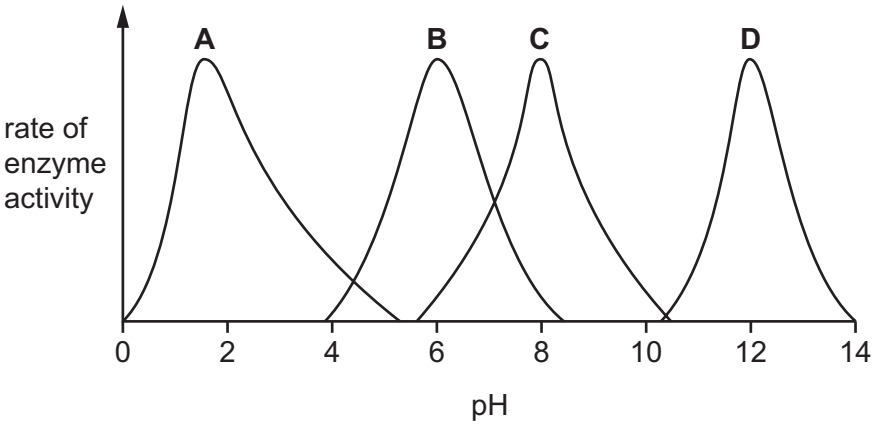
According to the 'lock and key' model of enzyme action, what is the 'lock' and what is the 'key' in this reaction?

	lock	key
A	fats	lipase
B	lipase	fats
C	fats	fatty acids and glycerol
D	lipase	fatty acids and glycerol

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6 The graph shows the effect of varying pH values on the activity of four different enzymes, **A**, **B**, **C** and **D**.

Which enzyme is active in the stomach?



7 A small mountain lake has aquatic plants growing under water on the lake bed. Shortly after heavy rainfall, the mud on the lake bed becomes stirred up and the water level rises.

Why does this cause the rate of photosynthesis of these plants to fall?

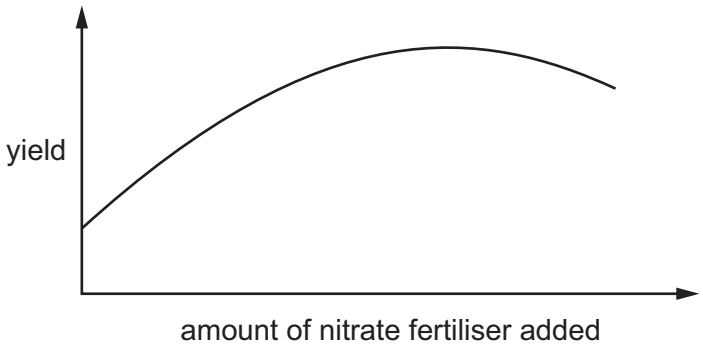
A extra carbon dioxide

B extra dissolved nitrates

C lower light intensity

D lower oxygen concentration

8 The graph shows how the yield of a wheat crop varies with the addition of different amounts of nitrate fertiliser.



What can be concluded from the graph?

A Nitrates help the formation of chlorophyll in wheat leaves.

B The yield of wheat is proportional to the amount of nitrate fertiliser added.

C Nitrate is needed for the formation of proteins.

D Nitrates are required for healthy plants, but excess nitrates may inhibit growth.

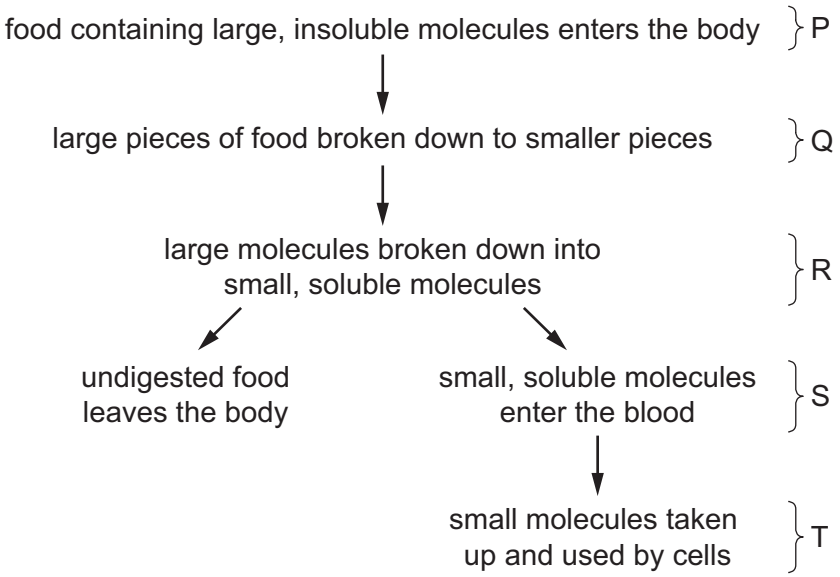
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9 A lack of certain minerals and vitamins can lead to deficiency diseases.

Which row shows the correct symptoms of such diseases?

	deficiencies in diet	symptoms in body
A	calcium and vitamin C	too few red blood cells and deformed bones
B	calcium and vitamin D	brittle bones and bleeding gums
C	iron and vitamin C	brittle bones and bleeding gums
D	iron and vitamin D	too few red blood cells and deformed bones

10 The diagram shows how food is processed in the human alimentary canal.



Which row correctly identifies the named stages?

	absorption	assimilation	enzyme digestion
A	P	S	T
B	P	S	Q
C	S	P	Q
D	S	T	R

11 Which function is **not** carried out by the liver?

A breakdown of alcohol

B conversion of glycogen to glucose

C formation of urea

D secretion of digestive enzymes

12 Which statements about root hairs are correct?

1 The cell membrane can allow movement of water and ions into the cell.

2 The cell vacuole extends into the root hair.

3 They are formed as an extension of the outer layer of root cells.

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

13 The table shows weather conditions in a field.

Which row shows conditions that would cause a plant to wilt most rapidly?

	air temperature / °C	humidity	time of day	wind speed / km per hour
A	15	raining	00:00	32
B	12	dry	14:00	24
C	6	fog / rain	08:00	3
D	5	dry	22:00	16

14 Some people have a rare heart condition in which the lower left chamber of the heart has not developed properly and is much smaller than normal.

The immediate result of this condition is to cause lower than normal blood flow into which blood vessel?

A aorta

B pulmonary artery

C pulmonary vein

D vena cava

15 Which route does blood take around the body?

A pulmonary artery → heart → aorta → lungs → pulmonary vein → heart → vena cava

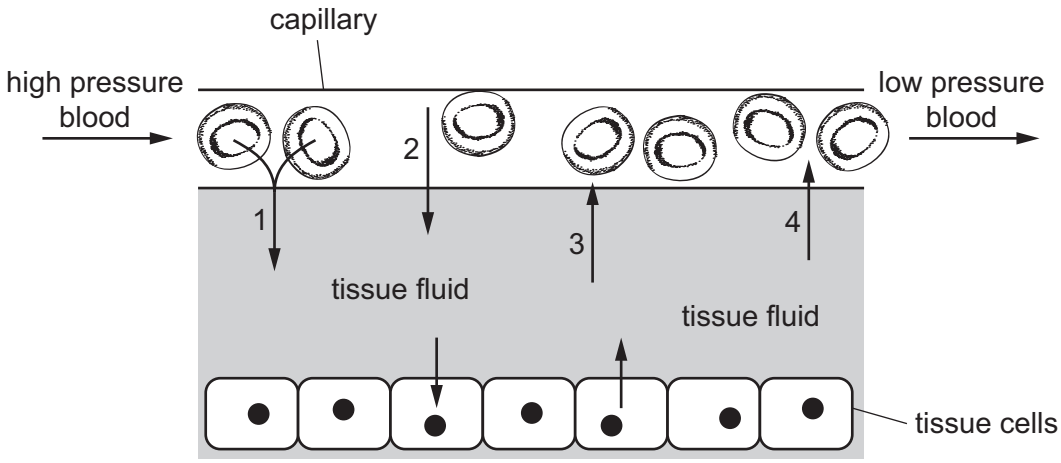
B pulmonary vein → heart → lungs → aorta → pulmonary artery → heart → vena cava

C vena cava → heart → pulmonary artery → lungs → pulmonary vein → heart → aorta

D vena cava → heart → pulmonary vein → lungs → pulmonary artery → heart → aorta

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16 The diagram shows the transfer of materials between blood in a capillary and tissue fluid.

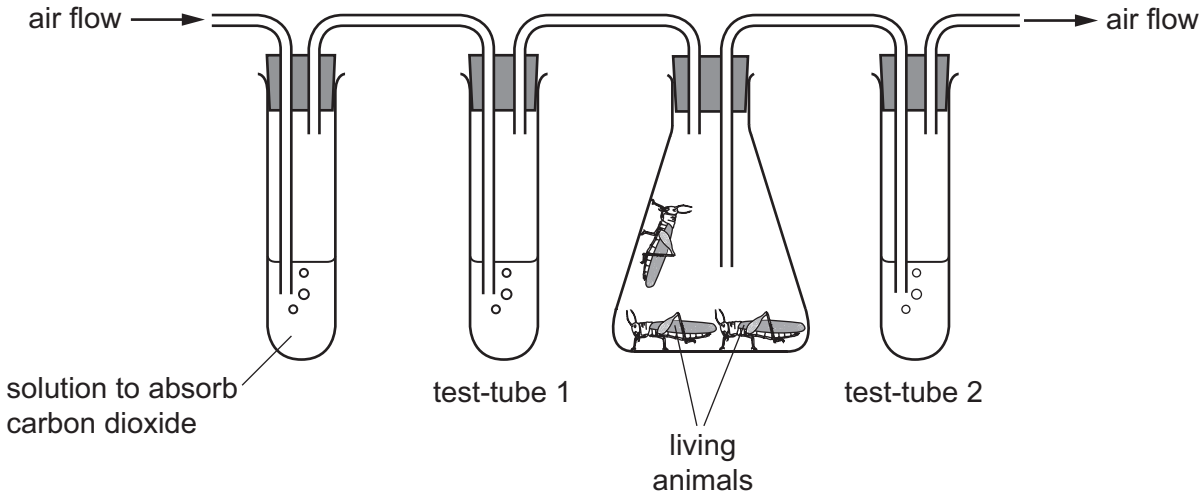


Which row shows the correct labels for the arrows in the diagram?

	1	2	3	4
A	carbon dioxide	glucose	oxygen	water
B	glucose	water	oxygen	urea
C	oxygen	glucose	carbon dioxide	water
D	oxygen	water	carbon dioxide	glucose

17 An experiment is set up, as shown.

Test-tubes 1 and 2 contain limewater. Limewater is a clear solution that turns cloudy in the presence of carbon dioxide. Air is pumped through the apparatus.



What is the appearance of the limewater in test-tubes 1 and 2 after a period of 10 minutes?

	test-tube 1	test-tube 2
A	clear	clear
B	clear	cloudy
C	cloudy	clear
D	cloudy	cloudy

18 Fitness training in athletes reduces the need for anaerobic respiration. It also increases the rate at which lactic acid is removed after exercise.

The table shows the concentration of lactic acid in the blood of four different athletes. They exercise for 20 minutes and rest for the next 70 minutes.

lactic acid concentration / mg per 100 cm^3 of blood					
time (min)	athlete 1	athlete 2	athlete 3	athlete 4	
0	20	20	20	20	exercise
10	84	82	60	86	
20	95	90	85	98	
30	92	95	76	99	
40	84	80	62	95	
50	78	75	50	81	
60	66	60	38	68	
70	54	50	25	62	
80	35	30	20	50	
90	28	20	20	39	

From the fittest athlete to the least fit, which order is correct?

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

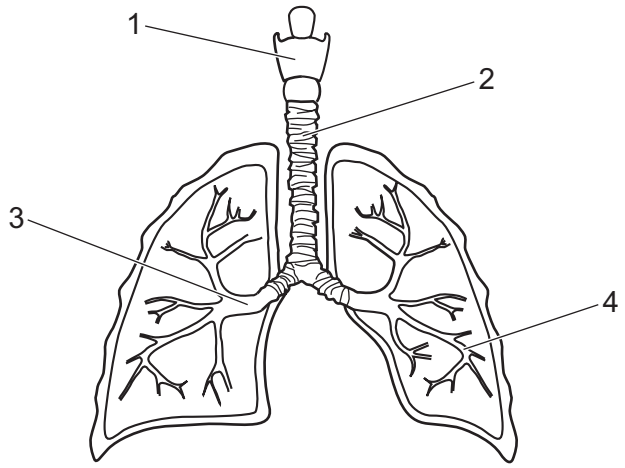
B $1 \rightarrow 2 \rightarrow 4 \rightarrow 3$

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

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

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19 The diagram shows the human gas exchange system.



Which row shows the correct labelling?

	1	2	3	4
A	trachea	larynx	bronchiole	bronchus
B	trachea	larynx	bronchus	bronchiole
C	larynx	trachea	bronchiole	bronchus
D	larynx	trachea	bronchus	bronchiole

20 What are two main functions of the kidneys?

A to make toxins in the blood harmless and to remove excess salt in the blood

B to remove excess salt in the blood and to remove urea from the blood plasma

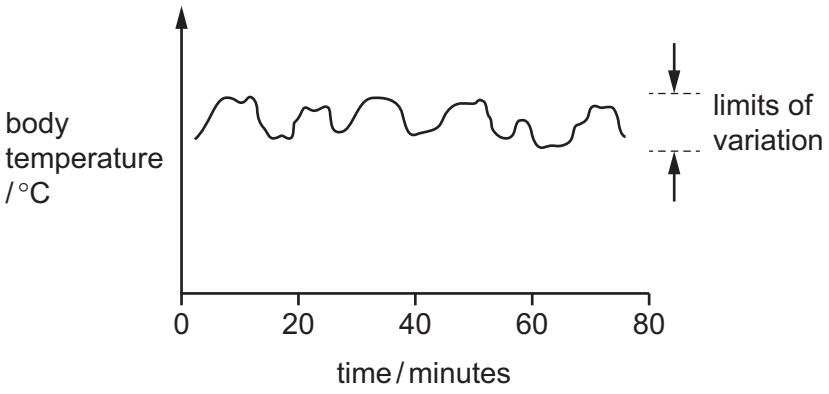
C to remove urea from the blood plasma and to convert glucose to glycogen

D to convert glucose to glycogen and to make toxins in the blood harmless

21 Which changes occur when a person walks from a very cold room into a hot room?

	sweating	skin blood vessels
A	decreases	constrict
B	decreases	dilate
C	increases	dilate
D	increases	constrict

22 The graph shows measurements taken of one aspect of the internal environment of the human body over time.



What controls the internal environment of the human body to keep each aspect within strict limits?

A excretion

B homeostasis

C positive feedback

D respiration

23 When a bright light is shone into the eye, the pupil becomes smaller.

Which statement explains this response?

A Ciliary muscles in the eye contract.

B Circular muscles in the iris contract.

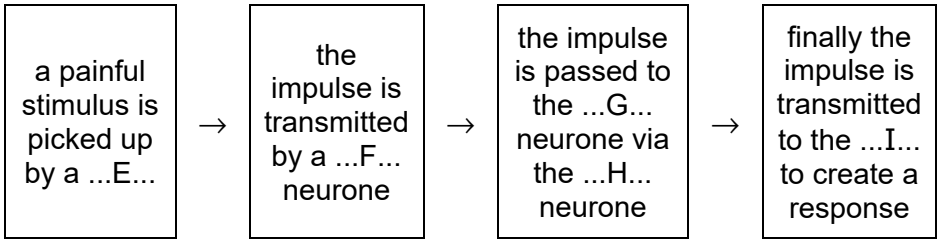
C Sensory cells in the iris detect the bright light.

D Sensory neurones stimulate the ciliary muscles in the iris.

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[Turn over

24 The flow chart describes a reflex action.



Which row correctly fills the flow chart?

	E	F	G	H	I
A	effector	relay	motor	sensory	brain
B	effector	sensory	relay	motor	receptor
C	receptor	sensory	motor	relay	effector
D	receptor	motor	sensory	relay	brain

25 A patient shows symptoms of unexplained weight loss, severe thirst and frequent need of urination.

A test shows high levels of glucose in the urine.

Which condition is diagnosed?

A cardiovascular disease

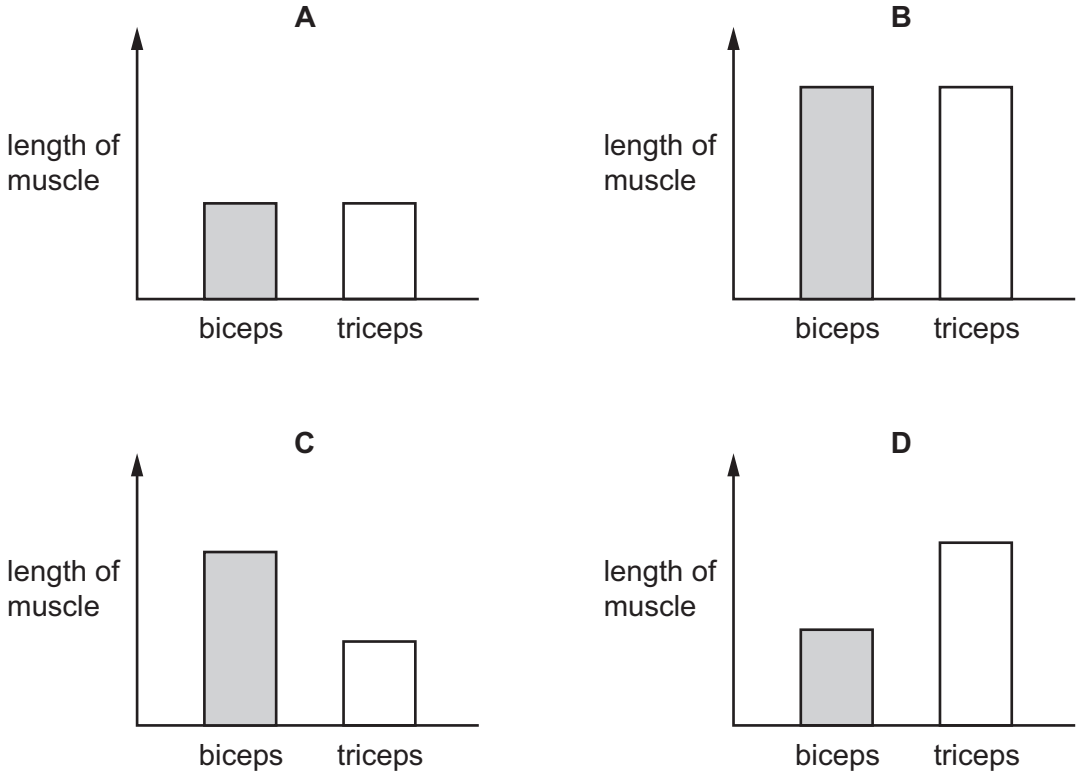
B diabetes

C anaemia

D obesity

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26 Which graph shows the lengths of the biceps and triceps muscles in the upper arm when the elbow joint is fully extended and the arm is straight?

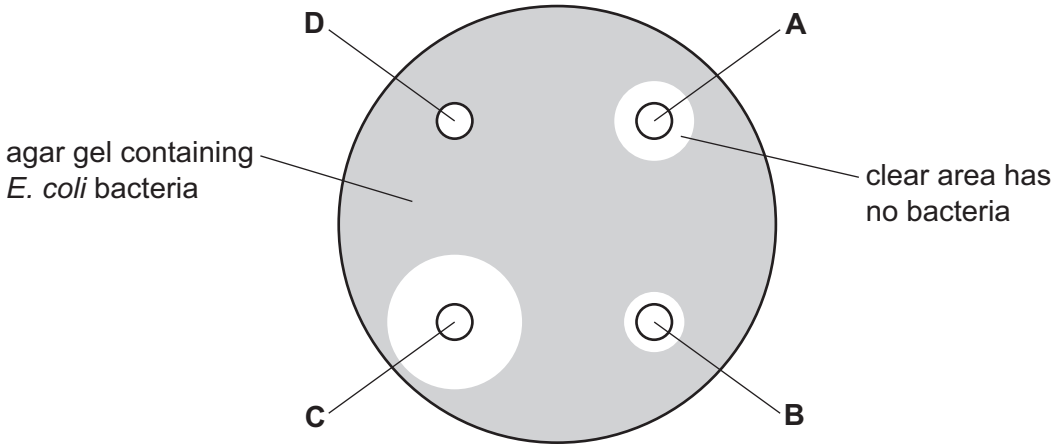


27 Four discs, **A**, **B**, **C** and **D**, each containing a different antibiotic, were placed onto agar gel in a Petri dish. The agar gel contained *E. coli* bacteria.

The Petri dish was then sealed and incubated for 24 hours at 35 °C.

The results are shown.

Which antibiotic is most effective?



28 Bacteria, fungi and viruses are often grouped together as microorganisms.

Which statement about microorganisms is correct?

A All types of microorganism are used to produce antibiotics.

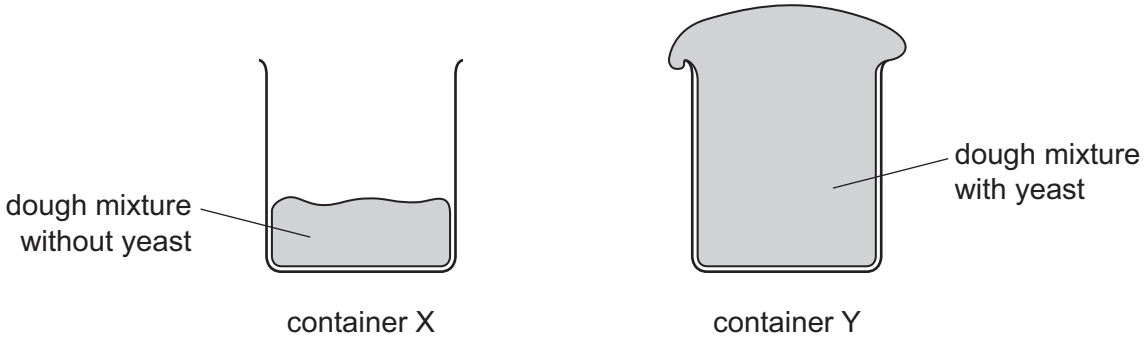
B Bacteria and viruses can only be found inside living cells.

C Decomposition is brought about by bacteria and fungi only.

D All microorganisms contain DNA but not in a nucleus.

29 Two containers, X and Y, were filled with equal amounts of dough mixture for making bread. The mixture in Y had yeast in it.

The containers were then left in a warm place for two hours. The diagram shows their appearance after this time.



Which substance produced by the yeast causes the difference between the dough in X and Y?

A alcohol

B carbon dioxide

C lactic acid

D oxygen

30 What is the principal source of energy input to biological systems?

A food chains

B photosynthesis

C producers

D the Sun

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31 In the carbon cycle, what is one way that carbon can enter the atmosphere?

A burning

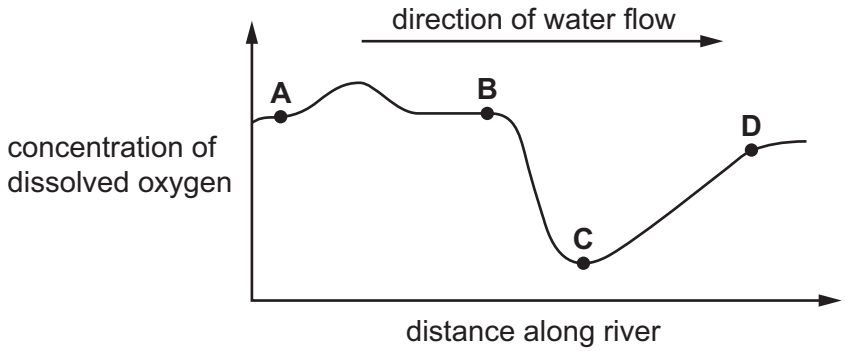
B feeding

C fossilisation

D photosynthesis

32 The graph shows the concentration of dissolved oxygen at different points along a river.

At which point is sewage emptied into the river?



33 A gardener has two groups of strawberry plants, labelled X and Y. They are grown to maturity under identical conditions. He makes some observations and concludes that those in group X were produced asexually and those in group Y were grown from seeds.

Which observations most closely support his conclusions?

1 Group X plants produced flowers all at the same time.

2 Group X plants produced flowers which varied in shape and size, some of which were produced earlier than others.

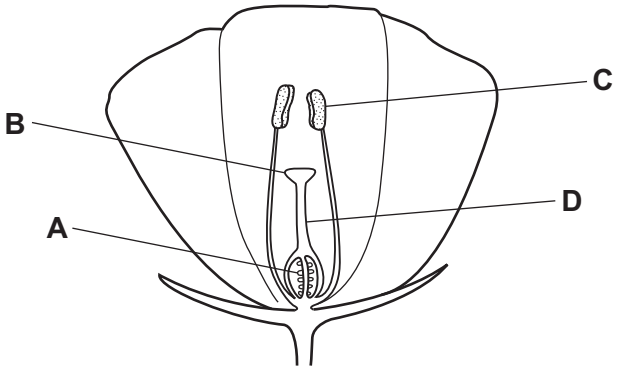
3 Group Y plants produced flowers all at the same time.

4 Group Y plants produced flowers which varied in shape and size, some of which were produced earlier than others.

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

34 The diagram shows a section through a flower.

Where does fertilisation take place?



35 Human gametes are different from each other.

Which information about male gametes is correct?

	size	numbers released at one time	movement
A	large	normally one	cannot move on their own
B	large	millions	cannot move on their own
C	small	normally one	can swim
D	small	millions	can swim

36 During the menstrual cycle, hormone M is released in the body to stimulate the production of eggs. This is then followed by the release of hormone N which brings about ovulation.

What are the names of hormones M and N?

	hormone M	hormone N
A	oestrogen	FSH
B	LH	oestrogen
C	FSH	LH
D	progesterone	oestrogen

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37 What is the correct order for the sizes of the pieces of genetic material shown in the table, from smallest to largest?

	smallest ⟶		largest
A	gene	molecule of DNA	chromosome
B	molecule of DNA	gene	chromosome
C	chromosome	molecule of DNA	gene
D	gene	chromosome	molecule of DNA

38 A man of blood group A and his wife of blood group O had two children, both of blood group A. The man concluded that he must be homozygous for the allele I^A, since he thought half his children would be of group O if he were heterozygous.

Why was his conclusion unsound?

A Blood group mutations are common.

B Genetic ratios are unreliable for small numbers.

C His wife might have been heterozygous.

D The expected ratio for a heterozygous father and group O mother is 3 group A : 1 group O.

39 Rising carbon dioxide levels in the atmosphere are causing the Earth's climate to warm up.

In what way might this change of climate affect the process of natural selection?

A A small rise in temperature may reduce the rate of photosynthesis in plants.

B Farmers may try to grow different crops in the warmer areas.

C It may allow some animals and plants to colonise new areas.

D Some mutations may prove to be an advantage in warmer conditions.

40 The gene for insulin production can be transferred from human DNA into bacterial DNA. These bacteria are cultured to produce human insulin.

What is an advantage to patients of using this type of human insulin instead of insulin from other animals?

A It will allow patients to pass the insulin gene to any offspring.

B It will cause patients' pancreas glands to start producing insulin again.

C It will be more readily available as it can be produced on a commercial scale.

D It will result in the transfer of the insulin gene to patients.

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