Cambridge Assessment International Education

Cambridge O Level

BIOLOGY **5090/11**

Paper 1 Multiple Choice **May/June 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.

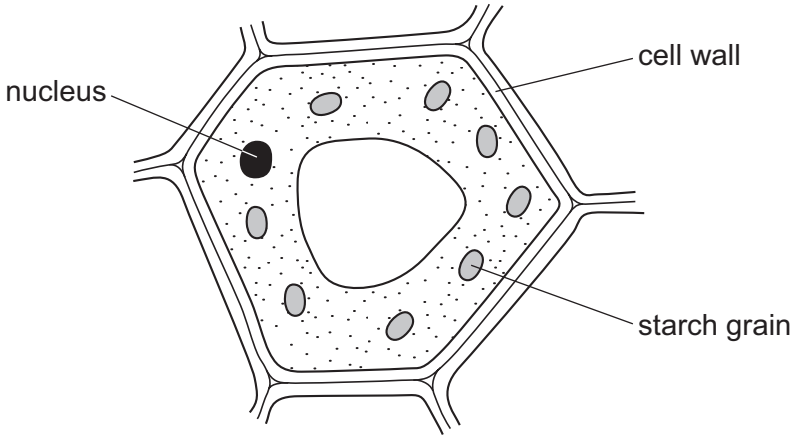
INFORMATION

- 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 **24** pages. Any blank pages are indicated.

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1 The diagram shows a plant cell. The cell is stained with iodine solution.



After staining with iodine solution, what are the colours of the cell wall and the starch grain?

	cell wall	starch grain
A	blue-black	blue-black
B	blue-black	orange-brown
C	orange-brown	blue-black
D	orange-brown	orange-brown

2 The diagram shows the shape of a red blood cell.



What is an advantage of this shape?

A allows it to carry more haemoglobin

B allows it to move more quickly in arteries

C increases its surface area for diffusion

D prevents it getting trapped in valves in veins

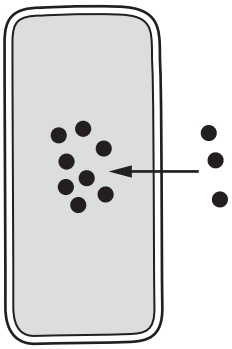
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3 The diagrams show four different plant cells.

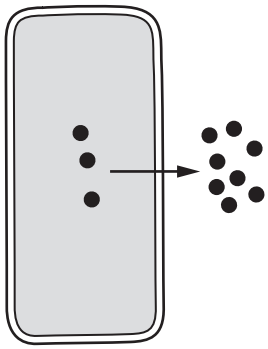
They are all carrying out aerobic respiration.

Which diagram represents the movement of carbon dioxide molecules?

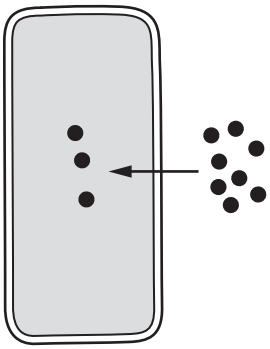
A



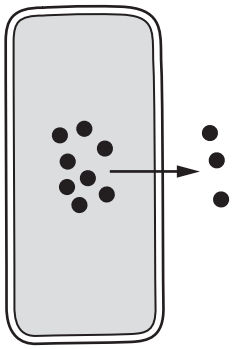
B



C



D

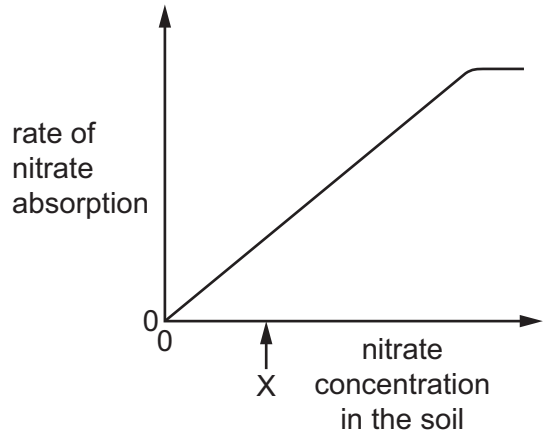


4 The rate of nitrate ion absorption by a root hair cell was measured at different soil nitrate concentrations.

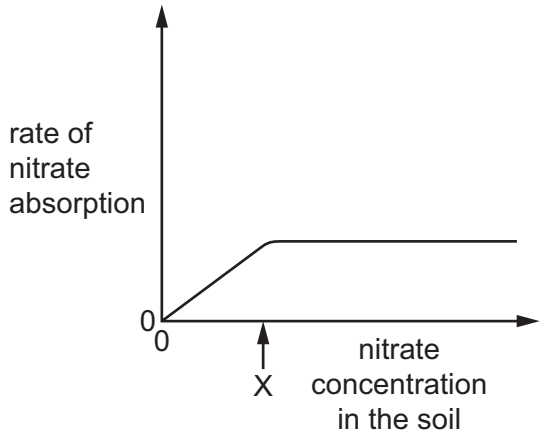
At X, the concentration of nitrate in the soil is the same as in the cell.

Which graph shows how the rate of absorption varies with nitrate concentration in the soil?

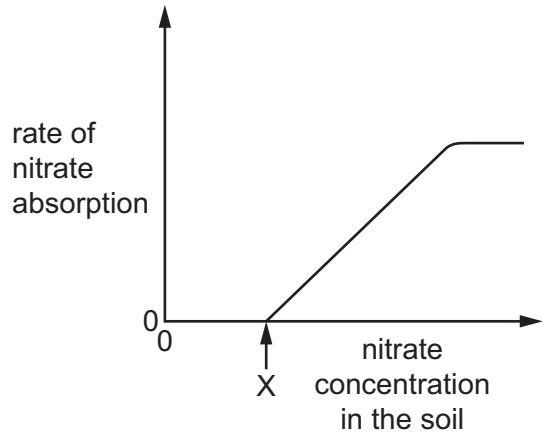
A



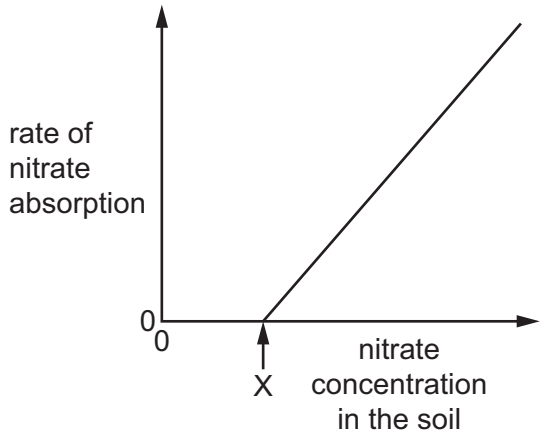
B



C

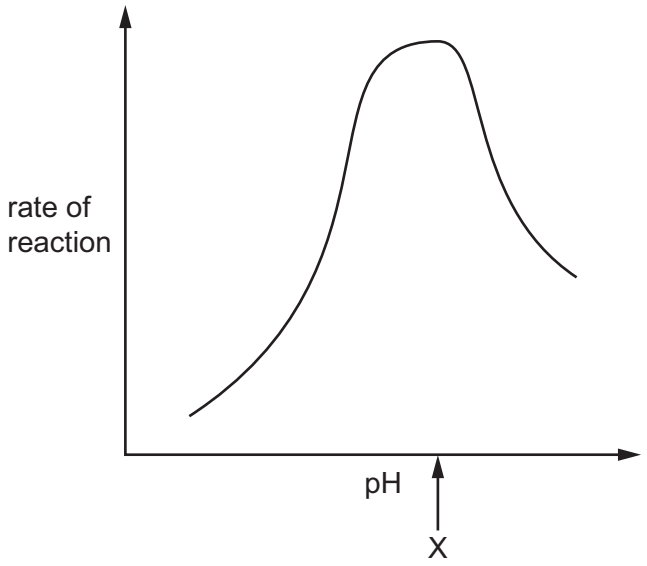


D



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5 The graph shows how the rate of reaction of a protease from the stomach varies with pH.



What describes the pH at point X?

A the highest pH at which this enzyme is active

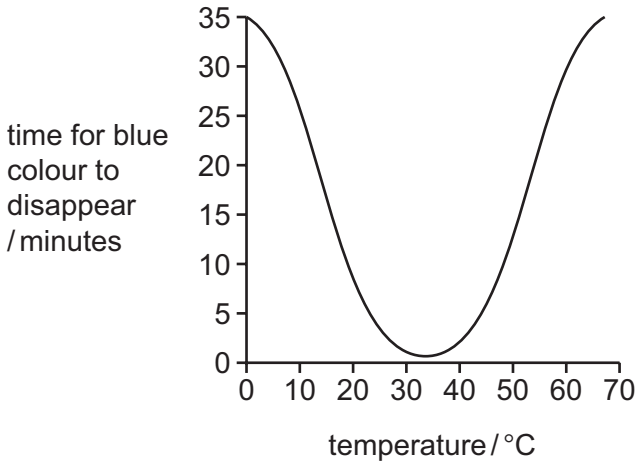
B the lowest pH that does not destroy the enzyme

C the pH at which the substrate starts to run out

D the pH that produces the highest rate of enzyme activity

6 A dilute starch solution turns blue when very dilute iodine solution is added. This colour disappears as the starch is broken down by amylase.

The graph shows the disappearance of the blue colour at different temperatures.



Which statement explains the shape of the curve?

A Enzyme activity rises as the temperature rises.

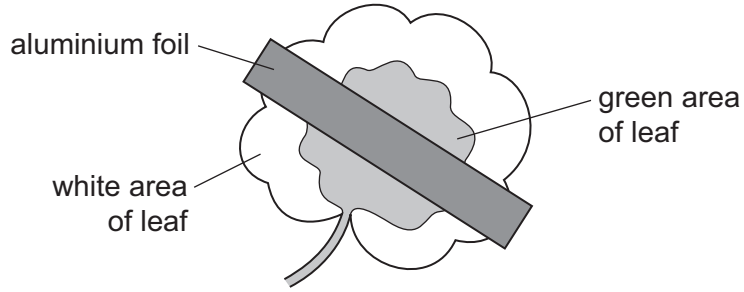
B Enzymes have an optimum temperature range for activity.

C Enzymes are inactive below 30 °C.

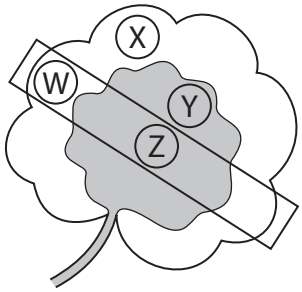
D Enzymes do not work above 30 °C.

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7 A plant has leaves with both green and white areas. One of its leaves is partly covered with aluminium foil which blocks light.



The plant is then placed under a lamp for 24 hours. After this time, discs are cut from the areas of the leaf shown, and tested with iodine solution.



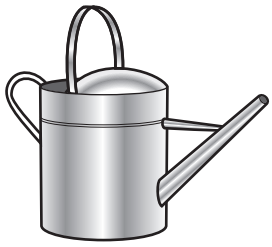
Which leaf discs will give a blue-black colour when tested with iodine solution?

A W and X **B** X only **C** Y and Z **D** Y only

8 A gardener grows tomato plants in pots. To begin with, the plants produce green leaves and grow quickly. Then, after a few weeks, the leaves turn yellow.

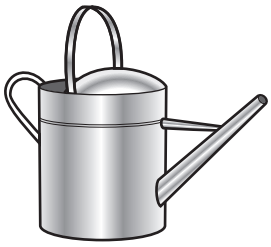
Which type of water can the gardener use on the plants to make the leaves turn green again?

A



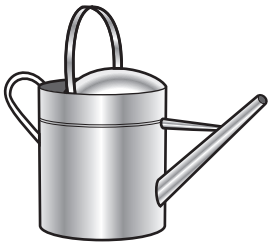
water with fertiliser containing magnesium

B



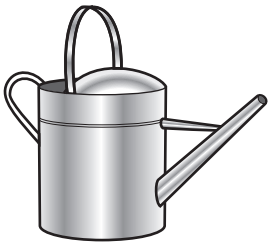
distilled water

C



rainwater

D



water with fertiliser containing nitrate

9 Which row shows the diseases caused by lack of different nutrients in the diet?

	lack of iron	lack of vitamin C	lack of vitamin D
A	scurvy	anaemia	rickets
B	anaemia	rickets	scurvy
C	scurvy	rickets	anaemia
D	anaemia	scurvy	rickets

10 Four food tests were each carried out on four different white powders, **A**, **B**, **C** and **D**.

The results are shown in the table.

Which powder contains a carbohydrate, a fat and a protein?

	results of tests on the powders			
	Benedict's test	biuret test	ethanol emulsion test	iodine solution test
A	blue colour	violet colour	milky	blue-black colour
B	orange colour	blue colour	milky	blue-black colour
C	red colour	violet colour	clear	yellow colour
D	green colour	blue colour	clear	yellow colour

11 What is an example of assimilation?

A absorption of glycerol into lacteals

B breakdown of glycogen to glucose in the liver

C building of proteins from amino acids

D release of a hormone from a gland

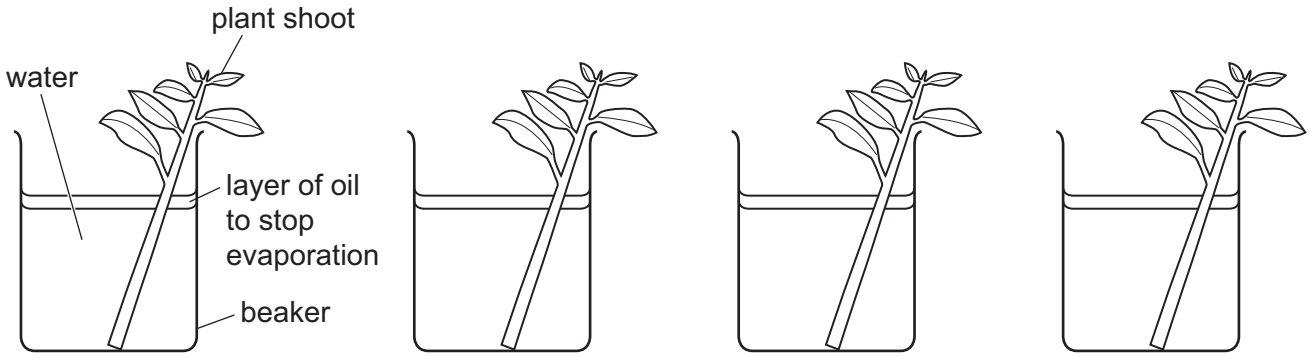
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12 Four plant shoots were set up as shown in the diagram, in the same environmental conditions.

Waterproof petroleum jelly was applied to the plant leaf surfaces, as shown.

Each beaker, with its plant shoot and water, was weighed at the start of the experiment and after 24 hours.

After 24 hours the percentage loss in mass was calculated for each plant shoot.



plant 1
petroleum jelly on lower leaf surfaces

plant 2
petroleum jelly on upper leaf surfaces

plant 3
petroleum jelly on upper and lower leaf surfaces

plant 4
no petroleum jelly

Which row shows the results of this experiment?

	percentage loss in mass after 24 hours			
	plant 1	plant 2	plant 3	plant 4
A	15	5	12	3
B	5	12	3	15
C	3	5	13	15
D	3	15	5	12

13 What is the main cause of water moving up to the leaves in xylem vessels?

A active transport

B evaporation from the epidermis of the leaf

C evaporation from the walls of the mesophyll cells

D use of water in photosynthesis

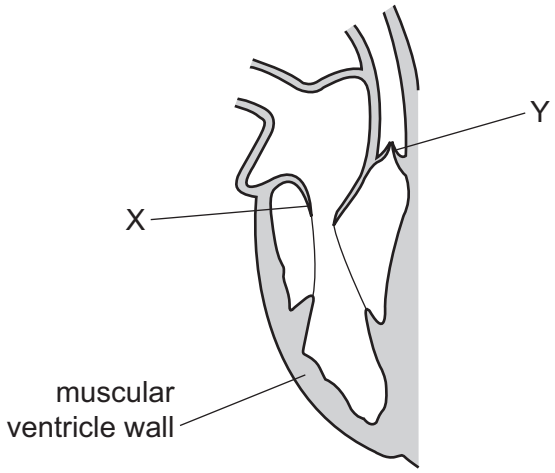
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[Turn over

14 Which blood vessels carry blood towards the heart and towards the lungs?

	towards heart	towards lungs
A	aorta	pulmonary artery
B	vena cava	pulmonary artery
C	aorta	pulmonary vein
D	vena cava	pulmonary vein

15 The diagram shows the right side of the human heart when the ventricle is relaxed.



Which row describes the positions of valve X and valve Y when the ventricle contracts?

	valve X	valve Y
A	closed	closed
B	closed	open
C	open	closed
D	open	open

16 People who have a diet that contains a lot of fat and who smoke have two important risk factors for which disease?

A anaemia

B coronary heart disease

C emphysema

D scurvy

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17 Which equation represents aerobic respiration in plant cells?

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

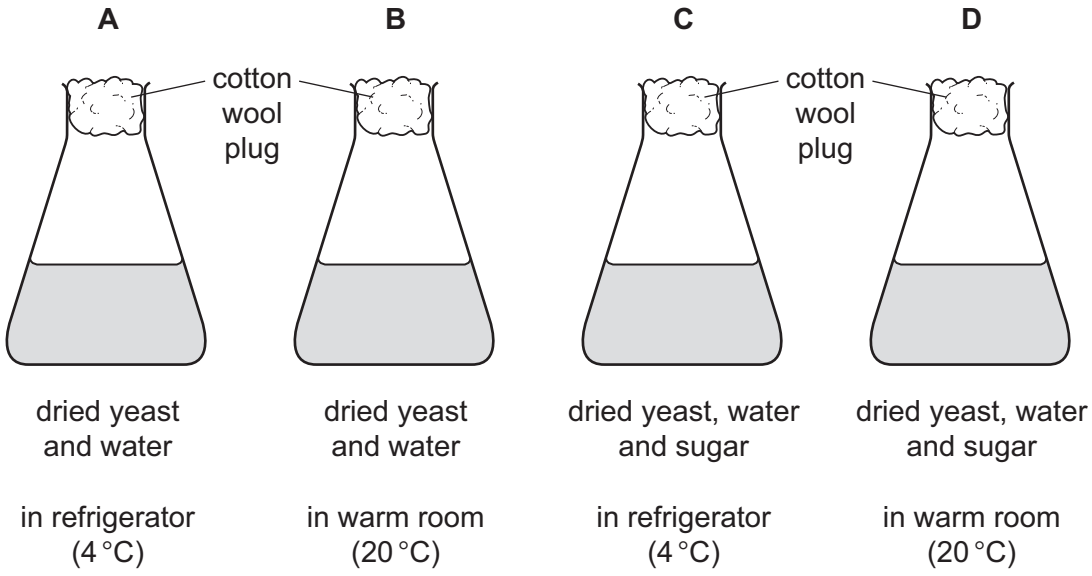
B $2C_2H_5OH + 2CO_2 \rightarrow C_6H_{12}O_6$

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

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

18 Four flasks are sterilised and set up as shown.

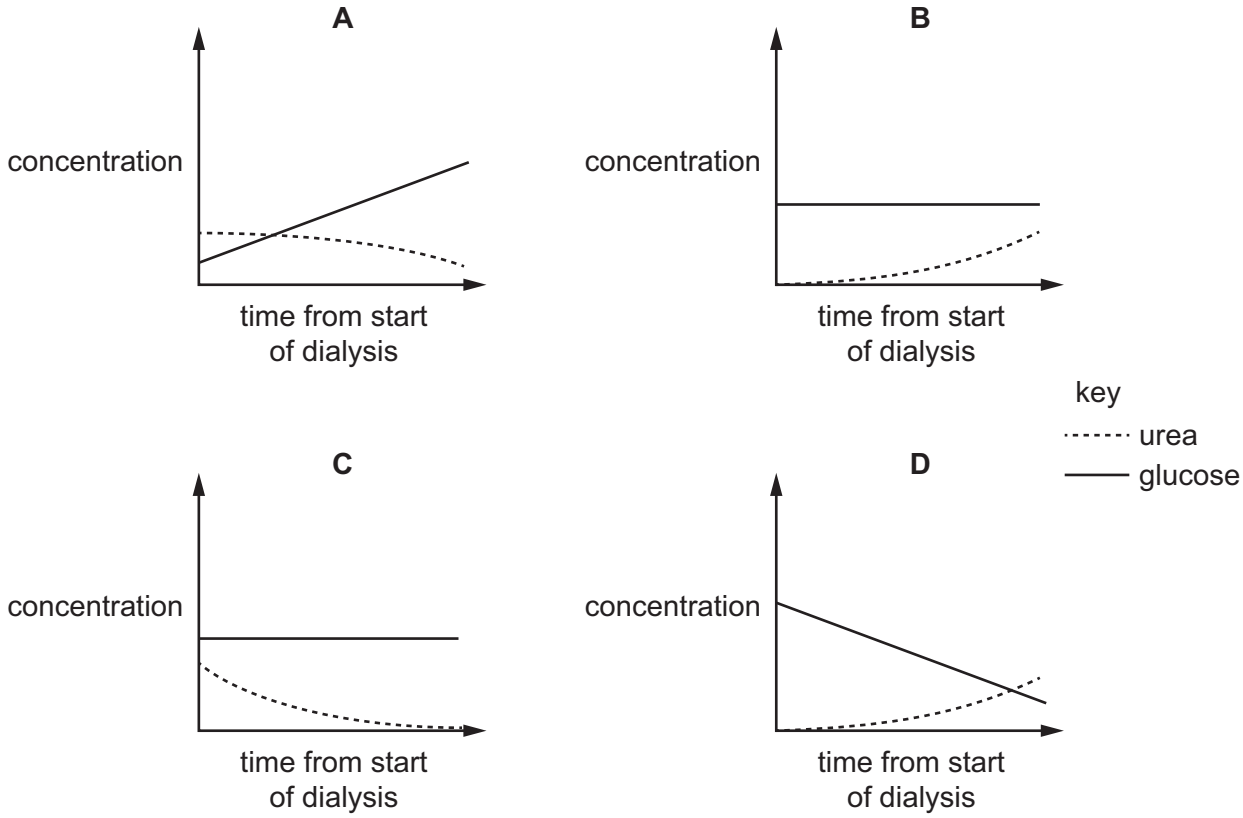
Which flask will show signs of fermentation (anaerobic respiration) after one hour?



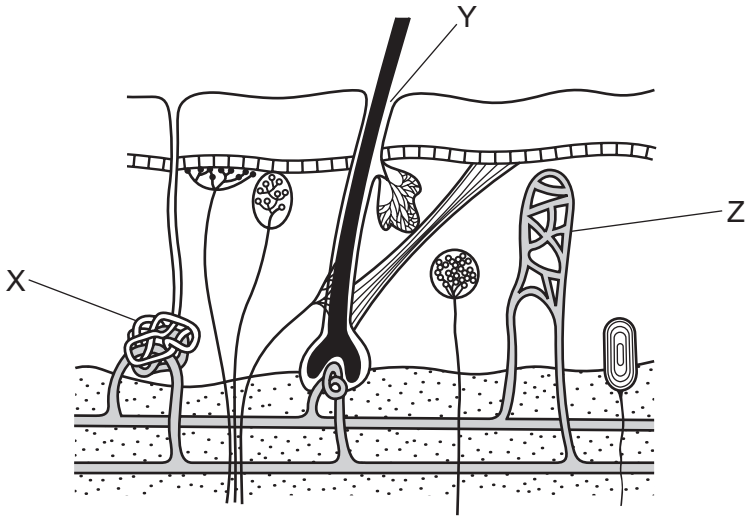
19 Which row shows actions that occur when humans breathe in?

	diaphragm	external intercostal muscles	ribs
A	becomes dome shaped	contract	fall
B	becomes dome shaped	relax	rise
C	flattens	contract	rise
D	flattens	relax	fall

20 Which graph shows the change in concentration of molecules in the dialysis fluid during kidney dialysis?



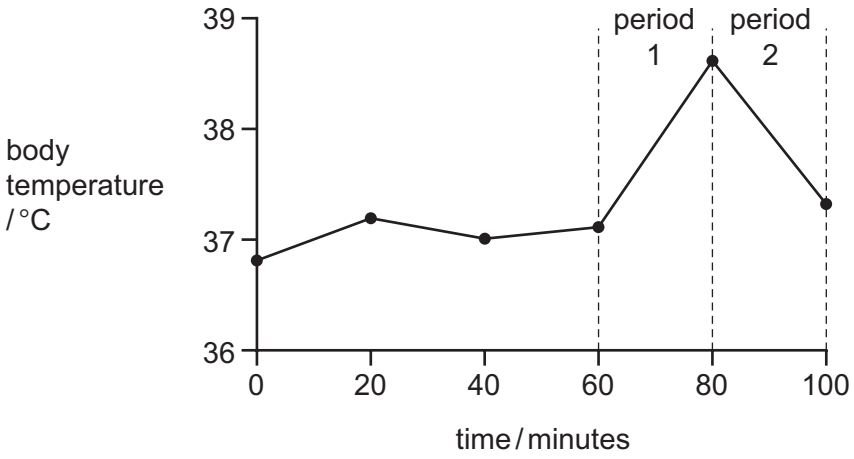
21 The diagram shows some structures in human skin.



Which row shows the names of structures X, Y and Z?

	X	Y	Z
A	blood vessel	hair follicle	sweat gland
B	hair follicle	blood vessel	sweat gland
C	sweat gland	hair follicle	blood vessel
D	sweat gland	blood vessel	hair follicle

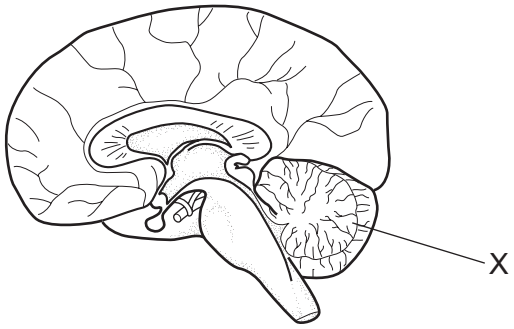
22 The graph shows changes in a person's body temperature plotted against time.



What could cause the changes in body temperature in periods 1 and 2?

	period 1	period 2
A	reduced air temperature	increased air temperature
B	reduced air temperature	shivering
C	vigorous exercise	increased sweating
D	vigorous exercise	shivering

23 The diagram shows a cross-section of the human brain.



If structure X is damaged, which body functions may be affected?

A control of body temperature

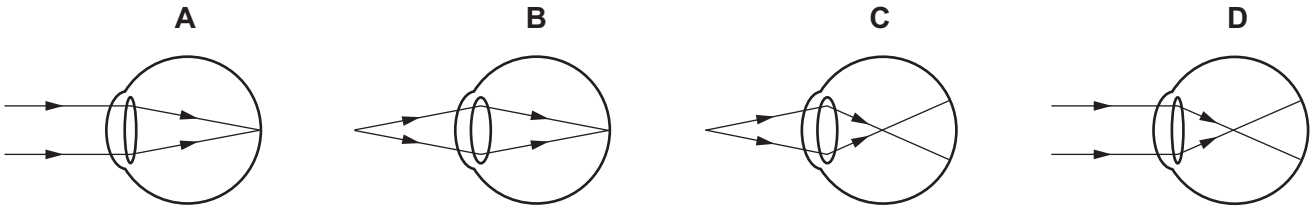
B control of breathing and heartbeat

C control of emotion, language, memory and reasoning

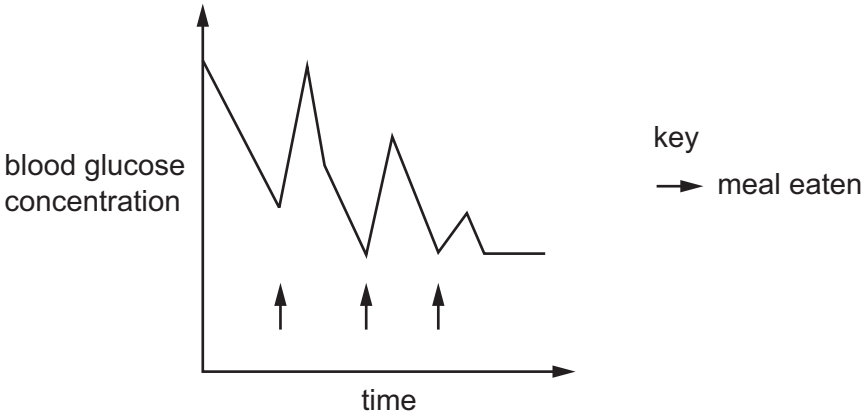
D control of movement, posture and balance

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24 Which diagram shows how light from a distant object is focused on the retina to form a clear image?



25 The graph shows the changing blood glucose concentration in one person over 24 hours.



Which statement explains the shape of the graph?

A After each meal, adrenaline is released.

B After each meal, insulin is released.

C Before each meal, adrenaline is released.

D Before each meal, insulin is released.

26 What happens when the triceps muscle of the forelimb begins to contract?

A The biceps muscle begins to relax.

B It starts to pull the radius bone upwards.

C The arm becomes bent at the elbow joint.

D The upper arm is raised above the shoulder.

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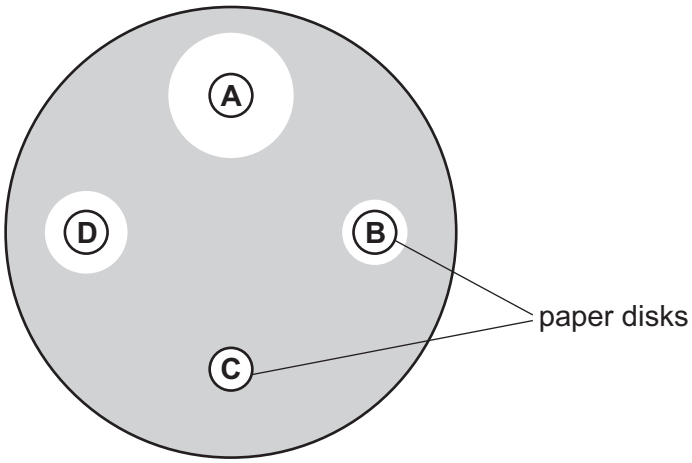
[Turn over

27 A patient has a bacterial infection. A sample of the bacteria is taken to identify which antibiotic to use for this patient.

The sample from the patient is spread evenly on an agar plate. Small paper disks soaked in each of four antibiotics are placed on the agar plate which is kept warm overnight.

The diagram shows the results of the test. The shaded area shows where bacteria have grown.

Which antibiotic is the most effective against these bacteria?



28 Which rows show some of the structures found in bacteria, fungi and viruses?

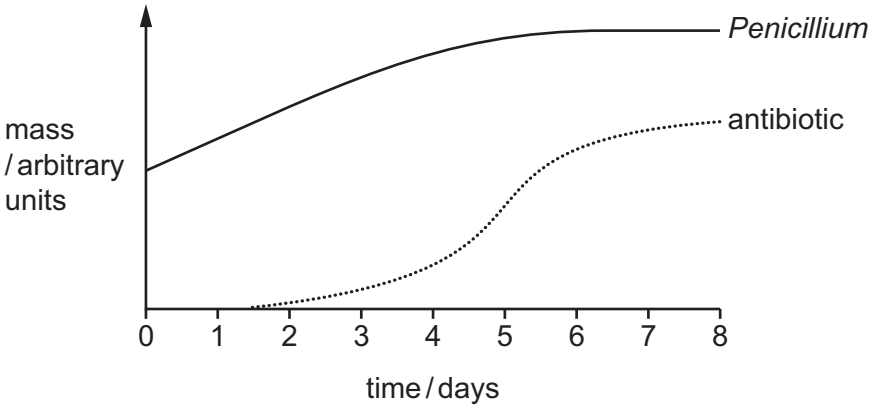
	structure	bacteria	fungi	viruses
1	cell membrane	✓	✓	✗
2	cell wall	✗	✓	✓
3	nucleus	✓	✗	✓
4	protein coat	✗	✗	✓

key
✓ = present
✗ = not present

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

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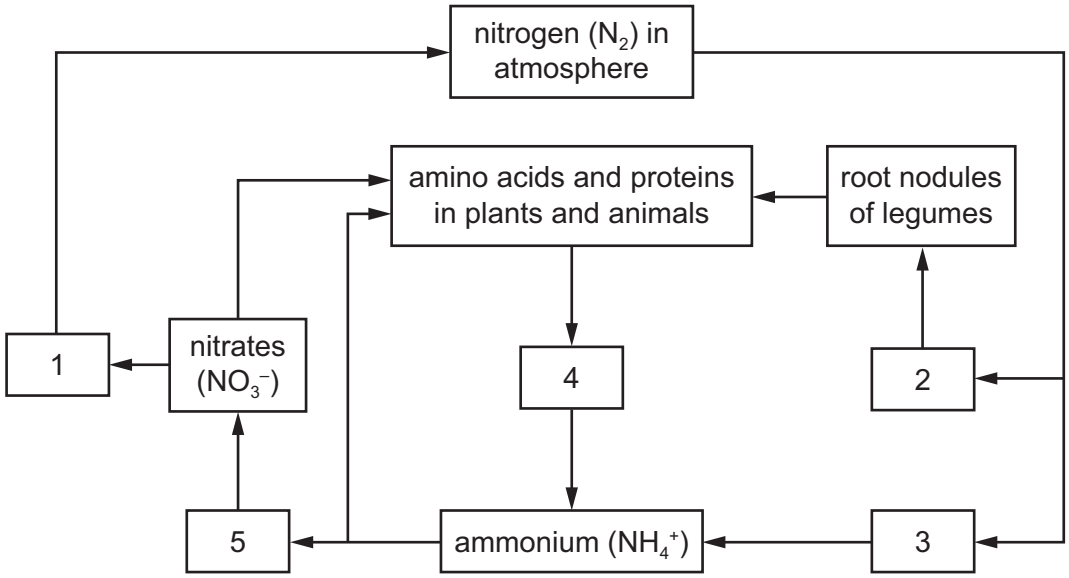
29 The graph shows the mass of *Penicillium* grown in a fermenter and the mass of antibiotic produced.



When is the *Penicillium* producing antibiotic most rapidly?

A day 1 **B** day 3 **C** day 5 **D** day 8

30 The diagram shows the nitrogen cycle.



In which stages of the nitrogen cycle are nitrogen-fixing bacteria important?

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

31 Malaria is spread by the .....1..... which acts as a .....2..... for the disease.

Which terms correctly complete the sentence?

	1	2
A	bacterium	parasite
B	bacterium	vector
C	mosquito	parasite
D	mosquito	vector

32 What increases in the long term as a result of tropical deforestation?

A cloud cover

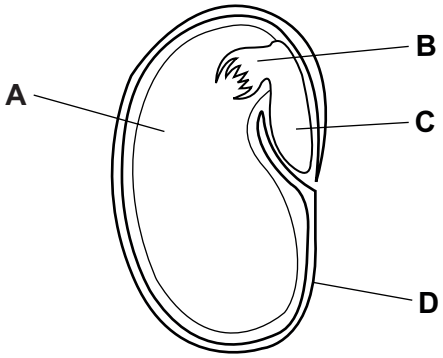
B humidity

C soil erosion

D soil fertility

33 The diagram shows a section through a bean seed.

Which labelled part is the testa?

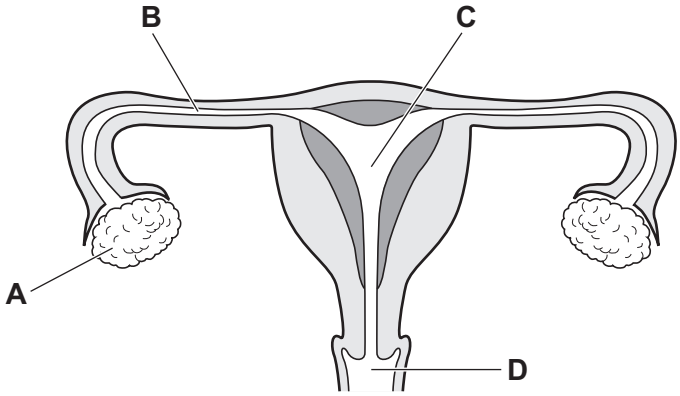


34 Which row shows the two hormones that are necessary for ovulation to occur?

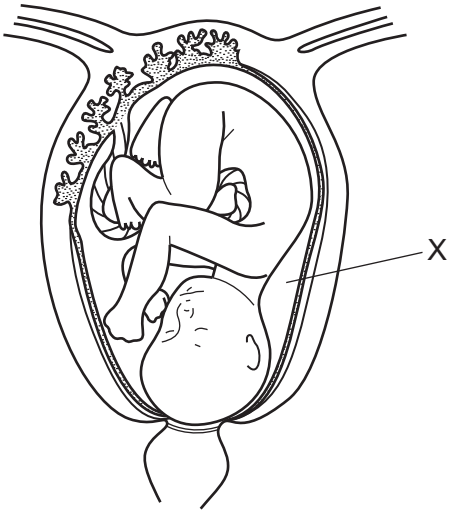
	hormones needed for ovulation to occur			
	FSH	LH	oestrogen	progesterone
A	no	no	yes	yes
B	no	yes	no	yes
C	yes	no	no	yes
D	yes	yes	no	no

35 The diagram shows the female reproductive system.

Where does fertilisation take place?



36 The diagram shows a developing fetus in the uterus.



What is the liquid at X called?

A amniotic fluid

B blood

C urine

D water

37 Which human feature shows discontinuous variation?

A agility

B body height

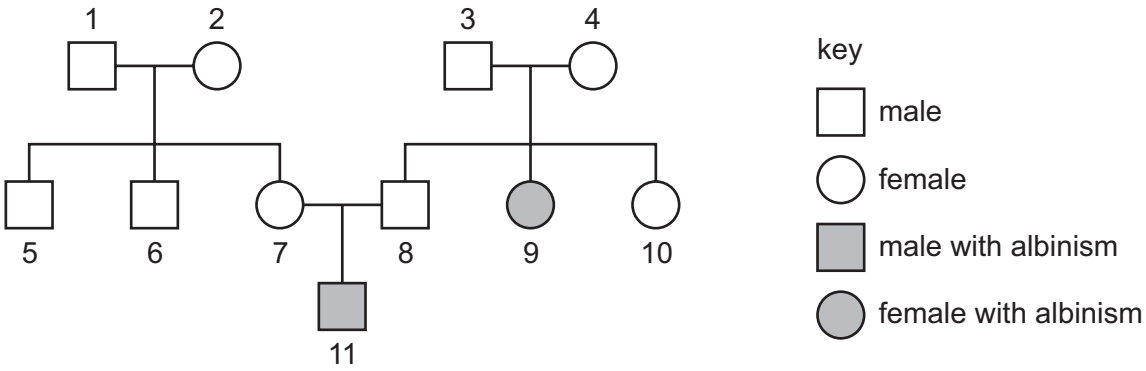
C obesity

D sickle cell anaemia

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38 Albinism is an inherited condition, caused by a recessive allele.

The diagram shows a family tree for a family affected by this condition.



Individuals 9 and 11 have albinism.

What is the chance that individual 10 is heterozygous?

A 0 in 4 **B** 1 in 4 **C** 2 in 3 **D** 3 in 4

39 The number of weed plants in a grass field was counted at monthly intervals. The table shows the results.

weeds	number of plants																
	2020									2021							
	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug
groundsel	361	382	400	490	475	400	275	120	60	0	0	5	5	4	4	2	0
dock	688	700	720	710	730	700	700	650	200	0	0	300	150	30	14	6	2
plantain	50	60	80	93	102	140	190	260	200	150	160	350	512	762	840	975	1090
dandelion	75	100	160	202	253	314	335	300	175	20	0	130	414	561	732	849	987

Since August 2020, the field was mown regularly and used as a football pitch.

From this information, which two weeds are best adapted to survive in mown grass?

A dandelion and dock

B dock and groundsel

C plantain and dandelion

D plantain and dock

40 Human insulin genes can be inserted into bacteria. The bacteria can then be cultured and will produce human insulin as a by-product.

What is an advantage to a patient of using this source of insulin rather than insulin from animals?

A It can be used to prevent the development of diabetes.

B It will allow the pancreas to regenerate.

C The insulin from animals has fewer side effects.

D It is much cheaper to produce.

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