Cambridge Assessment International Education

Cambridge O Level

BIOLOGY **5090/12**

Paper 1 Multiple Choice **May/June 2024**

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.

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This document has **24** pages. Any blank pages are indicated.

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1 Which type of cell has a cellulose cell wall?

A animal

B bacterium

C fungus

D plant

2 Some young plants were put into the soil and grew well for a few weeks. They then began to show signs of disease. Samples of the diseased leaves were examined using a microscope.

Which observations of the organism causing the disease show that it could be a fungus?

	long and thread-like structure	chloroplasts **not** present	cell walls present	nuclei surrounded by a membrane
A	✓	✓	✓	✓
B	✓	✓	✓	✗
C	✓	✗	✗	✓
D	✗	✓	✓	✓

key

✓ = yes

✗ = no

3 The cell wall of a plant cell is removed using an enzyme.

What would happen if this cell is then placed in distilled water?

A It would take longer for the cell to become turgid.

B Proteins in the cytoplasm would leave through the cell membrane.

C The cell would become smaller as water passes out.

D The cell would burst as water moves into it.

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4 The table shows the concentrations of four types of particle in two cells.

particle	concentration / arbitrary units	
	cell 1	cell 2
magnesium ions	6	2
nitrate ions	9	4
oxygen molecules	12	9
water molecules	320	520

Which particle can only be moved by active transport between the cells in the direction described?

	particle	direction of movement
A	magnesium ions	from cell 1 to cell 2
B	nitrate ions	from cell 2 to cell 1
C	oxygen molecules	from cell 1 to cell 2
D	water molecules	from cell 2 to cell 1

5 Which type of food molecule has the element nitrogen in its structure?

A amino acid

B fatty acid

C glucose

D glycerol

6 Which test can be used to determine the presence of glucose?

A Benedict's test

B biuret test

C ethanol emulsion test

D iodine test

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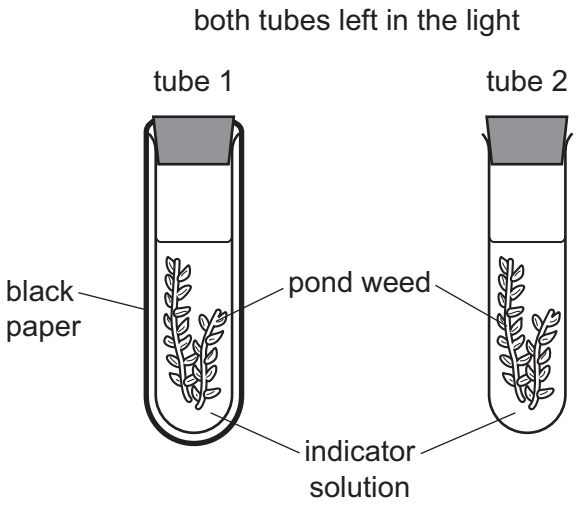
7 An indicator solution shows the following colour changes:

atmospheric carbon dioxide concentration: orange

high carbon dioxide concentration: yellow

low carbon dioxide concentration: purple.

In the experiment shown, the indicator was orange in both tubes at the beginning of the experiment.



Which colours would the indicators be after three hours?

	tube 1	tube 2
A	orange	yellow
B	purple	orange
C	purple	yellow
D	yellow	purple

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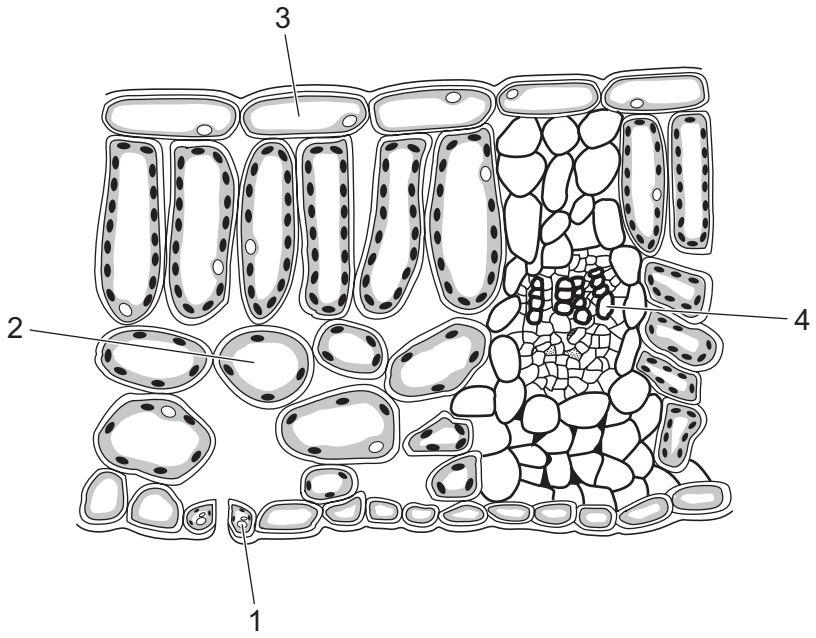
8 The diagram shows a section of a leaf.



Which numbers indicate cells where both photosynthesis **and** gas exchange occur?

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

9 Water moves from the soil to the atmosphere through a plant.

The water enters the plant through the root hair cells and moves into the root cortex.

Where does the water move into from the root cortex?

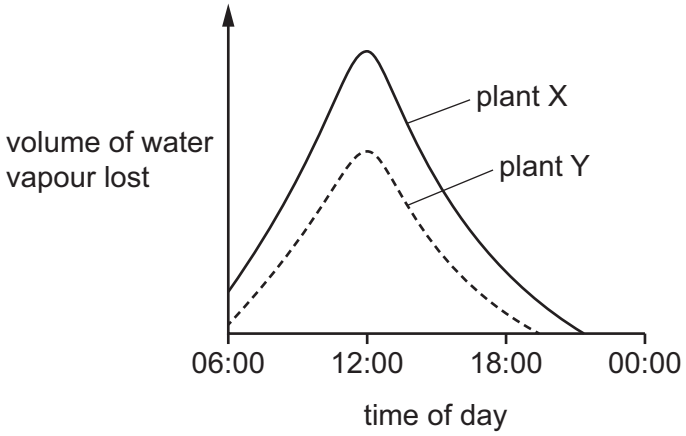
A into the mesophyll cells

B into the phloem cells

C into the xylem vessels

D through the stomata

10 The graph shows the loss of water vapour from two different plants growing in identical conditions.



What is a possible reason for the difference in the volume of water vapour lost from the two plants?

A Plant X has most of its stomata on the lower surfaces of its leaves.

B Plant Y has most of its stomata on the upper surfaces of its leaves.

C The surfaces of the mesophyll cells of plant X have a greater surface area.

D The surfaces of the mesophyll cells of plant Y have a greater surface area.

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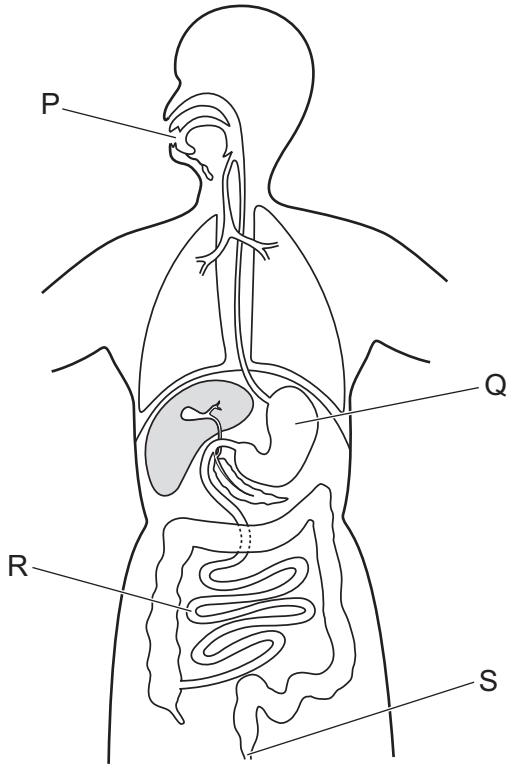
11 The diagram shows some parts of the human digestive system.

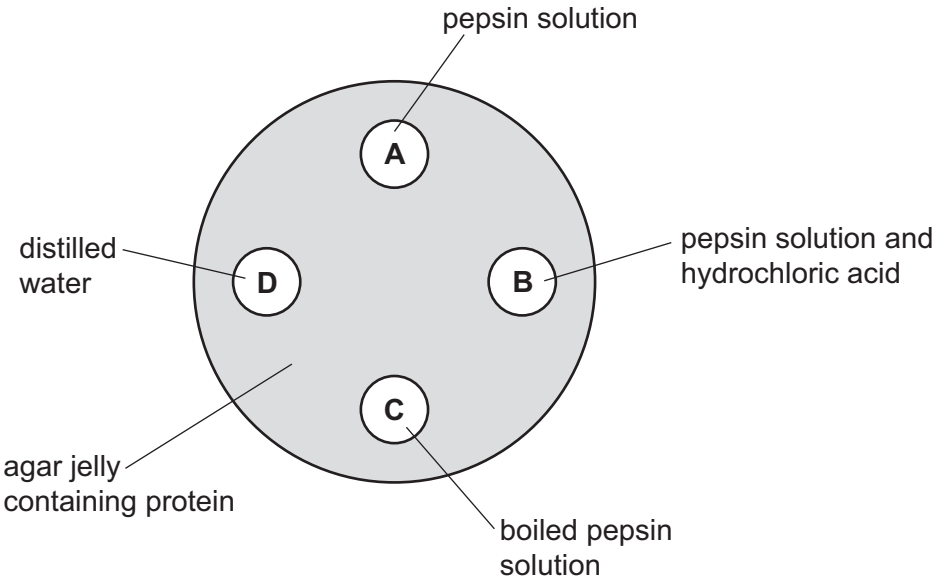


Which row identifies the main function of each of the labelled parts?

	P	Q	R	S
A	digestion	absorption	ingestion	egestion
B	ingestion	digestion	egestion	absorption
C	egestion	digestion	absorption	egestion
D	ingestion	digestion	absorption	egestion

12 A dish is filled with agar jelly containing protein. Four holes are cut in the jelly and each hole is filled as shown in the diagram.

After 30 minutes, which hole will be surrounded by the largest area without protein?



13 Scientists estimated the areas of the inner surfaces of different regions of a healthy human digestive system.

Which region is the small intestine?

region	surface area / m^2
A	0.25
B	0.75
C	2.00
D	32.00

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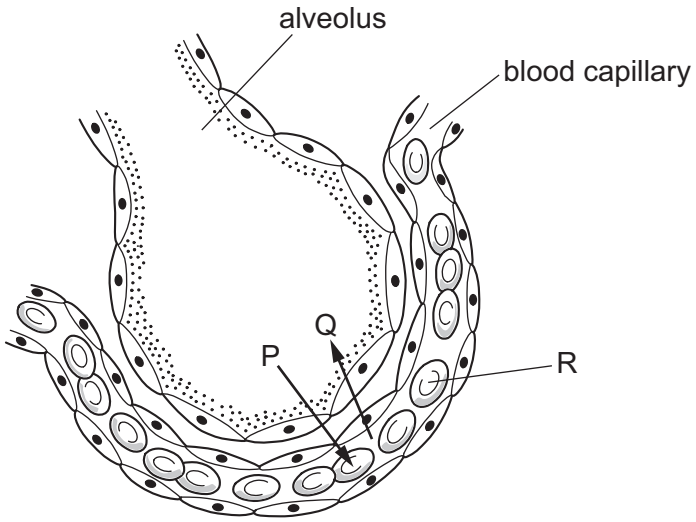
14 The diagram shows an alveolus and a blood capillary.



Which row identifies the letters P, Q and R?

	P	Q	R
A	carbon dioxide	oxygen	red blood cell
B	carbon dioxide	oxygen	white blood cell
C	oxygen	carbon dioxide	red blood cell
D	oxygen	carbon dioxide	white blood cell

15 What is produced during anaerobic respiration in muscles?

A alcohol, carbon dioxide and water

B carbon dioxide and lactic acid

C carbon dioxide only

D lactic acid only

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[Turn over

16 A student measured their pulse rate in beats per minute (bpm) three times at rest and three times after running.

The table shows the results.

pulse rate at rest / bpm	pulse rate after running / bpm
62	152
66	157
63	155

What was their mean heart rate after running, to the nearest bpm?

A 64 bpm **B** 154 bpm **C** 155 bpm **D** 157 bpm

17 A heart and lung bypass machine is used during heart surgery so that the heart can be stopped to allow an operation to take place.

Blood is diverted into the bypass machine from the blood vessel entering the heart from the body. The machine oxygenates the blood and pumps it back into the blood vessel leaving the heart to return it to the body.

Into which blood vessels are the tubes placed to remove the blood from the body to the bypass machine and to return the blood to the body?

	to remove blood from the body	to return blood to the body
A	vena cava	aorta
B	vena cava	pulmonary artery
C	aorta	pulmonary vein
D	aorta	vena cava

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18 Data on the number of people who suffer from malaria each year in different countries of the world have been collected for many years. Some of that data is shown in the table.

In which country was the number of people suffering from malaria in 2019 50% lower than in 1990?

country	number of people suffering from malaria	
	1990	2019
A	5 000	10 000
B	14 000	7 000
C	10 000	12 000
D	21 500	7 000

19 Which disease is strongly associated with cigarette smoking?

A anaemia

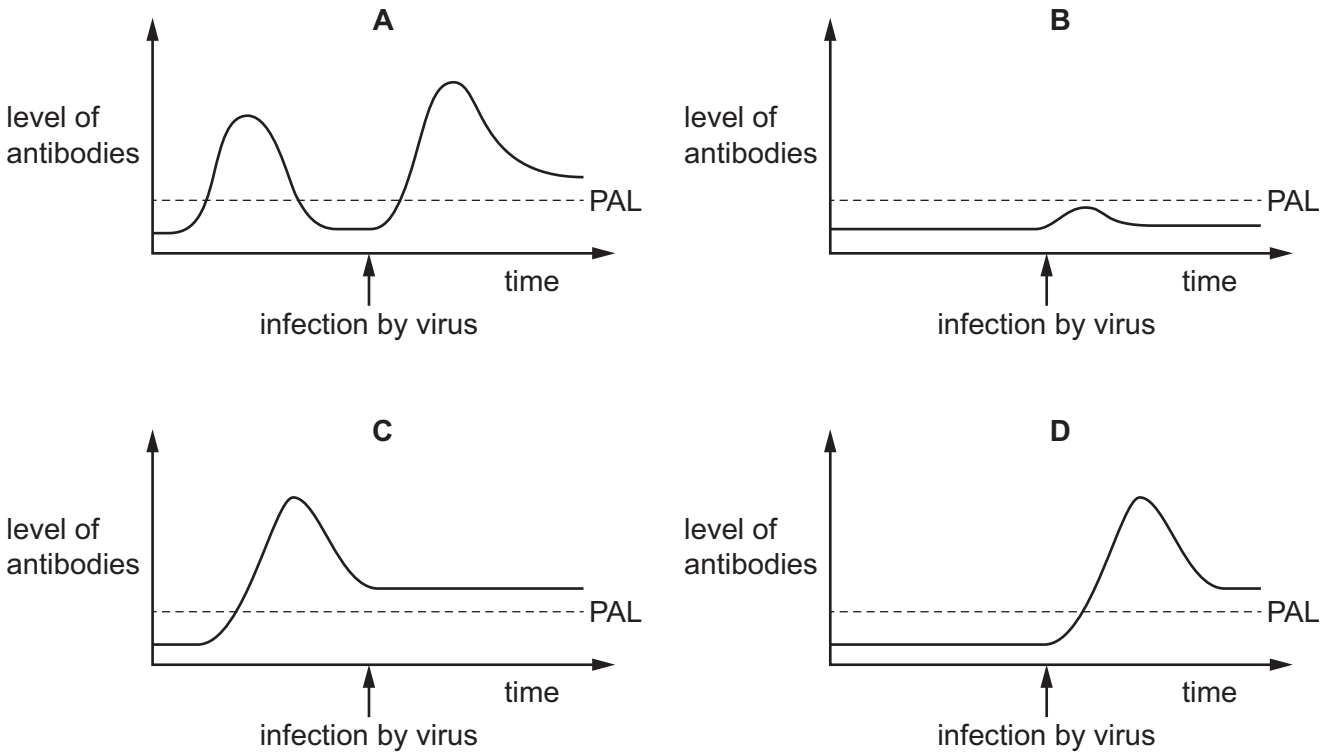
B bronchitis

C rickets

D scurvy

20 Four groups of people (**A**, **B**, **C** and **D**) were exposed to infection by a pathogenic virus. Researchers measured the level of antibodies in their blood before and after they were infected. The results are summarised in the graphs. PAL is the Protective Antibody Level – the level required to give protection from the virus.

Which group of people would have suffered the effects of the viral infection?



21 What is an example of excretion?

A release of a hormone into the blood

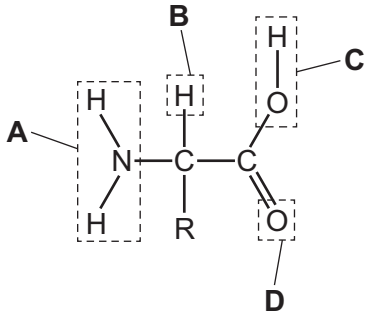
B removal of carbon dioxide from the lungs

C removal of undigested food from the digestive system

D release of water from the sweat glands

22 The diagram shows an amino acid molecule.

Which part of the amino acid molecule is removed and used to make urea?



23 What is a function of sensory neurones?

A transmitting impulses from muscles to the spinal cord

B transmitting impulses from receptors to muscles

C transmitting impulses from receptors to the spinal cord

D transmitting impulses from the spinal cord to muscles

24 Descriptions of changes that occur in the eye are listed.

1 Ciliary muscles contract.

2 Ciliary muscles relax.

3 Suspensory ligaments become slack.

4 Suspensory ligaments tighten.

5 The lens becomes more spherical.

6 The lens becomes thinner.

7 Light rays are refracted less.

8 Light rays are refracted more.

Which row lists the changes that occur when focusing on distant and near objects?

	focusing on a distant object	focusing on a near object
A	1, 3, 5, 8	2, 4, 6, 7
B	1, 4, 6, 8	2, 3, 5, 7
C	2, 3, 5, 7	1, 4, 6, 8
D	2, 4, 6, 7	1, 3, 5, 8

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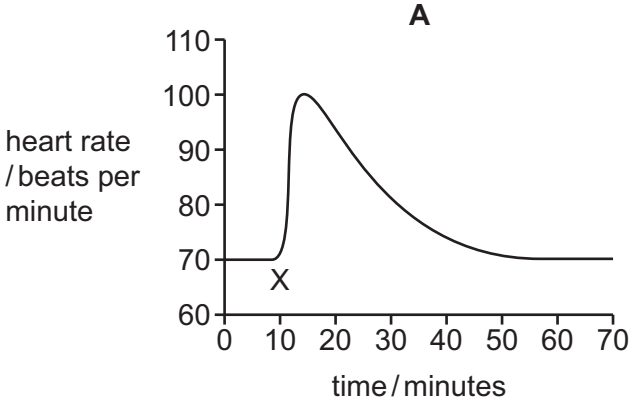
[Turn over

25 A student is walking along a road when a friend, who is hiding, jumps out suddenly giving her a shock.

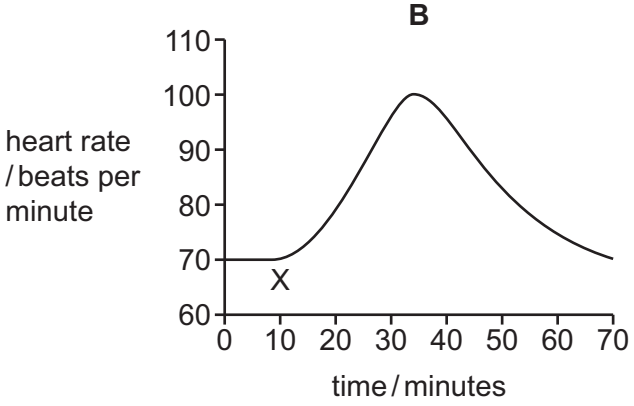
Which graph shows the effect of adrenaline on the heart rate of the student as a result of the shock?

(X on the graph is the point at which the student's friend jumps out suddenly.)

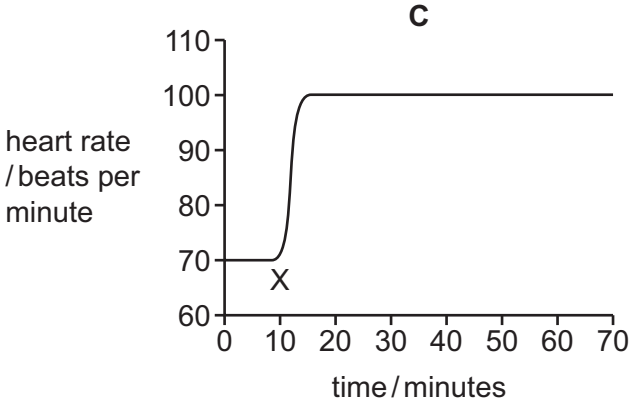
A



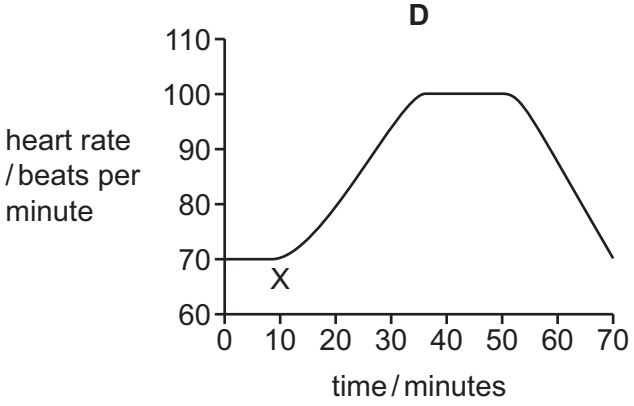
B



C



D



26 What is a sign of Type 1 diabetes?

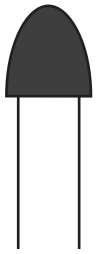
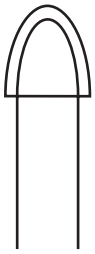
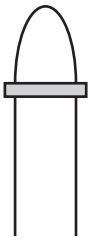
A lack of haemoglobin

B raised blood glucose levels

C reduced urine production

D too much insulin

27 Five experiments were carried out to investigate the phototropic response of shoots. The diagrams show how the growing shoots of the plants were treated.

1	2	3	4	5
				
black paper cap covering shoot tip	transparent cap covering shoot tip	black paper collar covering shoot stem	permeable layer inserted between shoot tip and stem	impermeable layer inserted between shoot tip and stem

Which shoot tips showed a positive phototropic response when light was shone on them from one side?

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

28 A student wrote some statements about chromosomes but made a number of mistakes.

1 There are 46 pairs of chromosomes in a human body cell.

2 In gametes, chromosomes are found in pairs.

3 Males have one X and one Y chromosome in each body cell.

4 Chromosomes contain a long DNA molecule divided into sections called genes.

5 Chromosomes include genes which are divided into sections called DNA molecules.

Which two statements are correct?

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

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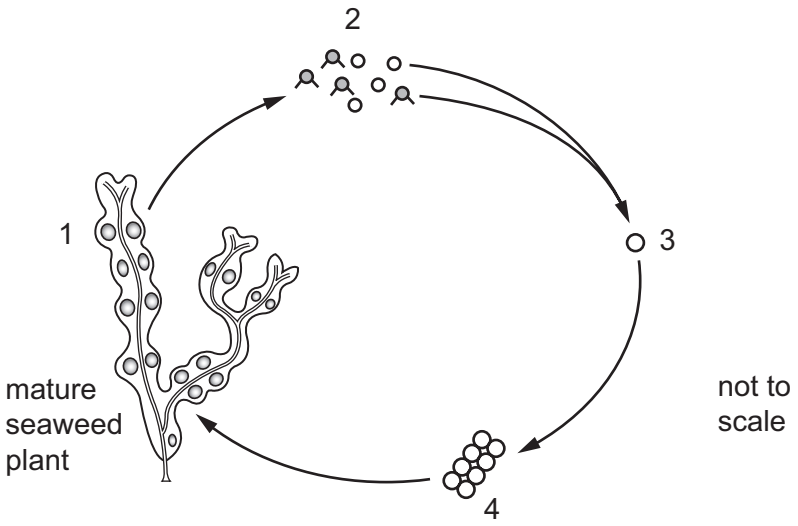
29 A seaweed lives in shallow water around the coast. Stages in its life cycle are shown.



At which stages in the life cycle are its cells diploid?

A 1, 2, 3 and 4

B 1, 3 and 4 only

C 2 and 3 only

D 2 only

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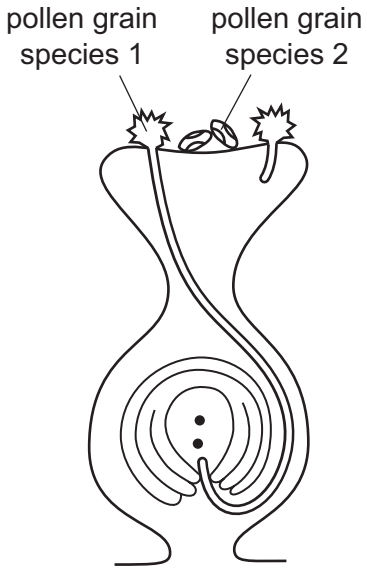
30 The diagram shows a carpel after pollination. Pollen grains from two different species of flower have landed on the stigma.



What explains the difference in the germination of the two types of pollen grains shown?

A Cross-pollination is better than self-pollination.

B After self-pollination, germination of pollen grains of species 2 is prevented.

C The carpel is from a flower of species 1.

D The carpel is from a flower of species 2.

31 In human reproduction, which sequence of events is correct?

A menstruation → ovulation → fertilisation → implantation

B menstruation → ovulation → implantation → fertilisation

C ovulation → menstruation → fertilisation → implantation

D ovulation → menstruation → implantation → fertilisation

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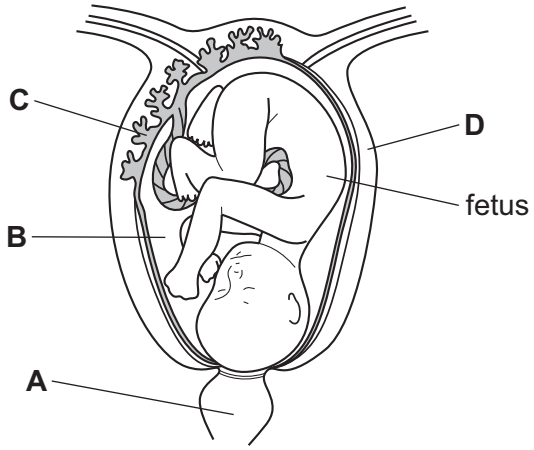
[Turn over

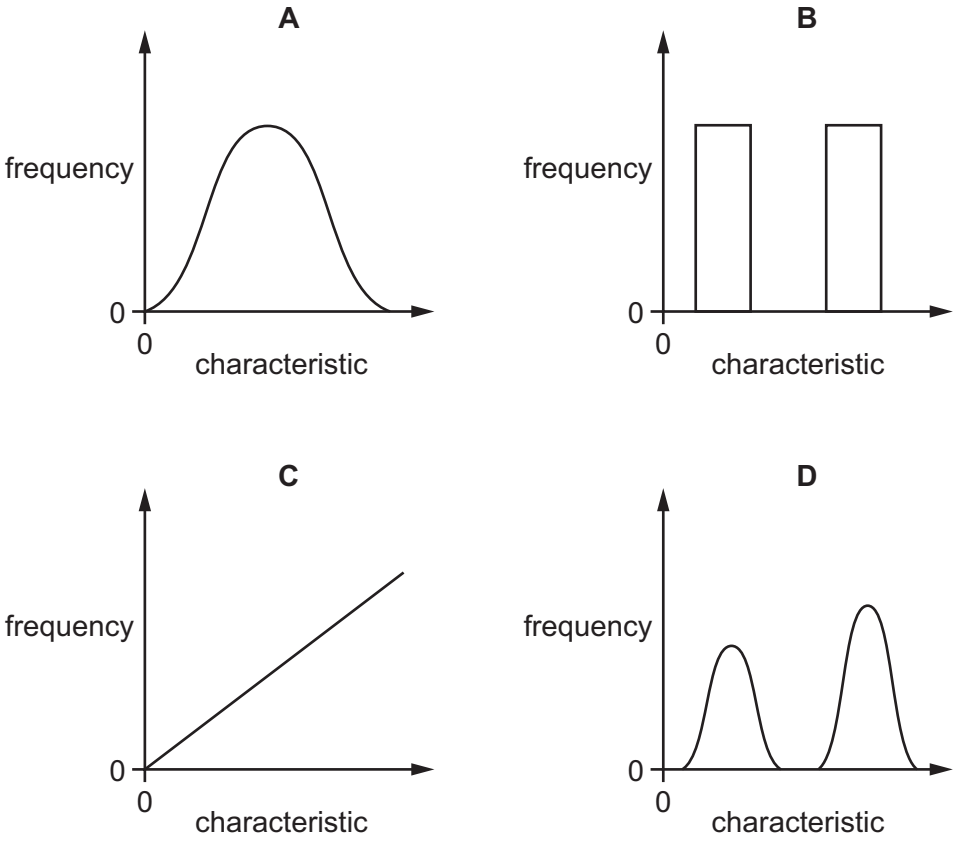
32 The diagram shows the female reproductive system during pregnancy.

Which labelled part removes the excretory products of the fetus?



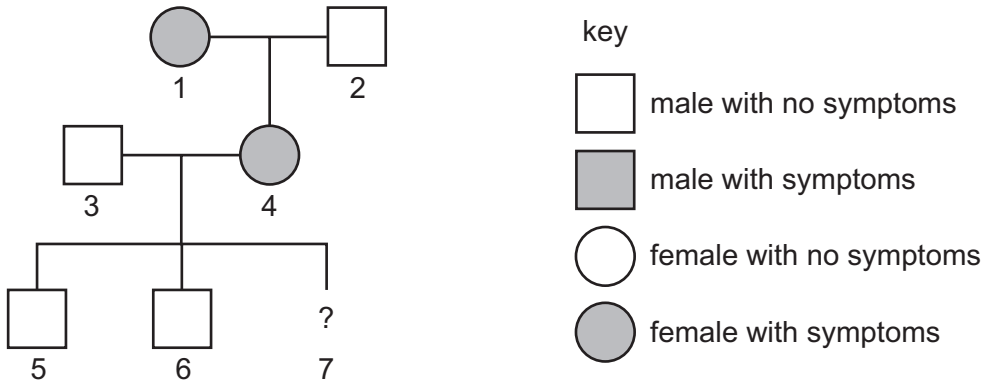
33 Three of the four graphs shown were constructed from data collected about the variation in particular characteristics in a population.

Which graph was **not** constructed from this kind of data?



34 The diagram shows three generations of a family tree in which an inherited condition that affects the nervous system occurs.

This condition is caused by a dominant allele that normally shows its effect in mature adults.



The woman, 4, shows symptoms of this condition while she is pregnant.

What is the chance that the new baby, 7, will be a girl who will also develop the condition later in life?

A 0.00 **B** 0.25 **C** 0.50 **D** 1.00

35 Which process involves reproduction between those members of a species that are best fitted to their environment?

A discontinuous variation

B gene mutation

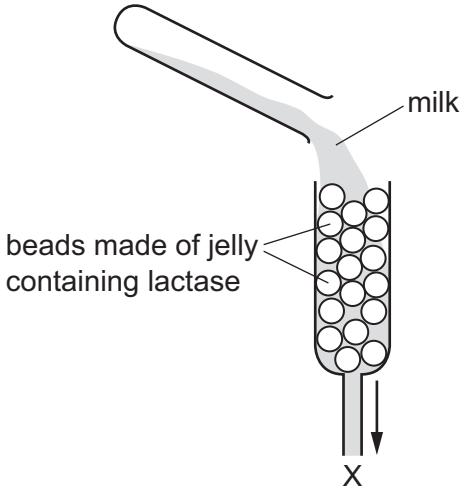
C natural selection

D survival of the fittest

36 In an industrial process, milk is poured over beads made of jelly that contain the enzyme lactase.

As the milk passes over the beads, it will come into contact with lactase.

Any digestion of the milk is completed by point X.



What is collected at X?

A milk containing glucose and lactose

B milk containing sugars but no lactose

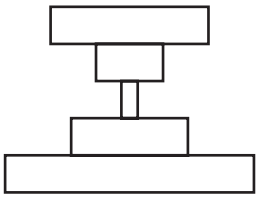
C milk containing lactose only

D milk containing lactase but no sugars

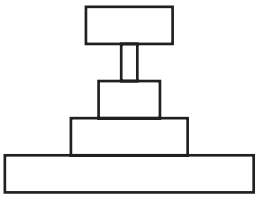
37 In the grasslands of Africa, large herbivores, such as elephants, have many parasites, such as ticks. The ticks suck blood from the skin of the herbivores. The parasites are a food source for small birds called oxpeckers. Oxpeckers are a food source for goshawks.

Which pyramid of numbers represents this food chain?

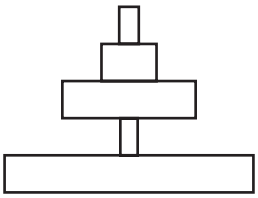
A



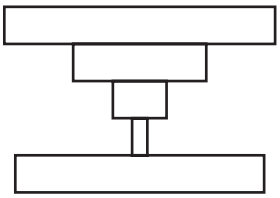
B



C



D



38 Which process is involved in the conversion of ammonia to nitrates?

A denitrification

B excretion

C nitrification

D nitrogen fixation

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39 Cutting down tropical rainforest trees has many consequences.

Which consequence could lead to global warming?

A fewer organisms decomposing

B fewer roots in the ground

C less carbon dioxide absorbed

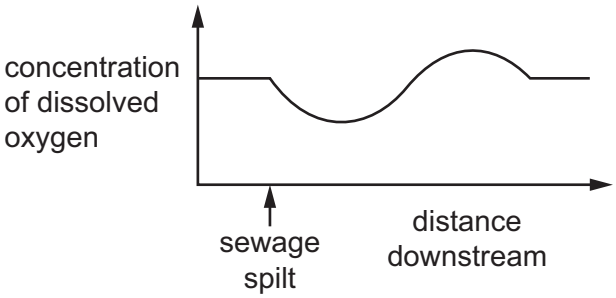
D soil eroded

40 The concentration of dissolved oxygen in the water of a river is measured at regular distances along the river.

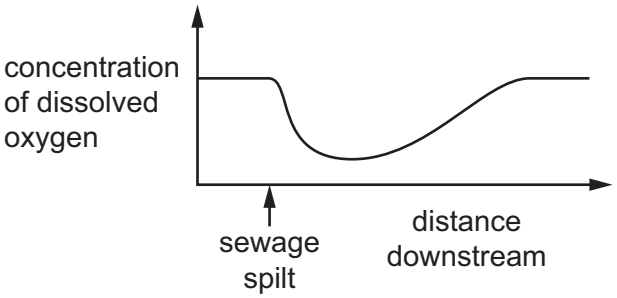
Some untreated sewage is accidently spilt into the river.

Which graph shows the effect of this pollution on the dissolved oxygen in the water?

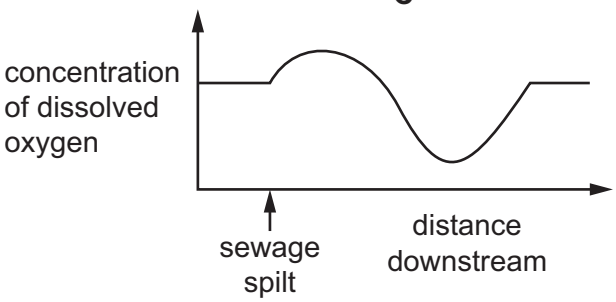
A



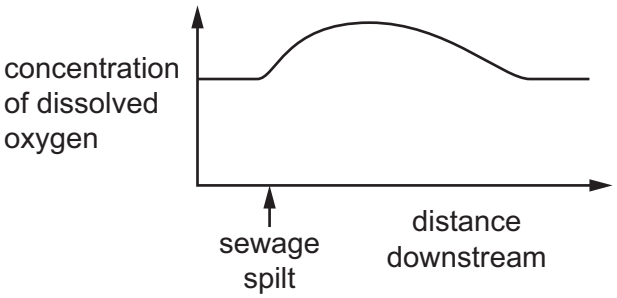
B



C



D



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