Cambridge Assessment International Education

MEM

# Cambridge IGCSE™

**BIOLOGY** **0610/22**

Paper 2 Multiple Choice (Extended) **February/March 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.



IB23 03_0610_22/5RP

**1** What is used as a means of classification?

**A** the number of strands of mRNA

**B** the shape of DNA molecules

**C** the sequence of bases in DNA

**D** the types of bases in DNA

**2** How many jointed legs does an insect have?

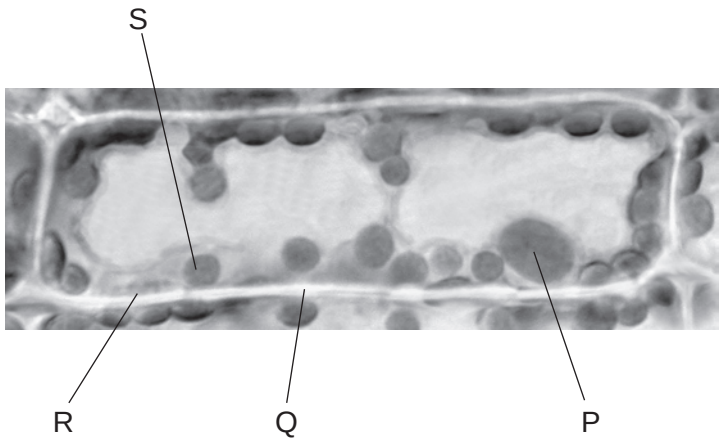
**A** two pairs

**B** three pairs

**C** four pairs

**D** more than six pairs

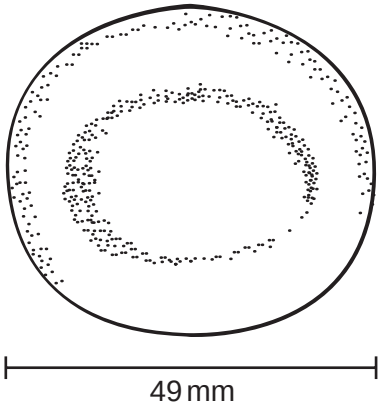
**3** The photomicrograph shows a cell from a type of aquatic plant.




Which labelled parts indicate that this is a plant cell?

**A** P and R **B** P and S **C** Q and R **D** Q and S

**4** The diagram shows a red blood cell.




The actual diameter of the cell is 7.0 micrometres.

What is the magnification of this cell?

**A** ×70 **B** ×700 **C** ×7000 **D** ×70 000

**5** Which molecule crosses a partially permeable membrane during osmosis?

**A** carbon dioxide

**B** oxygen

**C** urea

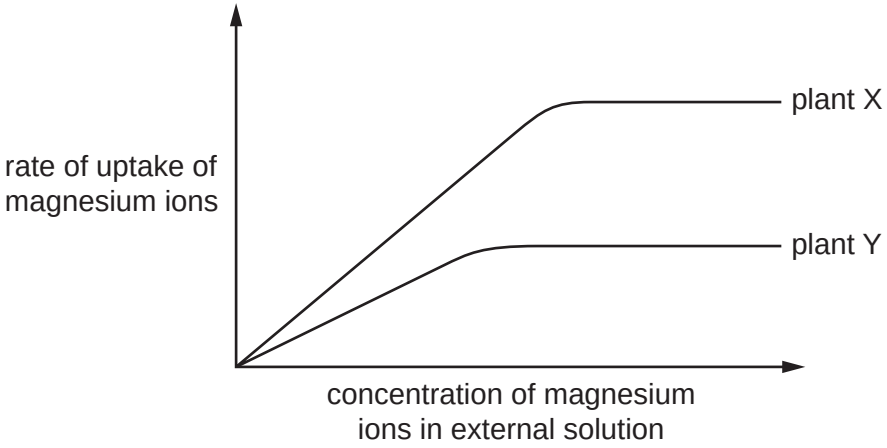
**D** water



[Turn over

**6** The graph shows the rate of uptake of magnesium ions by two similar plants, X and Y.

The roots of each plant were placed in a range of solutions. Each solution contained a different concentration of magnesium ions. All other conditions were kept constant.




What is a possible explanation for the difference in the results for the two plants?

**A** Plant Y has fewer protein carriers for magnesium ions in its cell membranes.

**B** Plant Y has a higher rate of respiration.

**C** Plant Y has more root hair cells.

**D** The root hair cells in plant Y have a lower water potential.

**7** Which substance is used to test a food for vitamin C?

**A** Benedict's solution

**B** DCPIP

**C** ethanol

**D** iodine solution

**8** In DNA, what is the correct base pairing?

**A** T with C **B** T with T **C** T with G **D** T with A

**9** What remains at the end of an enzyme-controlled reaction?

**A** enzymes and products

**B** enzymes and substrates

**C** enzymes only

**D** products only

**10** Which feature explains the specificity of an enzyme?

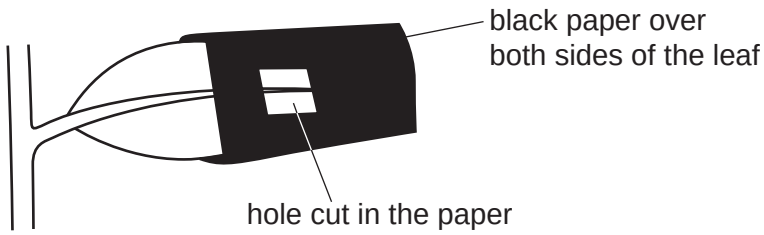
**A** complementary shape of active site and substrate

**B** denaturation at certain pH values

**C** temperature change leading to change in enzyme activity

**D** varying frequency of effective collisions between enzyme and substrate

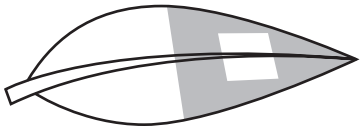
**11** A plant is placed in the dark until all its stored starch is used up. The plant is placed in light with black paper over part of one green leaf.



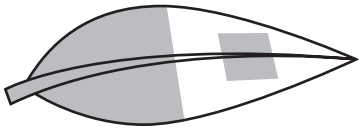

After eight hours, the leaf is tested for starch.

Which diagram shows the appearance of the leaf after this test?

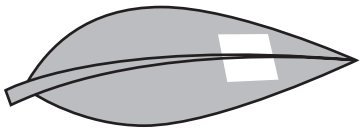
**A**



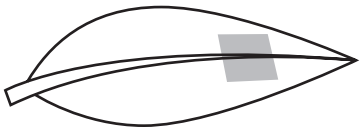
**B**

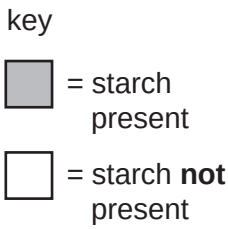


**C**

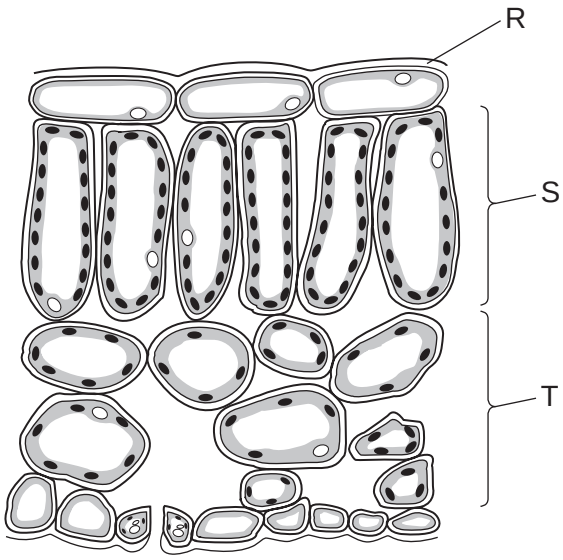


**D**





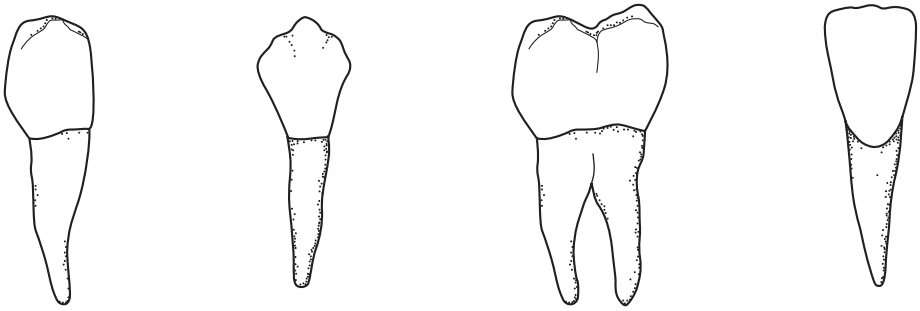
**12** The diagram shows part of a cross-section of a leaf.




Which row shows the correct labels?

| | R | S | T |
|---|---|---|---|
| **A** | cuticle | palisade mesophyll | spongy mesophyll |
| **B** | cuticle | spongy mesophyll | palisade mesophyll |
| **C** | epidermis | palisade mesophyll | spongy mesophyll |
| **D** | epidermis | spongy mesophyll | palisade mesophyll |

**13** The diagrams show the different types of human teeth.



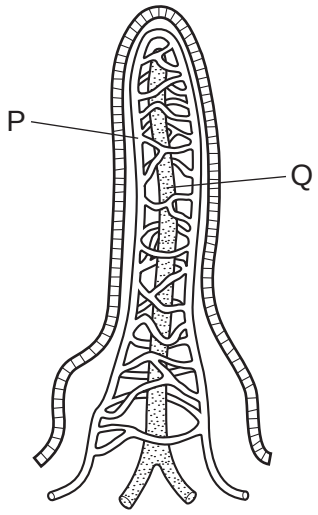
1 2 3 4

Which teeth are used for grinding food?

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| **A** | ✓ | ✗ | ✓ | ✗ |
| **B** | ✓ | ✓ | ✗ | ✗ |
| **C** | ✗ | ✗ | ✓ | ✓ |
| **D** | ✗ | ✓ | ✗ | ✓ |

key
✓ = yes
✗ = no

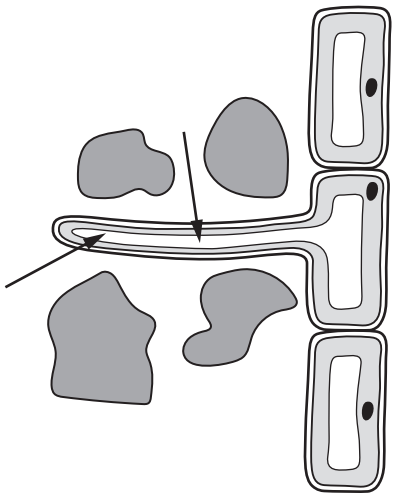
**14** The diagram shows a villus. Structures P and Q absorb different products of digestion.




Which row identifies the products absorbed by P and Q?

| | P | Q |
|---|---|---|
| **A** | amino acids | glucose |
| **B** | fatty acids | maltose |
| **C** | glucose | fatty acids |
| **D** | maltose | amino acids |

**15** The arrows show the movement of substances from the soil into a root hair cell.



Which substances move from the soil into the root hair cell?

**A** carbon dioxide and oxygen

**B** glucose and water

**C** mineral ions and glucose

**D** water and mineral ions



**[Turn over**

**16** By which process does water escape from stomata in the leaves?

**A** active transport

**B** diffusion

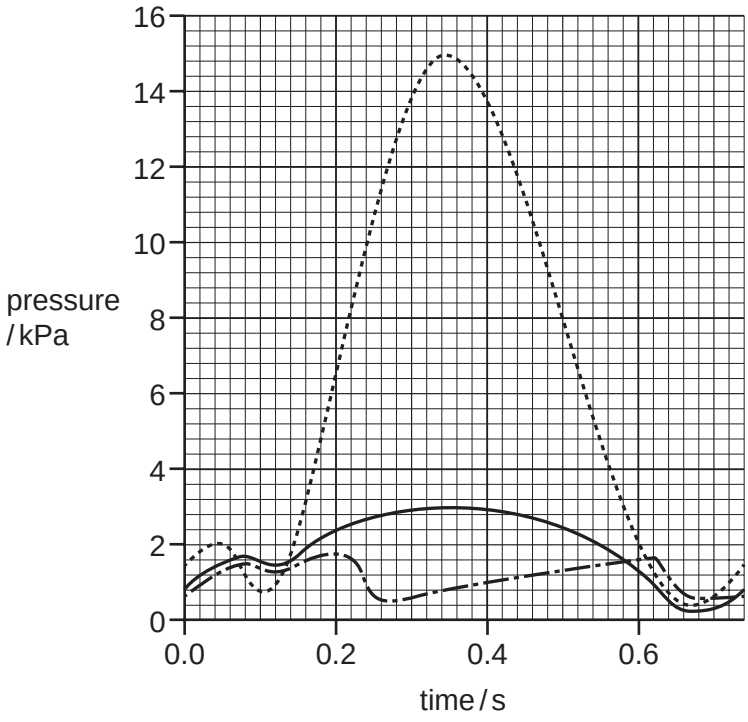
**C** evaporation

**D** osmosis

**17** Which row about the circulatory system is correct?

| | part that pumps blood | part with valves |
|---|---|---|
| **A** | heart | heart and veins |
| **B** | heart and blood vessels | all blood vessels |
| **C** | capillaries | heart |
| **D** | heart | capillaries and arteries |

**18** The graph shows pressure changes that take place in the right atrium, right ventricle and left ventricle of a human heart when the muscle walls contract and relax.




What is the pressure in the right ventricle when the left ventricle is at its maximum pressure?

**A** 0.4 kPa **B** 2.0 kPa **C** 3.0 kPa **D** 15.0 kPa

**19** The sequence of amino acids in antibodies enables them to complete which function?

**A** bind to a specific antigen

**B** bind to all pathogens

**C** perform phagocytosis

**D** confer passive immunity for all diseases

**20** The table shows some of the changes that occur during breathing.

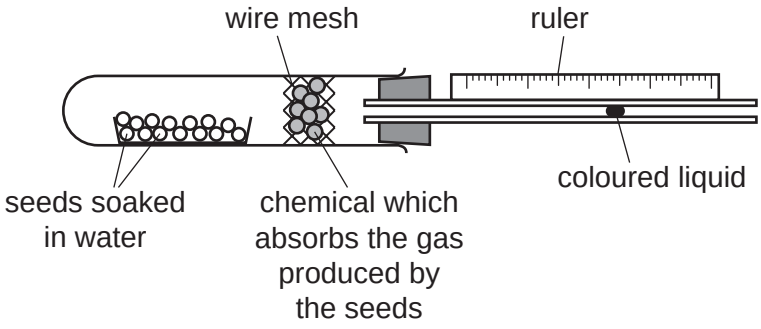
| | from contracted to relaxed | from relaxed to contracted |
|---|---|---|
| diaphragm | P | X |
| external intercostal muscles | Q | Y |
| internal intercostal muscles | R | Z |

Which changes occur to cause inspiration?

**A** P, Q and Z **B** X, Q and R **C** X, Y and R **D** X, Y and Z

**21** The apparatus shown was used to investigate aerobic respiration in seeds.

The apparatus was placed in a dark room.




All environmental conditions were kept constant.

What will happen in the apparatus?

| | gas taken in by the seeds | gas absorbed by the chemical in the wire mesh | direction of movement of the coloured liquid |
|---|---|---|---|
| **A** | carbon dioxide | oxygen | towards the seeds |
| **B** | carbon dioxide | oxygen | away from the seeds |
| **C** | oxygen | carbon dioxide | towards the seeds |
| **D** | oxygen | carbon dioxide | away from the seeds |

**22** Why is yeast used in bread-making?

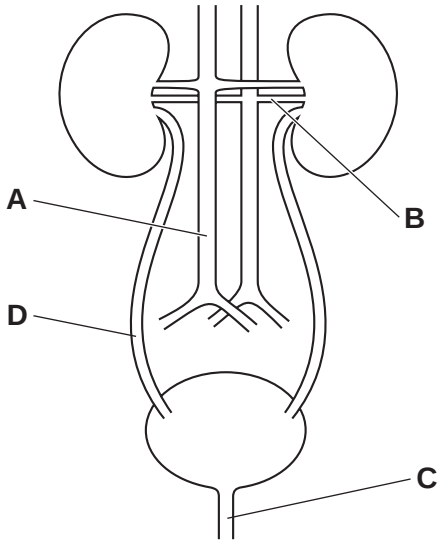
**A** Aerobic respiration produces alcohol.

**B** Aerobic respiration produces lactic acid.

**C** Anaerobic respiration produces alcohol.

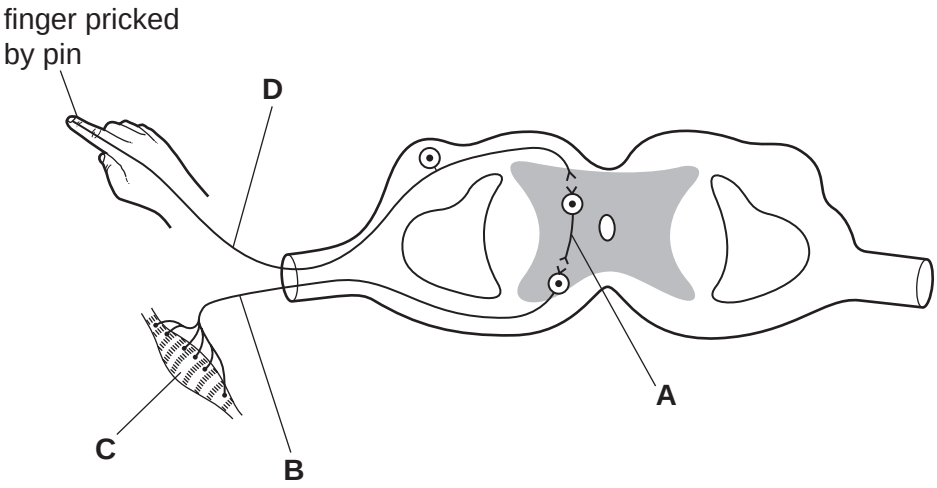
**D** Anaerobic respiration produces carbon dioxide.

**23** In the diagram, which label identifies the urethra?




**24** The diagram shows a reflex arc.

Which label identifies the motor neurone?



**25** Which structures contain neurotransmitter molecules in neurones?

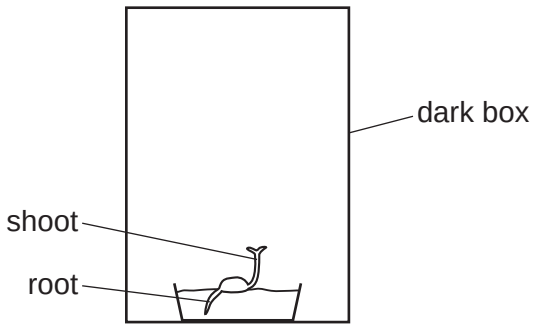
**A** chloroplasts

**B** mitochondria

**C** ribosomes

**D** vesicles

**26** The diagram shows a seedling growing inside a dark box.




Which type of responses affect the direction of growth of the root and the shoot inside the box?

| | response by the root | response by the shoot |
|---|---|---|
| **A** | gravitropism | gravitropism |
| **B** | gravitropism | phototropism |
| **C** | phototropism | gravitropism |
| **D** | phototropism | phototropism |

**27** Why is an MRSA infection difficult to treat?

**A** MRSA is a bacterium.

**B** MRSA is a virus.

**C** MRSA is resistant to some antibiotics.

**D** MRSA is resistant to some antibodies.

**28** What is the order of flower parts through which the pollen tube must grow to reach the egg cell nucleus during fertilisation?

**A** stigma → style → ovule → ovary

**B** stigma → style → ovary → ovule

**C** style → stigma → ovule → ovary

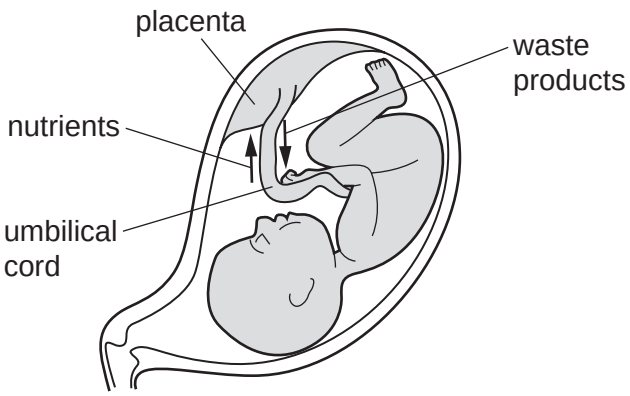
**D** style → stigma → ovary → ovule



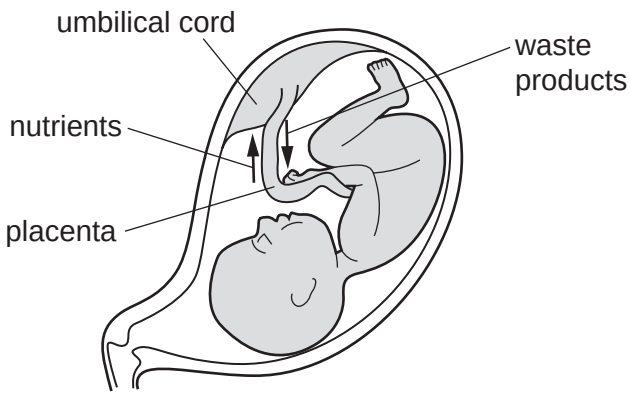
[Turn over

**29** Which diagram, showing the exchange of products between mother and fetus, is correctly labelled?

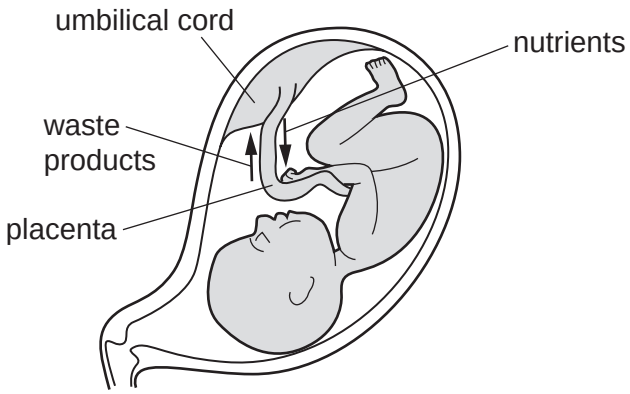
**A**



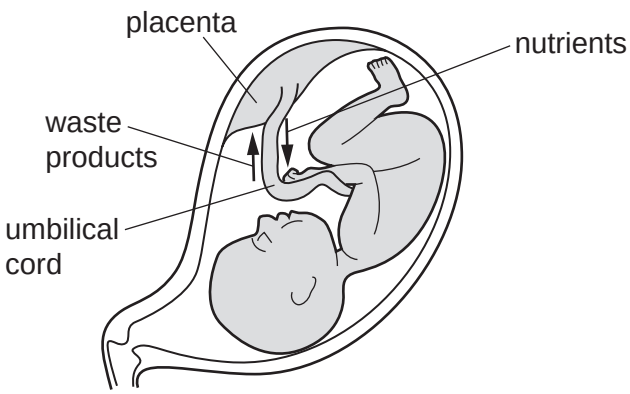

**B**




**C**




**D**




**30** Which statement about the synthesis of a protein molecule in a cell is correct?

**A** The gene coding for the protein moves from nucleus to cytoplasm.

**B** Ribosomes assemble amino acids into DNA molecules.

**C** mRNA remains in the nucleus.

**D** The sequence of amino acids is determined by the sequence of bases in the mRNA.

**31** Each statement describes cell division by mitosis or meiosis in humans.

1 It produces cells that show variation.

2 It produces cells that are diploid.

3 It produces cells that are haploid.

4 It involves reduction division.

Which statements describe meiosis?

| | 1 | 2 | 3 | 4 | |
|---|---|---|---|---|---|
| **A** | ✗ | ✓ | ✗ | ✗ | key |
| **B** | ✓ | ✗ | ✗ | ✓ | ✓ = yes |
| **C** | ✗ | ✓ | ✓ | ✗ | ✗ = no |
| **D** | ✓ | ✗ | ✓ | ✓ | |

**32** In humans, what is the genotype of a red-green colour-blind male?

**A** $X^RX^R$ **B** $X^rX^r$ **C** $X^RY$ **D** $X^rY$

**33** Which feature is found in a hydrophytic plant?

**A** Leaves are curled with stomata on the inside.

**B** Leaves are reduced to spines.

**C** Stomata are sunk in pits in the epidermis.

**D** There is no waxy cuticle.

**34** Which statements are correct during both natural selection and artificial selection?

1 Only certain individuals reproduce.

2 Alleles are passed on to the offspring.

3 Organisms do **not** compete with each other for survival.

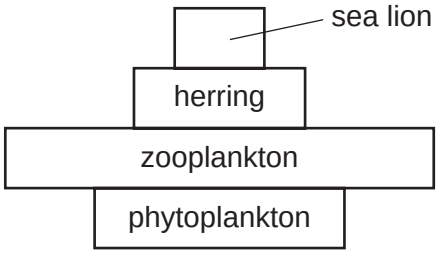
**A** 1 and 2 **B** 1 and 3 **C** 2 only **D** 2 and 3

**35** The diagram shows a food chain.

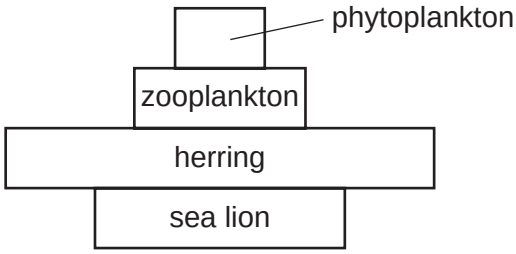
phytoplankton → zooplankton → herring → sea lion

Which diagram shows a pyramid of energy for this food chain?

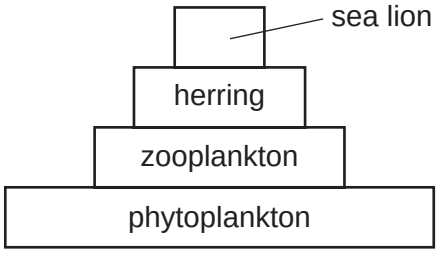
**A**



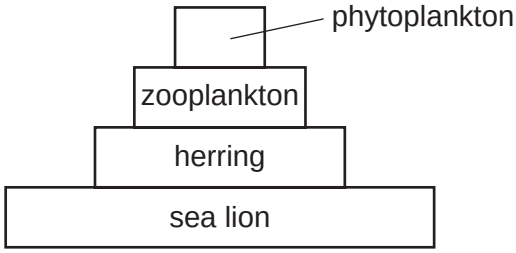

**B**



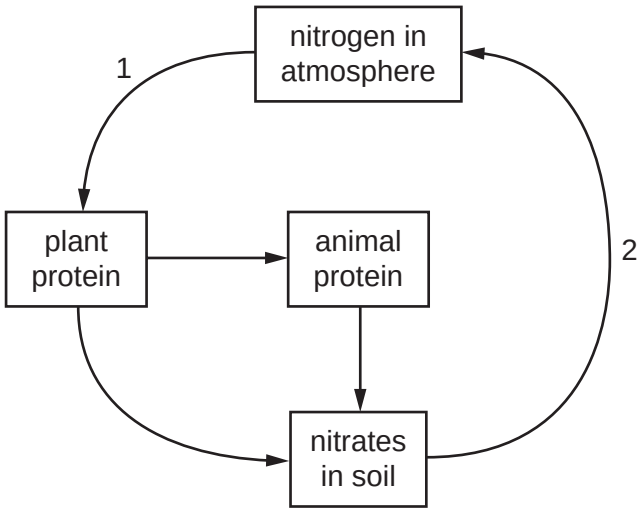

**C**




**D**




**36** In the nitrogen cycle, what are processes 1 and 2?




| | process 1 | process 2 |
|---|---|---|
| **A** | decomposition | nitrification |
| **B** | denitrification | nitrogen fixation |
| **C** | nitrification | evaporation |
| **D** | nitrogen fixation | denitrification |

**37** Untreated sewage is accidently released into a river for several weeks.

How will this affect the number of bacteria, the oxygen concentration of the water and the number of fish?

| | number of bacteria | oxygen concentration | number of fish |
|---|---|---|---|
| **A** | decrease | decrease | increase |
| **B** | increase | decrease | decrease |
| **C** | decrease | increase | decrease |
| **D** | no change | no change | no change |

**38** Fish stocks can be conserved in various ways.

Which method of conservation ensures that mainly large fish are caught?

**A** having closed seasons

**B** having protected areas

**C** having a minimum mesh size for nets

**D** setting legal fishing quotas

**39** Which component of bacteria is genetically modified to produce human insulin?

**A** cell membrane

**B** cell wall

**C** plasmids

**D** single circular DNA strand

**40** Fermenters must have carefully controlled conditions.

Which condition has the correct reason for controlling it?

| | condition to be controlled | reason for controlling condition |
|---|---|---|
| **A** | supply of amino acids | for carbohydrate synthesis |
| **B** | supply of glucose | waste product to be removed |
| **C** | supply of oxygen | for anaerobic respiration |
| **D** | pH | to be optimum for enzyme activity |

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