Cambridge Assessment International Education

# Cambridge IGCSE™

**BIOLOGY** **0610/21**

Paper 2 Multiple Choice (Extended) **October/November 2021**

**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.



IB21 11_0610_21/4RP
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**[Turn over**

**1** Which characteristics of all living organisms are needed to release energy for growth?

**A** breathing and respiration

**B** excretion and nutrition

**C** excretion and respiration

**D** nutrition and respiration

**2** Two animals have an identical sequence of amino acids in one of the proteins found in their cells.

What does this indicate about these animals?

**A** They have been eating the same types of food.

**B** They have not been exposed to substances that cause mutation.

**C** They must be members of the same genus.

**D** They share an ancestor.

**3** Which row shows the structure on the outside of a plant cell and the location of the chloroplasts in the cell?

| | structure on the outside of a plant cell | location of chloroplasts |
|---|---|---|
| **A** | cell membrane | in the cytoplasm |
| **B** | cell membrane | in the vacuole |
| **C** | cell wall | in the cytoplasm |
| **D** | cell wall | in the vacuole |

**4** The length of a mitochondrion in a photomicrograph is 15 mm.

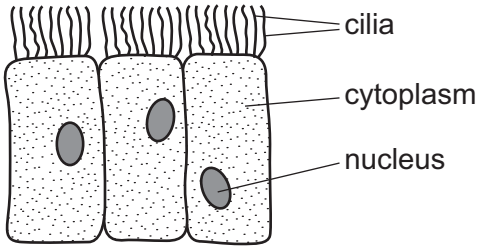
The actual length of the mitochondrion is 3 μm.

What is the magnification of the photomicrograph?

**A** ×5 **B** ×45 **C** ×5000 **D** ×45 000

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**5** The diagram shows some cells.




Where are these cells found?

**A** alimentary canal

**B** blood

**C** bronchus

**D** plant roots

**6** Which statement about turgor pressure is correct?

**A** It creates a pull in the xylem which allows water to move upwards.

**B** It allows sucrose and amino acids to travel upwards and downwards in the phloem.

**C** It is a pressure that is only found in cells containing chloroplasts.

**D** It is pressure that helps to provide support for plants.

**7** Which words complete the definition of diffusion?

'Diffusion is the net movement of particles from a region of their ……1…... concentration to a region of their ……2…... concentration, ……3…... a concentration gradient.'

| | 1 | 2 | 3 |
|---|---|---|---|
| **A** | higher | lower | up |
| **B** | higher | lower | down |
| **C** | lower | higher | up |
| **D** | lower | higher | down |

**8** The bases on one of the strands of a DNA molecule have the sequence shown.

A-A-T-C-T-G

What is the corresponding sequence of bases on the other strand?

**A** A-A-T-C-T-G

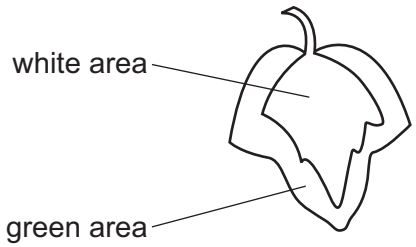
**B** C-C-G-A-G-T

**C** G-G-C-T-C-A

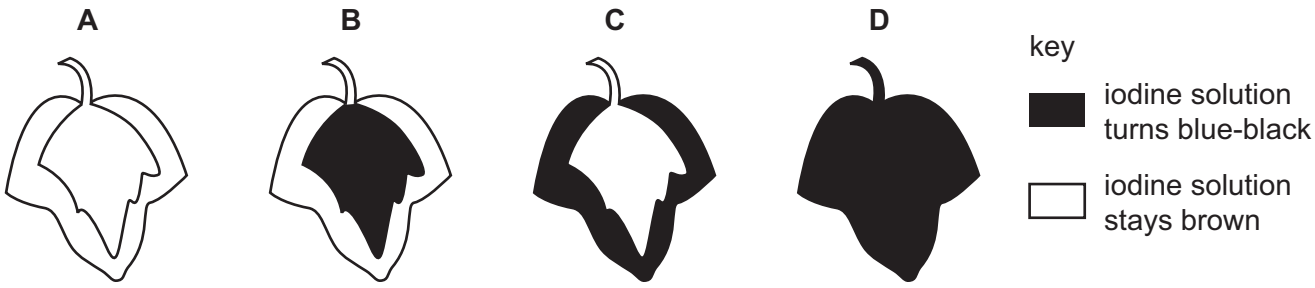
**D** T-T-A-G-A-C

**9** In a photosynthesis experiment, a plant is left in bright sunlight for several hours. A leaf is then removed from the plant and tested for starch, using iodine solution.

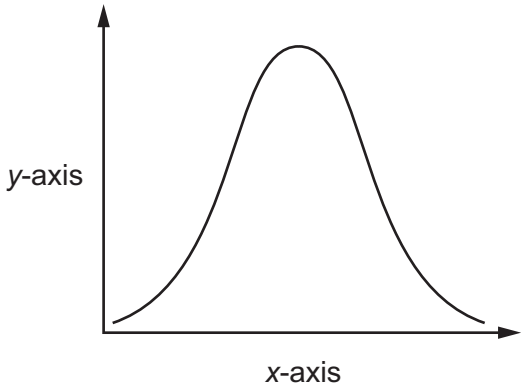
The diagram shows the leaf from the plant that was used in the experiment.




Which diagram shows the result of the experiment?



**10** An experiment was carried out to investigate the effect of pH on enzyme action. The graph shows the results.

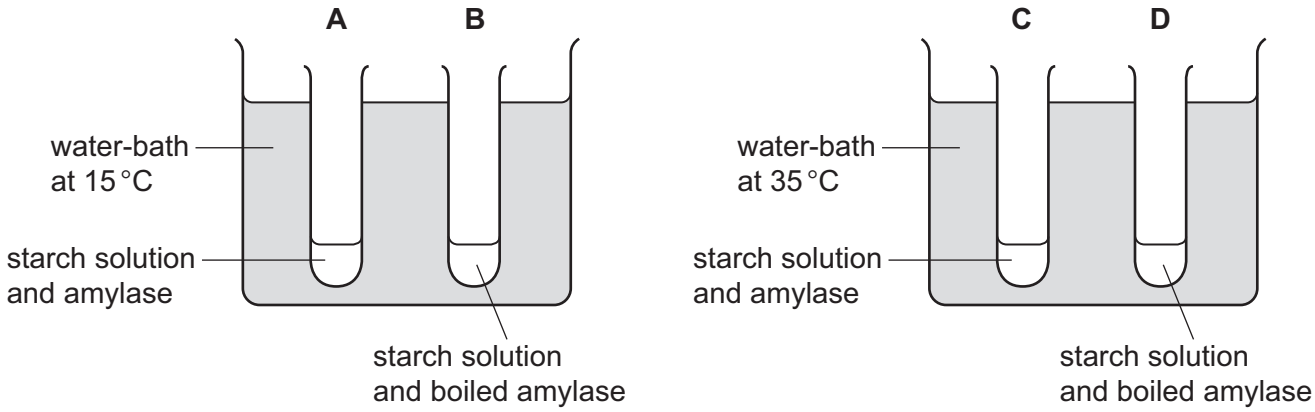



What are the labels for the *x*-axis and the *y*-axis?

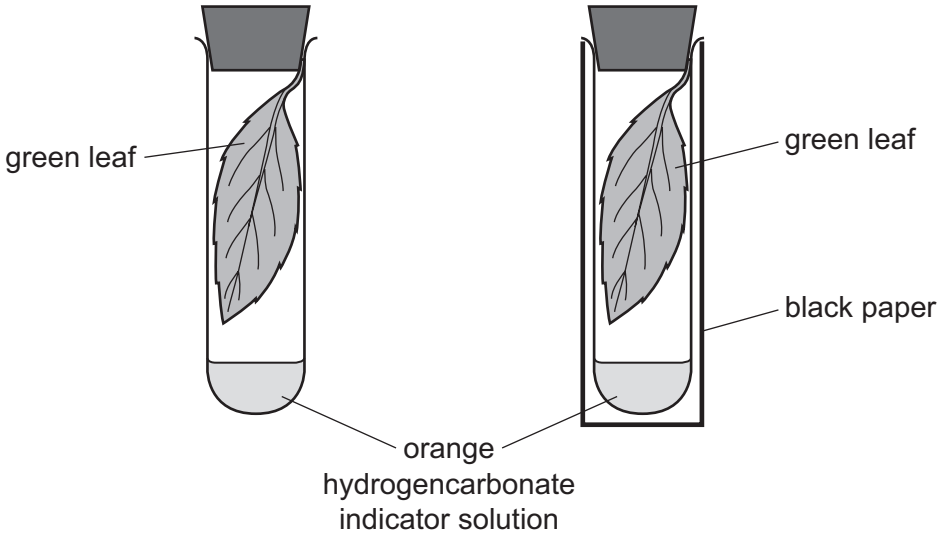
| | *x*-axis | *y*-axis |
|---|---|---|
| **A** | pH | rate of reaction |
| **B** | pH | time |
| **C** | rate of reaction | pH |
| **D** | time | pH |

**11** Four test-tubes were set up as shown in the diagram.

In which test-tube is the starch digested most quickly?



**12** Two similar leaves are set up in test-tubes as shown. One is exposed to light, while the other is kept in the dark.




After a few hours, which colour would the hydrogencarbonate indicator solution be in each test-tube?

| | light | dark |
|---|---|---|
| **A** | colourless | blue-black |
| **B** | purple | yellow |
| **C** | red | blue |
| **D** | yellow | purple |

**13** Which food is the best source of vitamin C?

**A** bread

**B** meat

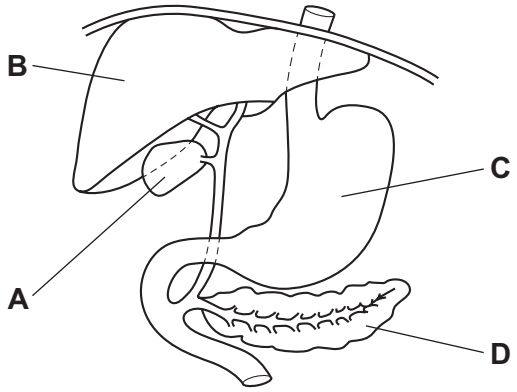
**C** milk

**D** oranges

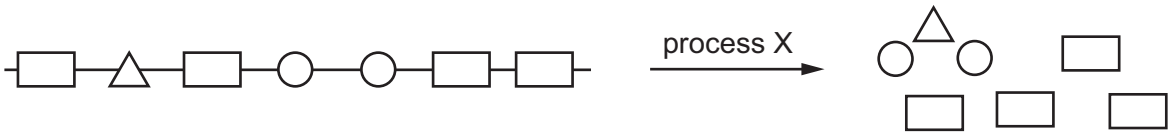
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**14** The diagram shows part of the human alimentary canal and associated organs.

Which structure produces hydrochloric acid?




**15** The diagram shows a large food molecule changing into smaller molecules.




What is process X?

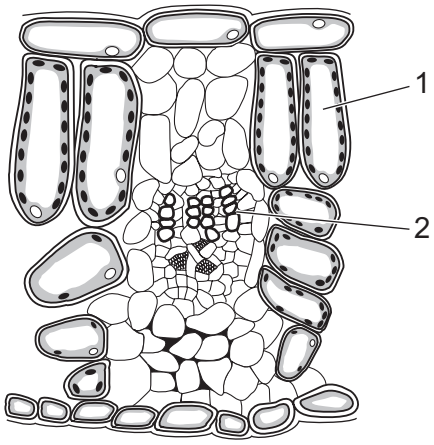
**A** absorption

**B** chewing

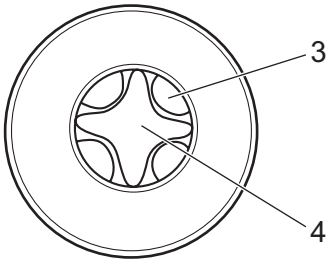
**C** digestion

**D** secretion

**16** The diagrams show sections of a leaf and a root.




section of a leaf




section through a root

not to scale

Which two labelled structures identify xylem?

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

**17** What holds the water molecules together during the transpiration pull in the xylem?

**A** active transport

**B** cohesion

**C** diffusion

**D** turgor pressure

**18** Which component of blood produces antibodies?

**A** lymphocytes

**B** phagocytes

**C** plasma

**D** red blood cells

**19** What is the function of the septum in the heart?

**A** to contract in order to pump blood to the body

**B** to prevent back flow of blood when the ventricles contract

**C** to prevent oxygenated and deoxygenated blood mixing

**D** to provide the heart muscle itself with oxygenated blood

**20** What causes the air pressure in the lungs to decrease during breathing in?

**A** contraction of the external intercostal muscles and diaphragm

**B** expansion of the lungs causing a decrease in the volume of the alveoli

**C** outward movement of the ribs and upward movement of the diaphragm

**D** higher pressure in the atmosphere than in the lungs causing the alveoli to expand

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**21** Some features that help to defend the body against pathogens are listed.

1 mucus

2 skin

3 stomach acid

4 phagocytosis

Which features can prevent pathogens entering body tissues?

**A** 1, 2, 3 and 4

**B** 1, 2 and 3 only

**C** 2 and 3 only

**D** 4 only

**22** In a balanced chemical equation for aerobic respiration, what are the products?

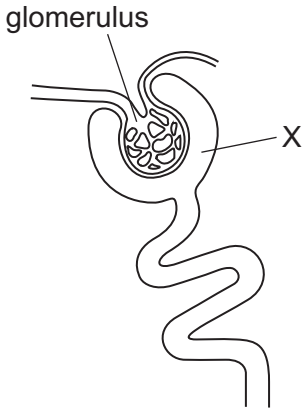
**A** $6O_2$ and $6H_2O$

**B** $C_6H_{12}O_6$ and $6O_2$

**C** $6O_2$ and $6CO_2$

**D** $6CO_2$ and $6H_2O$

**23** The diagram shows the structure of part of a kidney tubule and associated blood vessels.




Which substances are normally present in the filtrate at X?

| | glucose | urea |
|---|---|---|
| **A** | absent | absent |
| **B** | absent | present |
| **C** | present | absent |
| **D** | present | present |

**24** Which situation is a voluntary action?

**A** an increase in heart rate in response to danger

**B** blinking to avoid injury to the eye

**C** raising your hand to answer a question

**D** sweating in hot weather

**25** When we read a book, our eyes accommodate to view near objects.

Which statement is correct when viewing a near object?

**A** ciliary muscle contracts, suspensory ligaments are slack, lens is thicker

**B** ciliary muscle contracts, suspensory ligaments are tense, lens is thinner

**C** ciliary muscle relaxes, suspensory ligaments are slack, lens is thinner

**D** ciliary muscle relaxes, suspensory ligaments are tense, lens is thicker

**26** How does the body increase blood glucose concentration?

**A** Insulin released by the liver triggers the pancreas to release glucose.

**B** Glucagon released by the pancreas triggers the liver to release glucose.

**C** Insulin released by the pancreas triggers the liver to release glucose.

**D** Glucagon released by the liver triggers the pancreas to release glucose.

**27** Which definition of a drug is correct?

**A** a substance that increases the rate of a chemical reaction and is not changed by the reaction

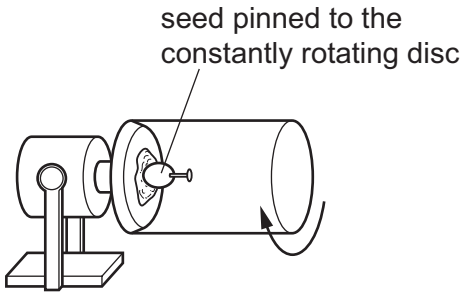
**B** a protein that functions as a biological catalyst

**C** a substance taken into the body that modifies or affects chemical reactions in the body

**D** a chemical substance, produced by a gland and carried by the blood, which alters the activity of one or more specific target organs

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**28** A seed is placed and grown on a rotating disc, as shown.




Which diagram shows the appearance of the seedling shoot after seven days?

**A**



**B**



**C**



**D**



**29** Which hormone stimulates the release of an egg from the ovary during the menstrual cycle?

**A** FSH

**B** LH

**C** oestrogen

**D** progesterone

**30** Some descriptions of different human cells are listed.

1 contains 46 chromosomes

2 haploid nucleus

3 diploid nucleus

4 contains one set of unpaired chromosomes

Which descriptions are correct for the nucleus of a human gamete?

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

**31** Which adaptive feature is only found in female gametes?

**A** acrosome containing enzymes

**B** flagellum

**C** jelly coat

**D** nucleus containing chromosomes

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**32** A man of genotype $I^AI^B$ and woman of genotype $I^BI^o$ have a child.

What is the chance that the child will have the same blood group as one of its parents?

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

**33** Which statement is correct?

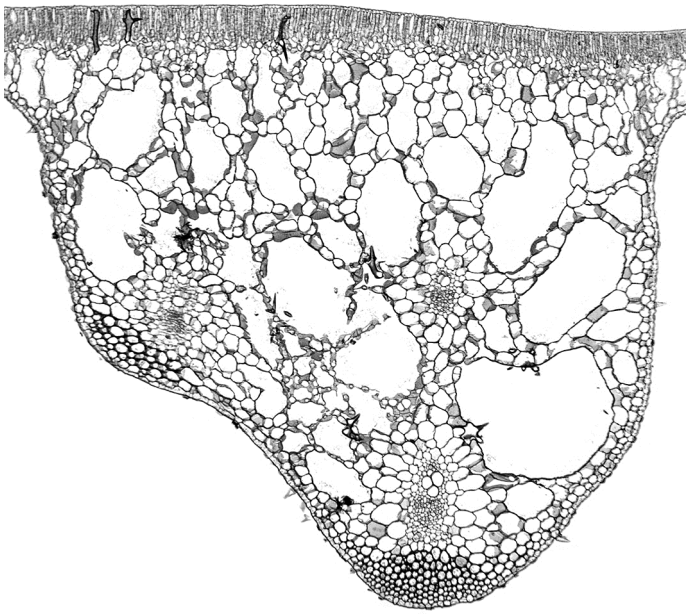
**A** Genetic variation can be caused by phenotypic variation.

**B** Mutations can be caused by phenotypic variation.

**C** Phenotypic variation can be caused by genetic variation.

**D** Phenotypic variation cannot be caused by mutations.

**34** The diagram shows a section through the leaf of a water lily.



Water lilies are hydrophytes.

They have larger air spaces than most other plants.

How does this adaption help the lily to survive?

**A** increases the number of chloroplasts for photosynthesis

**B** makes the leaf buoyant enough to float on water

**C** provides more space for the xylem and phloem

**D** speeds up gas exchange between the leaf and water

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**35** A species of insect usually has pale-coloured wings. This helps to camouflage them on pale-coloured tree trunks. A few of the insects in this species have darker coloured wings.

After a number of years the tree trunks become darker in colour due to environmental changes. The insects with dark-coloured wings become more common than insects with pale-coloured wings in this species.

Which process causes this change in the proportion of insects with dark-coloured wings?

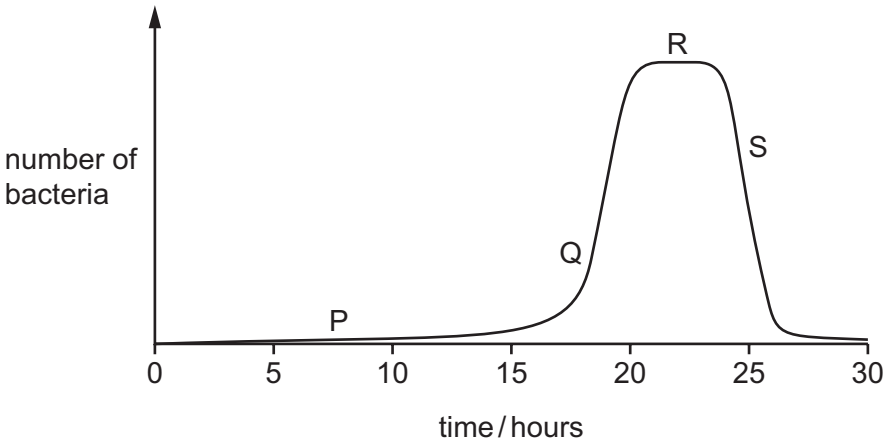
**A** biotechnology

**B** conservation

**C** natural selection

**D** selective breeding

**36** The graph shows the growth curve for a population of bacteria.




The table identifies each phase shown in the graph.

Which row is correct?

| | death phase | exponential (log) phase | lag phase | stationary phase |
|---|---|---|---|---|
| **A** | P | Q | R | S |
| **B** | S | Q | P | R |
| **C** | S | P | Q | R |
| **D** | P | S | R | Q |

**37** Bacteria can be genetically engineered to produce human protein.

What happens during this process?

**A** The human plasmids are isolated using restriction enzymes.

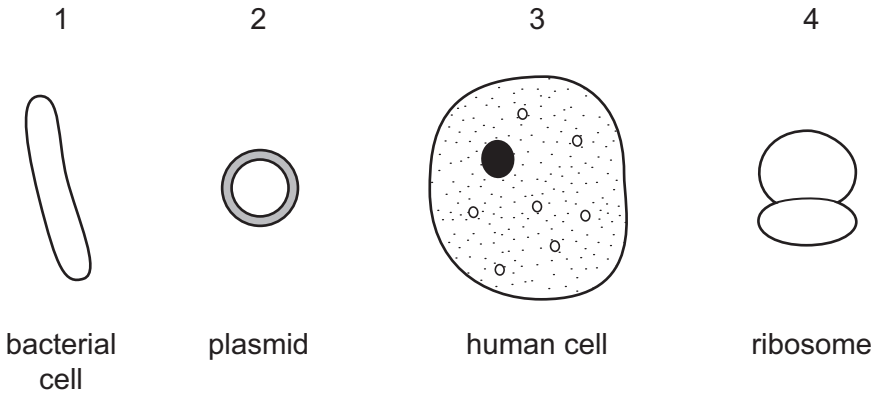
**B** Ligase is used to create sticky ends in bacterial plasmids.

**C** Restriction enzymes are used to create sticky ends in human DNA.

**D** Human DNA is isolated using ligase.

**38** Human insulin is a protein that can be made by genetically engineered bacteria. This involves the transfer of genetic information to bacteria.

The diagrams show cells and parts of cells involved in this process.




What is the correct order of transfer of genetic information?

**A** 3 → 2 → 1 → 4

**B** 1 → 2 → 4 → 3

**C** 3 → 4 → 2 → 1

**D** 1 → 2 → 3 → 4

**39** What is an effect of an increase in the use of insecticides?

**A** decreased competition between crop plants and weeds

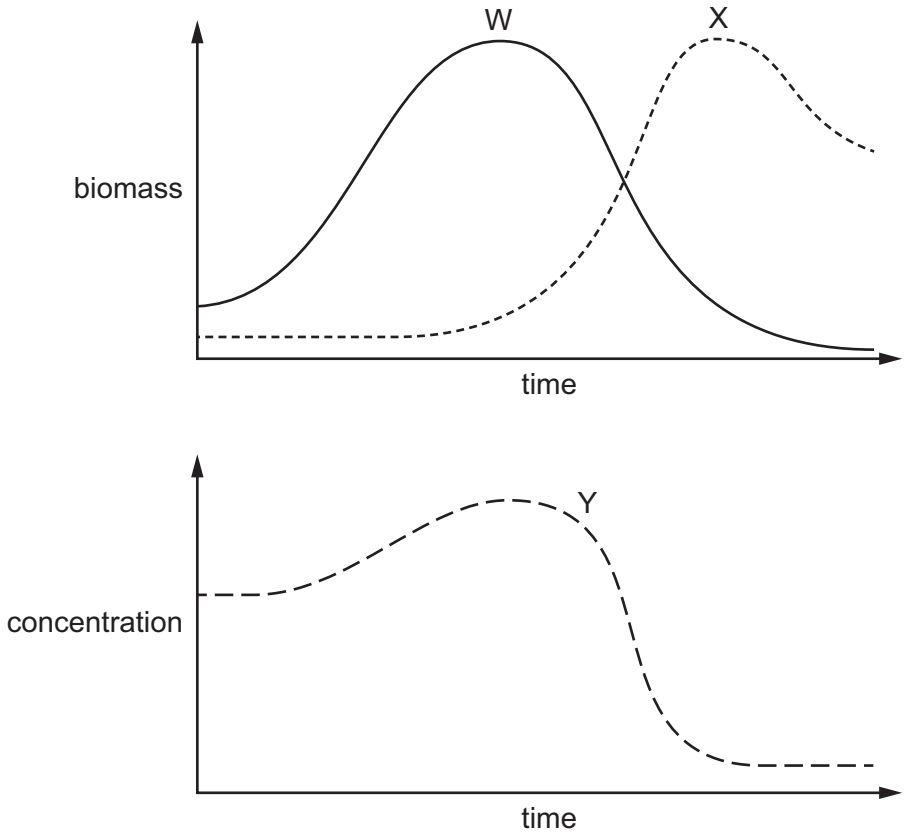
**B** decreased numbers of extinctions

**C** decreased numbers of pollinators

**D** decreased use of fertilisers

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**40** The graphs show changes that occur in a lake during the process of eutrophication.




What are the labels for W, X and Y?

| | W | X | Y |
|---|---|---|---|
| **A** | decomposers | producers | oxygen |
| **B** | decomposers | producers | sulfur dioxide |
| **C** | producers | decomposers | oxygen |
| **D** | producers | decomposers | sulfur dioxide |

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