Cambridge Assessment International Education

Cambridge IGCSE™

BIOLOGY **0610/22**

Paper 2 Multiple Choice (Extended) **February/March 2025**

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.

This document has **12** pages.

[Turn over

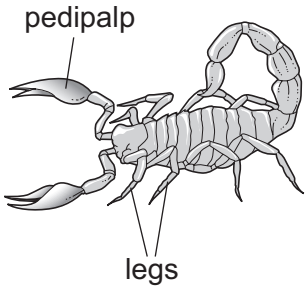
1 The relationships of four species of bacteria, P, Q, R and S, were compared.

- Species P and Q have a more recent common ancestor than either species has with species R.
- Species S developed recently from species P.

Which species has the **least** similar base sequences in their DNA compared to the other three species of bacteria?

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

2 The diagram shows an arthropod.



To which group does it belong?

A arachnids

B crustaceans

C insects

D myriapods

3 Which structures are found in both plant cells and bacterial cells?

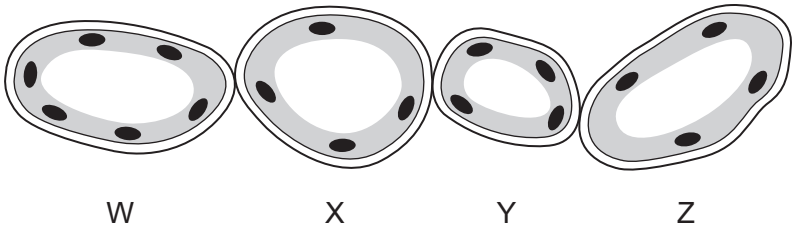
	cell membrane	cell wall	plasmid	ribosomes
A	yes	yes	yes	no
B	no	yes	yes	yes
C	yes	no	yes	yes
D	yes	yes	no	yes

4 A cell is 65 μm across.

What is this measurement in mm?

A 0.00065 mm **B** 0.0065 mm **C** 0.065 mm **D** 0.65 mm

5 The diagram shows four mesophyll cells, W, X, Y and Z. Water moves through these cells.



Which arrow shows the direction of movement of water through these cells?

	direction of water movement	water potential / kPa			
		W	X	Y	Z
A	→	–600	–450	–350	–250
B	→	–350	–400	–450	–600
C	←	–400	–450	–500	–550
D	←	–200	–300	–350	–450

6 Three processes are listed.

1 Molecules or ions are moved across membranes.

2 Molecules or ions are moved by protein carriers.

3 Ions are taken up by root hairs.

Which processes can involve active transport?

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

7 A section of a chromosome contains 4500 bases. There are 1450 G bases.

How many A bases are there?

A 800 **B** 1450 **C** 1600 **D** 2900

8 Which chemical element is found in proteins but **not** in carbohydrates?

A carbon

B hydrogen

C nitrogen

D oxygen

9 Which statement describes enzymes?

A Enzymes are carbohydrates.

B Enzymes are involved in metabolic reactions.

C Enzymes decrease the rate of reaction.

D Enzymes have the same shape of active site as their substrate.

10 The graphs show how the rate of photosynthesis and the rate of respiration in a plant changed over a 24-hour period.

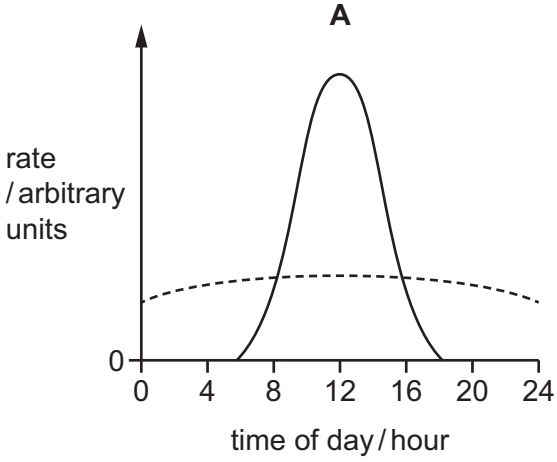
Which graph shows the correct rate of photosynthesis and rate of respiration?

key

——— photosynthesis

- - - - - - - - respiration

A



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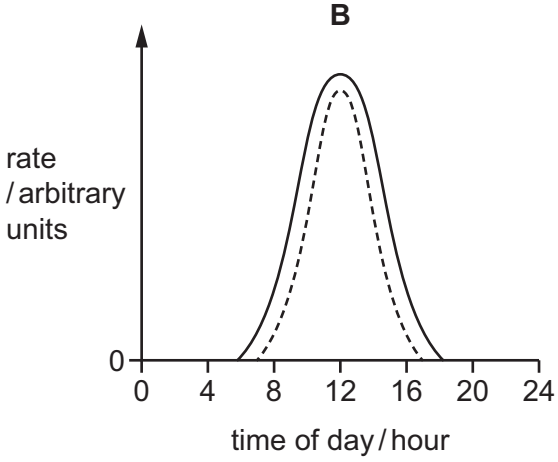

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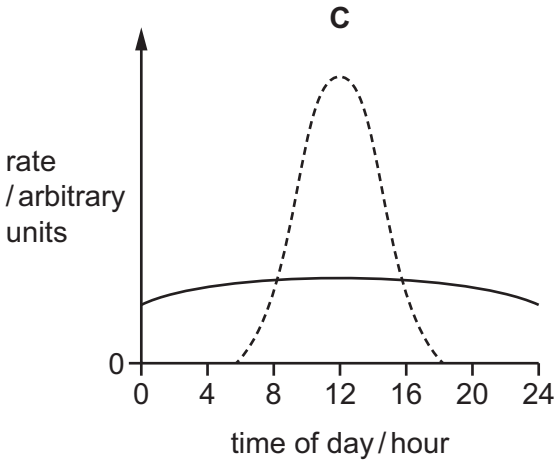
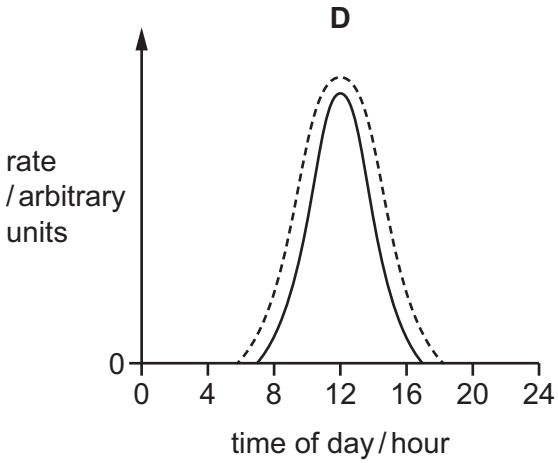
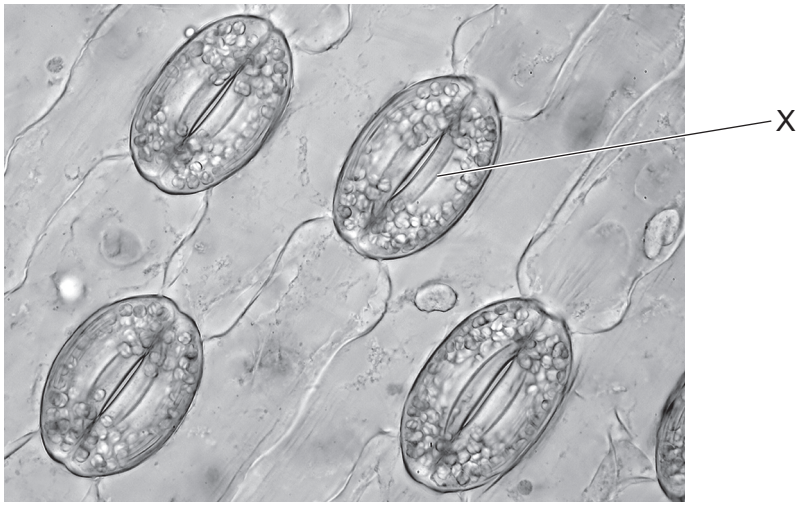


D



11 The photomicrograph shows part of the lower surface of a leaf.



What is the structure labelled X?

A guard cell

B palisade mesophyll cell

C spongy mesophyll cell

D xylem vessel

12 A student is told that their diet is **not** balanced and they may be at risk of developing scurvy.

What should the student do to reduce their risk of scurvy?

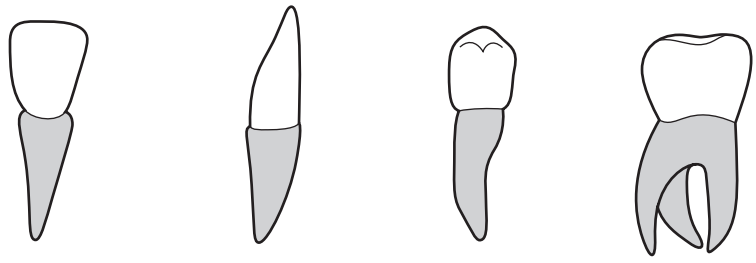
A The student should drink more milk which will provide more calcium.

B The student should drink more milk which will provide more vitamin C.

C The student should eat more citrus fruits which will provide more calcium.

D The student should eat more citrus fruits which will provide more vitamin C.

13 The diagram shows the four types of human tooth.



1 incisor

2 canine

3 premolar

4 molar

Which teeth are used for grinding food?

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

14 Which substance causes the change in pH when food enters the small intestine?

A amylase

B bile

C gastric juice

D trypsin

15 Which conditions cause the highest rate of transpiration?

A high temperature, high wind speed and high humidity

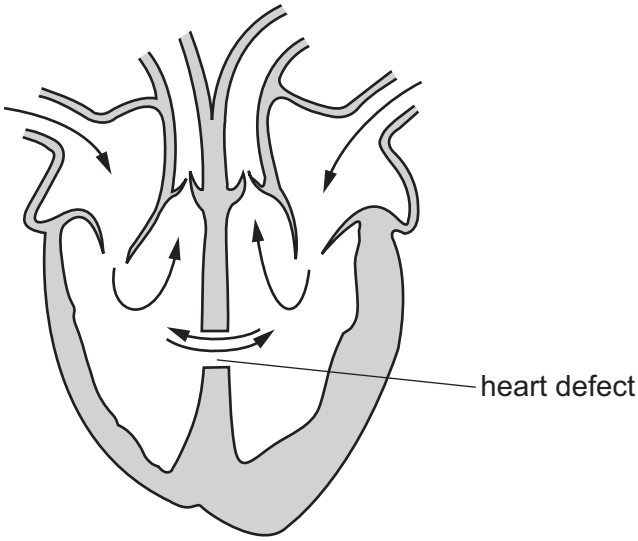
B high temperature, high wind speed and low humidity

C low temperature, low wind speed and low humidity

D low temperature, low wind speed and high humidity

16 The diagram shows a heart defect that some babies are born with.

The arrows indicate direction of blood flow.



Which statement explains why this heart defect might cause the baby to have poor growth?

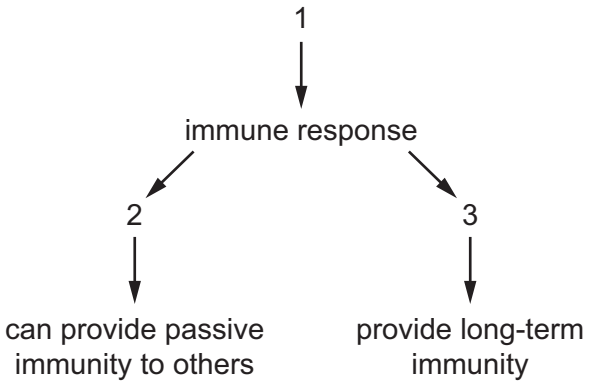
A Blood flows to the lungs at high pressure increasing rate of gas exchange.

B Blood flows to the lungs at low pressure decreasing rate of gas exchange.

C Mixing of blood results in less oxygen available for respiration.

D Mixing of blood results in more glucose available for respiration.

17 The diagram shows the effect of vaccination on the human body. Three components in the diagram are represented by numbers.



Which components are memory cells?

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

18 What helps to keep the trachea open during breathing?

A cartilage

B cilia

C external intercostal muscles

D larynx

19 Yeast can respire aerobically and anaerobically.

For each molecule of glucose used in yeast, how many more molecules of carbon dioxide gas are produced by aerobic respiration compared with anaerobic respiration?

A 1 more

B 2 more

C 4 more

D 6 more

20 In a healthy human, in which blood vessel would you find the **lowest** concentration of urea?

A hepatic artery

B hepatic vein

C renal artery

D renal vein

21 A specific eye condition can cause permanent contraction of the ciliary muscles.

Which row is correct for an eye **with** this condition compared to an eye without this condition?

	suspensory ligaments	refraction of light rays onto the retina
A	slack	less
B	slack	more
C	taut	less
D	taut	more

22 The liver and the pancreas work together to control the concentration of glucose in the blood.

Which statement is correct?

A The liver converts the small molecule glucose into the large molecule glucagon.

B The liver releases the hormone insulin when blood glucose concentration is too high.

C The pancreas does **not** respond to an increase in blood glucose concentration.

D The pancreas responds to a fall in the blood glucose concentration by increasing the release of the hormone glucagon.

23 In the dark, plant shoots grow upwards and roots grow downwards.

What causes these responses?

	gravitropism	phototropism
A	no	no
B	no	yes
C	yes	no
D	yes	yes

24 What is the reason why antibiotics should be used **only** when essential?

A It increases the artificial selection of antibiotic resistant bacteria.

B It increases the natural selection of antibiotic resistant bacteria.

C It reduces the artificial selection of antibiotic resistant bacteria.

D It reduces the natural selection of antibiotic resistant bacteria.

25 Which row describes self-pollination?

	pollen transferred from an anther to the stigma of a different flower on the same plant	pollen transferred from an anther to the stigma of a flower on a different plant of the same species	pollen transferred from an anther to the stigma of the same flower
A	✓	✓	✗
B	✓	✗	✓
C	✗	✗	✓
D	✗	✓	✓

key
✓ = yes
✗ = no

26 The list shows terms used when describing sexual reproduction.

1 male gamete
2 female gamete
3 ovule
4 ovary
5 filament
6 fertilisation
7 haploid

Which terms are used **only** when describing sexual reproduction in plants?

A 1 and 7 **B** 2 and 4 **C** 2 and 6 **D** 3 and 5

27 Which statement correctly describes the effect of a hormone in a human menstrual cycle that lasts for 28 days?

A FSH causes maturation of an egg up to day 21.

B LH stimulates the release of an egg on day 14.

C Oestrogen maintains the uterus lining between days 14 and 28.

D Progesterone causes the repair and thickening of the uterus lining between days 4 to 14.

28 What is the main hormone responsible for the development of male secondary sexual characteristics?

A adrenaline

B insulin

C oestrogen

D testosterone

29 Which term is defined as a length of DNA that codes for a protein?

A amino acid

B chromosome

C gene

D mutation

30 Which statement about the sex chromosomes is correct?

A Men and women can inherit characteristics controlled by genes on the X chromosome.

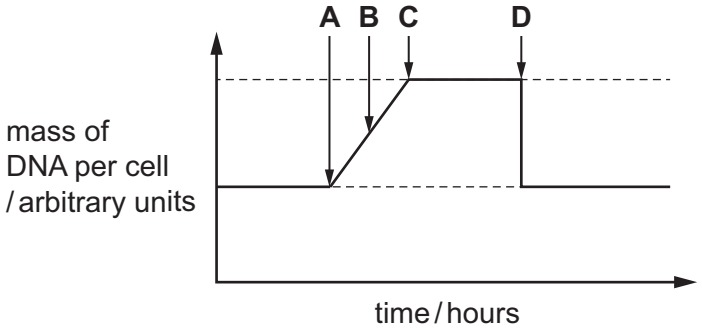
B Men and women can inherit characteristics controlled by genes on the Y chromosome.

C Only men can inherit characteristics controlled by genes on the X chromosome.

D Only women can inherit characteristics controlled by genes on the Y chromosome.

31 The graph shows how the mass of DNA changes during a mitotic cell division.

Where on the graph are **two** cells formed?



32 A man with blood group A and genotype I^AI^o has a child with a woman who has blood group B and genotype I^BI^o.

What is the probability of the child having blood group O?

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

33 What are sources of genetic variation in populations?

A meiosis, mutation, random mating

B meiosis, random mating, asexual reproduction

C mitosis, mutation, random fertilisation

D mitosis, random fertilisation, asexual reproduction

34 The food chain shows how energy is transferred to a human.

lettuce → snails → duck → human

Where did the energy in the lettuce come from?

A snails

B soil

C the Sun

D water

35 The processes listed affect the concentration of carbon dioxide in the atmosphere.

1 increased deforestation

2 increased tree planting

3 decreased fossil fuel combustion

4 increased fossil fuel combustion

Which processes increase the concentration of carbon dioxide in the atmosphere?

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

36 Which organisms can be sources of energy for decomposers?

	producers	herbivores	carnivores
A	✓	✓	✓
B	✓	✗	✗
C	✗	✓	✓
D	✗	✗	✗

key

✓ = yes

✗ = no

37 A coral reef contains species such as stony corals, sponges, seahorses and whale sharks.

These species interact with each other and are affected by the temperature, salt concentration and oxygen concentration of the water.

Using all the information given, what is being described?

A community

B ecosystem

C food web

D population

38 What can cause an increase in the size of a rabbit population?

A an increase in a disease that affects rabbits

B an increase in available food for the rabbits

C an increase in pollution in the habitat of the rabbits

D an increase in predation of rabbits

39 How does eutrophication lead to the death of fish?

A A sudden increase in the number of bacteria increases the spread of disease.

B Algae respire instead of photosynthesise.

C Decomposer bacteria lower the oxygen concentration in the water.

D Fertilisers reduce the availability of nitrates in the water.

40 The diagram shows a bacterial cell.

Which cell structure makes bacteria useful in genetic modification?