Cambridge Assessment International Education

Cambridge IGCSE™

BIOLOGY **0610/21**

Paper 2 Multiple Choice (Extended) **May/June 2024**

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 **16** pages.

© UCLES 2024

1 A person touches a hot object and rapidly moves their hand away from the hot object.

Which characteristic of living organisms is this an example of?

A excretion

B growth

C reproduction

D sensitivity

2 Which types of organisms are used in genetic modification because they have plasmids?

A arachnids

B bacteria

C myriapods

D ferns

3 The list shows some of the structures contained in cells.

- cytoplasm
- cell membrane
- cell wall
- chloroplast

How many of these structures are found in the cells of **all** living organisms?

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

4 A student draws a red blood cell.

The diameter of the red blood cell they draw is 20 mm.

The actual diameter of the red blood cell is 0.008 mm.

What is the magnification of the student's drawing?

A ×0.0004 **B** ×0.16 **C** ×250 **D** ×2500

© UCLES 2024

5 Samples of plant cells from the same species are immersed in three different liquids. The low concentration sucrose solution has a higher water potential than the plant cell cytoplasm. The high concentration sucrose solution has a lower water potential than the plant cell cytoplasm.

What is the state of the cells in the different liquids?

	distilled water	low concentration sucrose solution	high concentration sucrose solution
A	turgid	plasmolysed	flaccid
B	flaccid	turgid	plasmolysed
C	flaccid	plasmolysed	flaccid
D	turgid	turgid	plasmolysed

6 Which process requires energy from respiration?

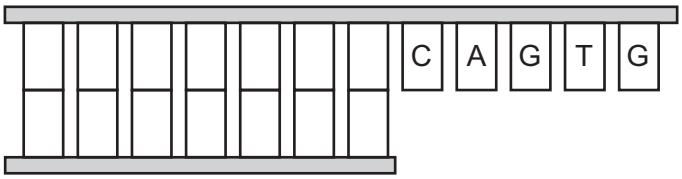
A active transport

B diffusion

C osmosis

D transpiration

7 The diagram shows the sticky end of the DNA of a plasmid that has been cut by a restriction enzyme. The unpaired bases are labelled.



What is the correct sequence of the missing bases?

A CAGTG **B** GTGAC **C** GTCAC **D** CACTG

8 A test was performed on a food substance. A positive result was shown by a colour change to blue-black.

What solution was used for the test?

A biuret solution

B DCPIP solution

C iodine solution

D Benedict's solution

9 A student investigates the breakdown of fats in milk by lipase. Four test-tubes labelled **A**, **B**, **C** and **D** are set up.

The table shows the contents of each test-tube.

In which test-tube will the contents become acidic most quickly?

	milk	bile	boiled lipase	lipase
A	✓	✓	✗	✓
B	✓	✓	✓	✗
C	✓	✗	✓	✗
D	✗	✓	✓	✓

key

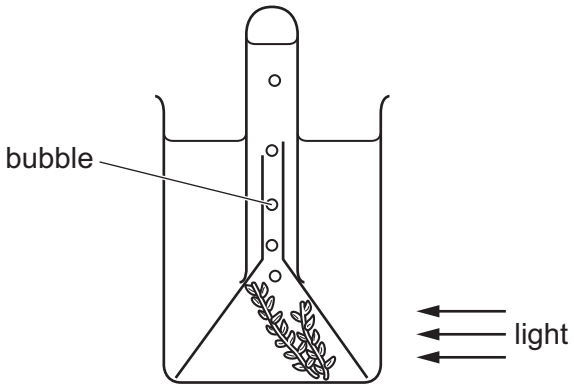
✓ = present

✗ = absent

10 The diagram shows an experiment to investigate the effect of increasing light intensity on the rate of photosynthesis in an aquatic plant.

The rate is found by measuring the rate of bubble release by the plant.

As the light intensity increases, the rate of bubble release increases and then becomes constant.



Which statement describes why the rate of bubble release becomes constant at high light intensities?

A Carbon dioxide concentration becomes a limiting factor.

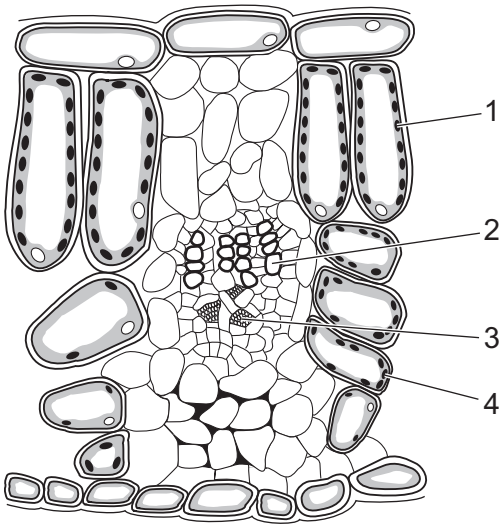
B Light intensity becomes a limiting factor.

C Oxygen availability becomes a limiting factor.

D Water availability becomes a limiting factor.

© UCLES 2024

11 The diagram shows a section through the leaf of a flowering plant.

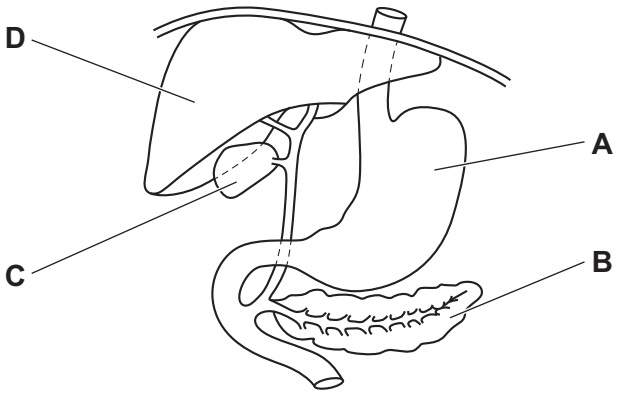


Where does photosynthesis take place?

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

12 The diagram shows part of the alimentary canal and associated organs.

Which labelled part stores bile?



13 The list contains statements about villi.

1 Villi increase the efficiency of the absorption of nutrients.

2 Villi increase the efficiency of the alveoli during gas exchange.

3 Villi provide a large surface area.

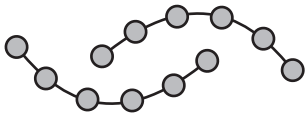
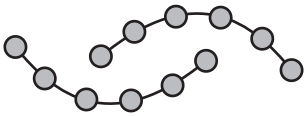
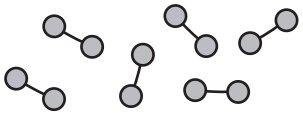
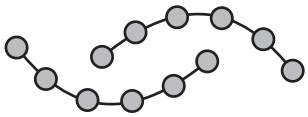
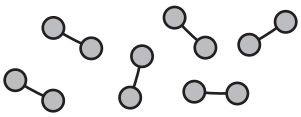
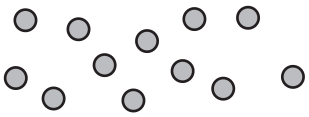
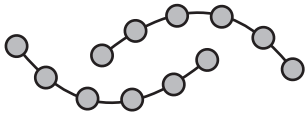
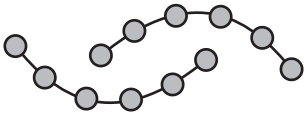
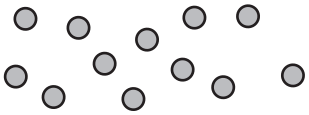
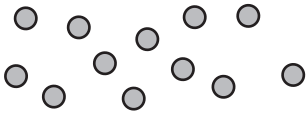
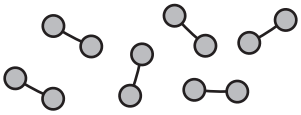
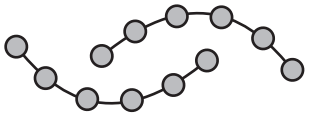
4 Villi filter urea from the blood.

Which two statements explain the role of the villi in humans?

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

14 The diagrams show carbohydrate molecules as they pass through the alimentary canal.

Which row represents the molecules correctly?

	before taking into the mouth	after some time in the mouth	after some time in the small intestine
A			
B			
C			
D			

© UCLES 2024

15 Which row shows correct information about three digestive enzymes in humans?

	lipase	maltase	trypsin
A	acts in acidic conditions	acts in the stomach	secreted by the pancreas
B	secreted by the pancreas	secreted in the mouth	acts in acidic conditions
C	secreted by the small intestine	acts in alkaline conditions	secreted in the stomach
D	acts in the small intestine	acts in the small intestine	acts in alkaline conditions

16 Which substance found in a healthy diet helps to prevent constipation?

A fat

B fibre

C minerals

D vitamins

17 When is the transpiration rate of a well-watered plant highest?

A on a cool, dry, windy day

B on a cool, wet, windy day

C on a hot, dry, windy day

D on a hot, wet, windy day

18 Which statement is correct for a flowering plant during photosynthesis?

A The flowers, fruits, leaves and roots are all sources of sucrose.

B The fruits are a source of sucrose and the flowers are a sink.

C The leaves are a source of sucrose and the fruits are a sink.

D The roots are a source of sucrose and the leaves are a sink.

© UCLES 2024

19 What is an advantage of having a double circulatory system?

A It uses less energy because blood flows through the heart only once in each circuit around the body.

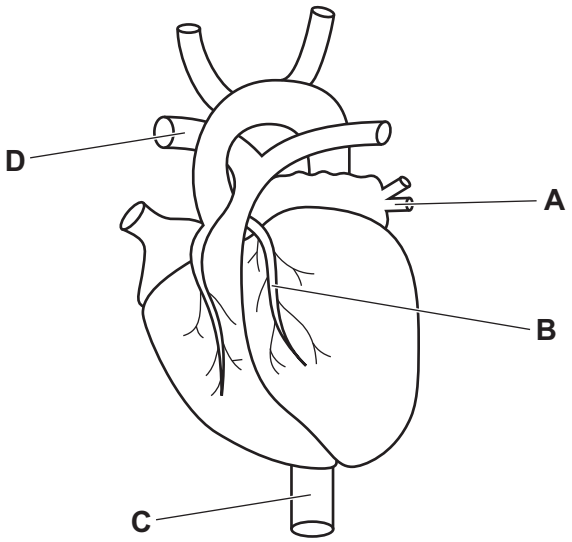
B Concentration gradients of solutes and gases are kept low.

C Deoxygenated and oxygenated blood are separated to allow a high rate of oxygen supply to the tissues.

D It maintains high-pressure blood flow to the lungs and low-pressure blood flow to the body.

20 The diagram shows the external structure of the human heart.

Which part is blocked in coronary heart disease?



21 One of the symptoms of the disease cholera is diarrhoea. This is due to water loss by osmosis caused by the cholera toxin.

What is the effect of cholera toxins that results in diarrhoea?

A secretion of chloride ions out of the small intestine lowering the water potential

B secretion of chloride ions out of the small intestine raising the water potential

C secretion of chloride ions into the small intestine lowering the water potential

D secretion of chloride ions into the small intestine raising the water potential

© UCLES 2024

22 Which statement about immunity is correct?

A A part of the antibody molecule has the same shape as the antigen it acts on.

B Babies develop passive immunity from the antibodies they receive in breast milk.

C Phagocytes produce antibodies.

D Vaccines contain weakened antibodies.

23 What are the functions of the diaphragm and the cilia in the human gas exchange system?

	diaphragm	cilia
A	contracts to cause breathing in	carry mucus to the throat
B	contracts to cause breathing out	trap bacteria from the air
C	relaxes to cause breathing in	filter dust from the air
D	relaxes to cause breathing out	produce mucus

24 Vigorous exercise can cause an oxygen debt.

Which process removes the oxygen debt?

A aerobic respiration of lactic acid in the liver

B a decrease in breathing rate

C a decrease in heart rate

D an increase in blood supply to the skin

25 In healthy people, which substance is completely reabsorbed into the blood from the kidney nephrons?

A glucose

B salts

C urea

D water

26 What would be the pupil size and lens shape of a person reading a mobile phone text message in a brightly lit room?

	pupil size	lens shape
A	large	fat
B	large	thin
C	small	fat
D	small	thin

27 What describes how the body maintains a constant internal temperature on a hot day?

A Vasoconstriction increases blood flow to the skin surface capillaries.

B Vasoconstriction decreases blood flow to the skin surface capillaries.

C Vasodilation increases blood flow to the skin surface capillaries.

D Vasodilation decreases blood flow to the skin surface capillaries.

28 What would lead to a **decrease** in blood glucose concentration?

A increased release of adrenaline

B increased release of amylase

C increased release of glucagon

D increased release of insulin

29 Which statement about antibiotics is correct?

A Antibiotics do not affect bacteria but kill viruses.

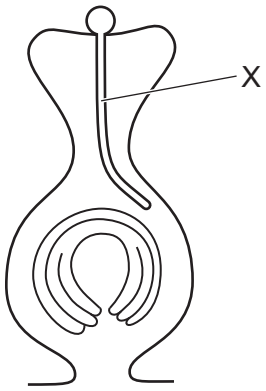
B Antibiotics do not affect bacteria or viruses.

C Antibiotics kill bacteria and kill viruses.

D Antibiotics kill bacteria but do not affect viruses.

© UCLES 2024

30 The diagram shows the carpel of a flower just after pollination.



What is the name of the part labelled X?

A filament

B ovule

C pollen tube

D stigma

31 The table shows the percentage of sperm with different abnormalities in samples from a person with normal fertility and two people with low fertility.

	person with normal fertility	person P with low fertility	person Q with low fertility
percentage of sperm with no acrosome	2	25	2
percentage of sperm with deformed flagellum	11	11	35
percentage of sperm with few mitochondria	4	4	30

What are the causes of low fertility in person P and person Q?

	person P	person Q
A	too many sperm cannot digest jelly coat of egg cell	too many sperm cannot digest jelly coat of egg cell
B	too many sperm cannot digest jelly coat of egg cell	too many sperm cannot move to oviduct
C	too many sperm cannot move to oviduct	too many sperm cannot digest jelly coat of egg cell
D	too many sperm cannot move to oviduct	too many sperm cannot move to oviduct

32 Which word is used to describe stem cells?

A gametes

B haploid

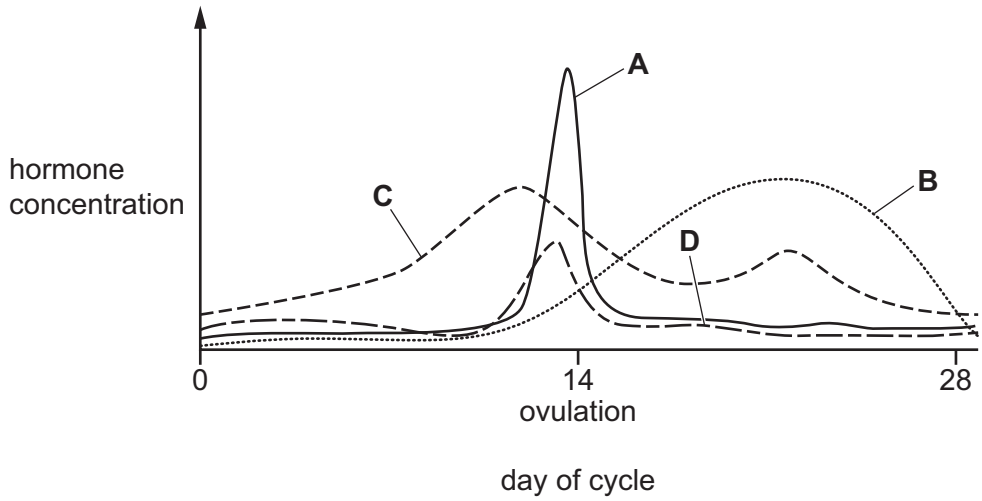
C homozygous

D unspecialised

© UCLES 2024

33 The graph shows the concentration of four hormones during the menstrual cycle.

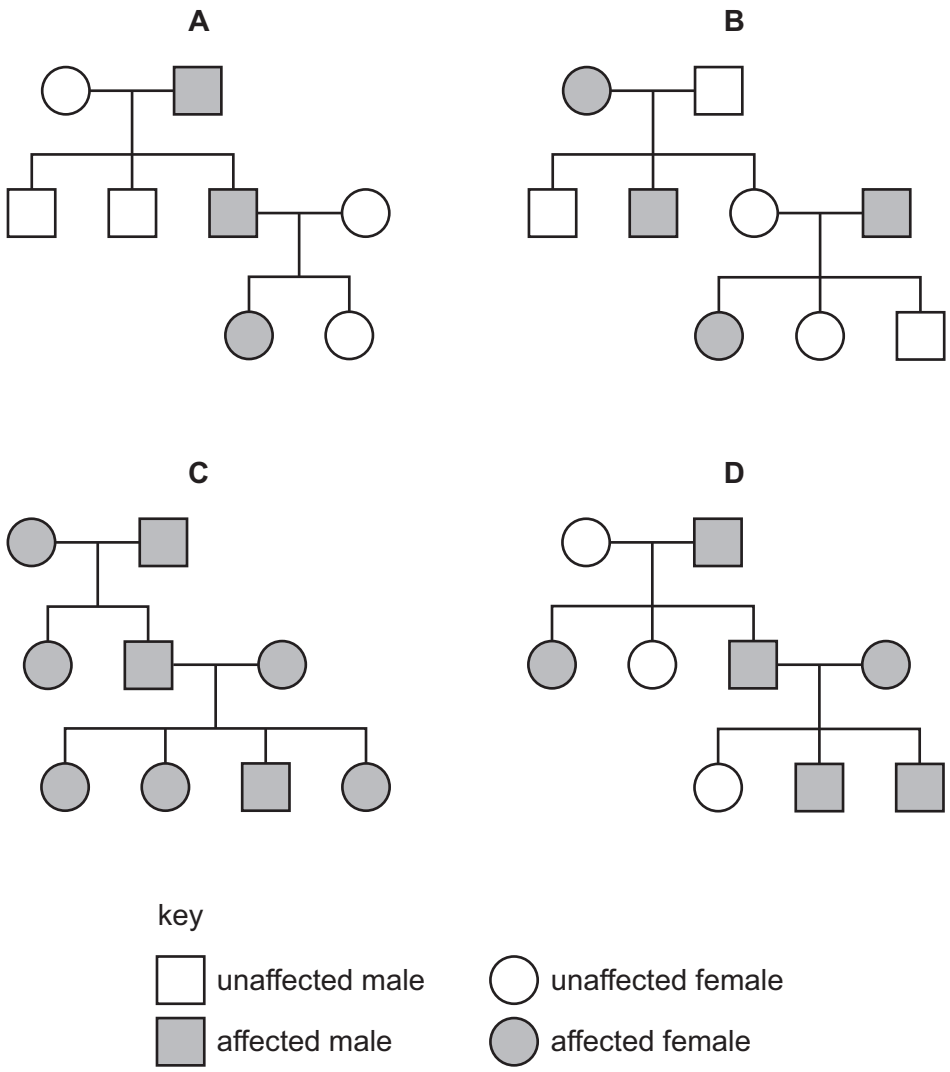
Which line represents progesterone?



34 The pedigree diagrams show the pattern of inheritance of a genetic disorder in four families.

This genetic disorder is **not** sex-linked.

Which pedigree diagram proves that the genetic disorder **must** be caused by a dominant allele?



35 What are correct statements about meiosis?

	produces genetically identical cells	involved in repair of damaged tissues
A	yes	yes
B	yes	no
C	no	yes
D	no	no

36 The photograph shows a species of fish called a leafy sea-dragon.

Leafy sea-dragons live in areas of the sea where seaweed is present.

Which statements explain how natural selection caused the leafy sea-dragon species to develop?

1 Leafy sea-dragons that looked like seaweed were better adapted to their environment.

2 Leafy sea-dragons that survived passed on the allele for their appearance to their offspring.

3 Humans selected leafy sea-dragons that looked like seaweed.

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

37 What is the main source of energy input to biological systems?

A glucose

B oxygen

C plants

D the Sun

38 Which organisms remove nitrate ions from soil?

A denitrifying bacteria and nitrogen-fixing bacteria in root nodules

B denitrifying bacteria and plants

C nitrifying bacteria and plants

D nitrogen-fixing bacteria in root nodules

39 What are **two** reasons for organisms becoming endangered?

1 habitat destruction

2 monitoring

3 education

4 pollution

5 captive breeding programmes

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

40 What is an example of the use of genetic modification in agriculture?

A choosing cattle to breed so that alleles for high milk yield will be passed on to their offspring

B increasing food production by using insecticides to improve quality and yield

C inserting genes into crop plants to improve the nutritional qualities of the plant

D selecting crop plants with desirable characteristics and crossing these to produce the next generation

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of Cambridge Assessment. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which is a department of the University of Cambridge.

© UCLES 2024