Cambridge Assessment International Education

Cambridge O Level

BIOLOGY **5090/11**

Paper 1 Multiple Choice **October/November 2023**

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.

IB23 11_5090_11/7RP
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1 What are characteristics of bacteria?

	contain cytoplasm	have DNA	nuclear membrane present
A	✗	✓	✗
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

key

✓ = yes

✗ = no

2 Some students were provided with some specimens of arthropods. They counted the number of legs on each arthropod. Their results are shown in the table.

number of legs	number of arthropods with that number of legs
6	10
8	4
10	4
20 or more	2

Which statement about the arthropods is correct?

A The same number of insects and crustaceans were counted.

B 25% of the arthropods counted were arachnids.

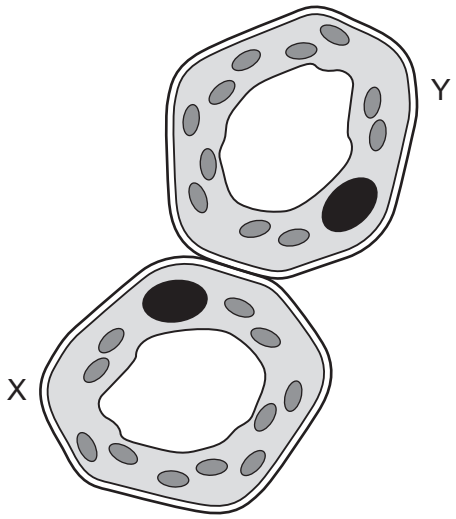
C 50% of the arthropods counted were insects.

D 10% of the arthropods counted were crustaceans.

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3 The diagram shows two plant cells, X and Y.

Cell X has a higher water potential than Y.



In which direction and by which process will water move between these two cells?

	direction	process
A	X to Y	active transport
B	X to Y	osmosis
C	Y to X	active transport
D	Y to X	osmosis

4 Which row identifies how ions and molecules move by active transport?

	against the concentration gradient	down the concentration gradient	through a membrane	requiring energy
A	✓	✗	✓	✓
B	✗	✓	✗	✗
C	✗	✓	✓	✓
D	✓	✗	✓	✗

key

✓ = yes

✗ = no

5 A student carried out two tests on a liquid. When Benedict's solution was added to half of the liquid and heated, it turned red. When biuret reagent was added to the rest of the liquid, it turned mauve (purple).

Which conclusion is correct?

A The liquid contained solutions of lipids and glucose.

B The liquid contained solutions of lipids and protein.

C The liquid contained solutions of starch and glucose.

D The liquid contained solutions of glucose and protein.

6 Enzymes are involved in many reactions in living cells.

Which statement describes the action of enzymes?

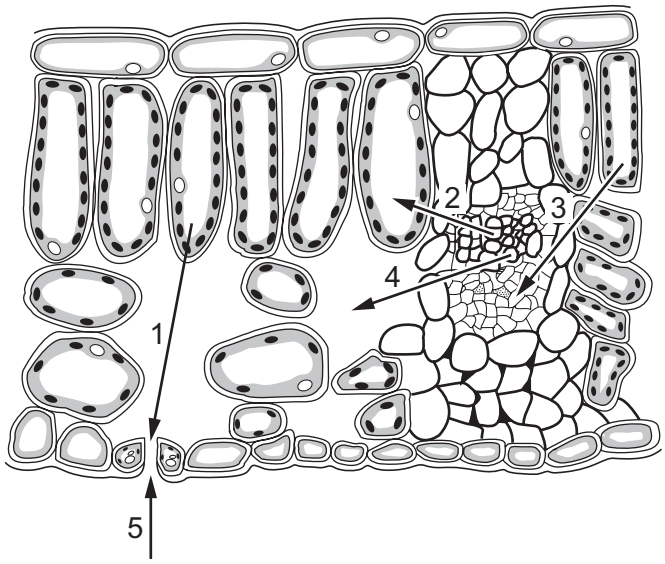
A Enzymes are able to start up reactions that would otherwise not occur.

B Enzymes can only act inside living cells or organisms.

C Enzymes increase the rate of chemical reactions.

D One enzyme can catalyse a number of different reactions.

7 The diagram shows the movement of substances involved in photosynthesis in a leaf.

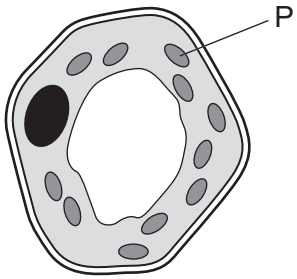


Which row shows the correct labels for the diagram?

	1	2	3	4	5
A	carbon dioxide	water	glucose	water	oxygen
B	oxygen	glucose	water	glucose	carbon dioxide
C	oxygen	water	glucose	water	carbon dioxide
D	water	glucose	carbon dioxide	carbon dioxide	oxygen

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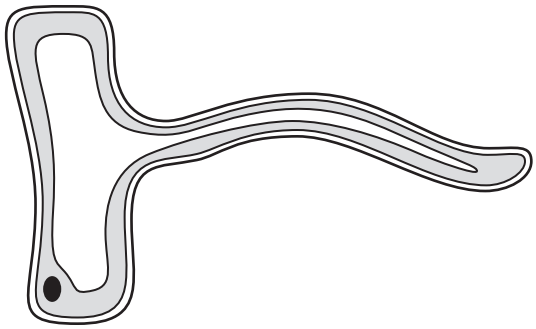
8 The diagram shows a plant cell.



Compared with the rest of the cell, which row describes the concentrations of oxygen and magnesium inside structure P during the daytime?

	oxygen	magnesium
A	high	high
B	high	low
C	low	high
D	low	low

9 The diagram shows a root hair cell.



How does the shape of the cell help the plant?

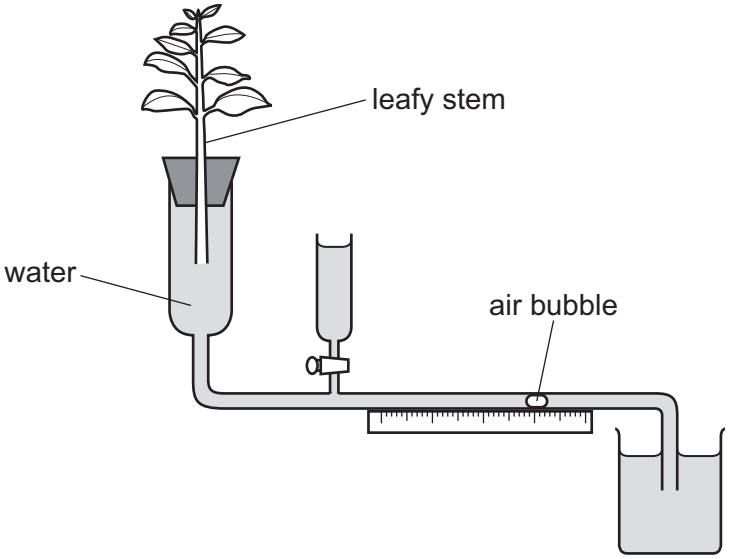
A It allows roots to search for ions.

B It allows roots to search for water.

C It increases the surface area for sugar uptake.

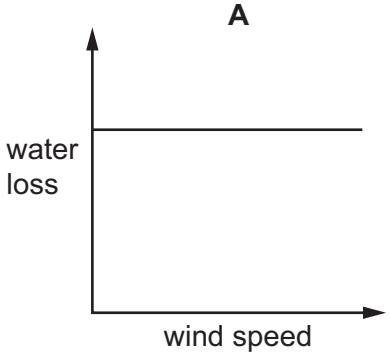
D It increases the surface area for water uptake.

10 A student used the apparatus shown to measure the rate of water loss by the leafy stem at increasing wind speeds.

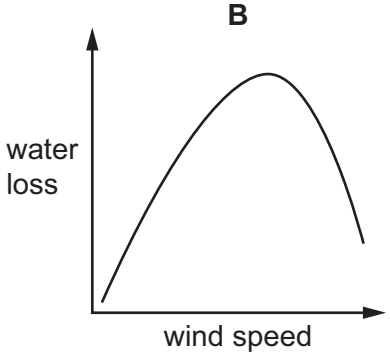


Which graph was produced from their results?

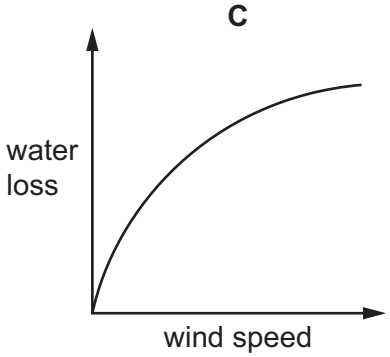
A



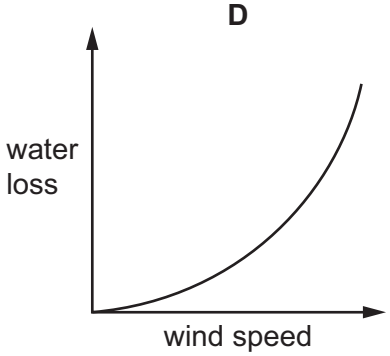
B



C



D



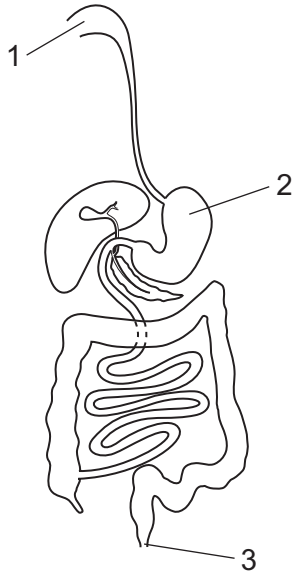
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11 A deficiency disease in children causes soft and deformed bones.

What is the name and cause of this deficiency disease?

	name	cause
A	rickets	lack of vitamin D and calcium
B	rickets	lack of vitamin C and calcium
C	anaemia	lack of iron and calcium
D	scurvy	lack of vitamin C

12 The diagram shows the human digestive system.

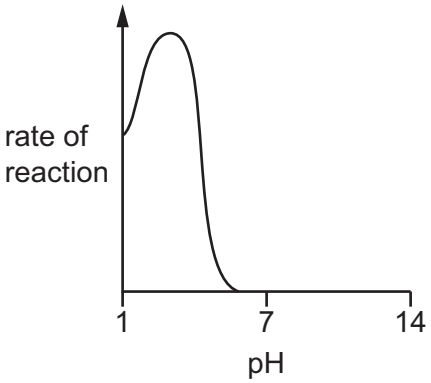


Where do egestion and ingestion occur?

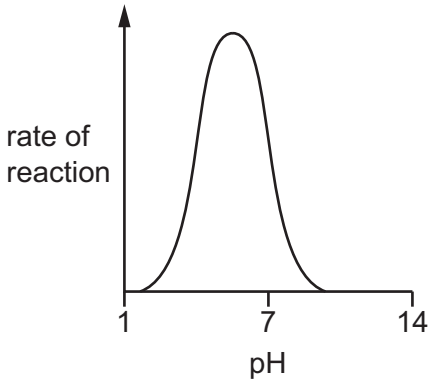
	egestion	ingestion
A	1	3
B	2	3
C	3	1
D	3	2

13 Which graph best represents the effect of pH on the action of gastric protease?

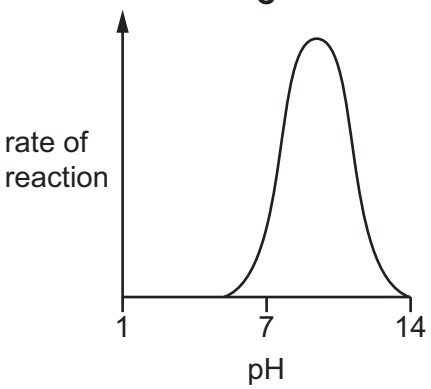
A



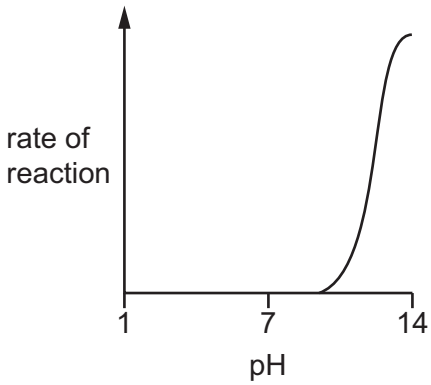
B



C

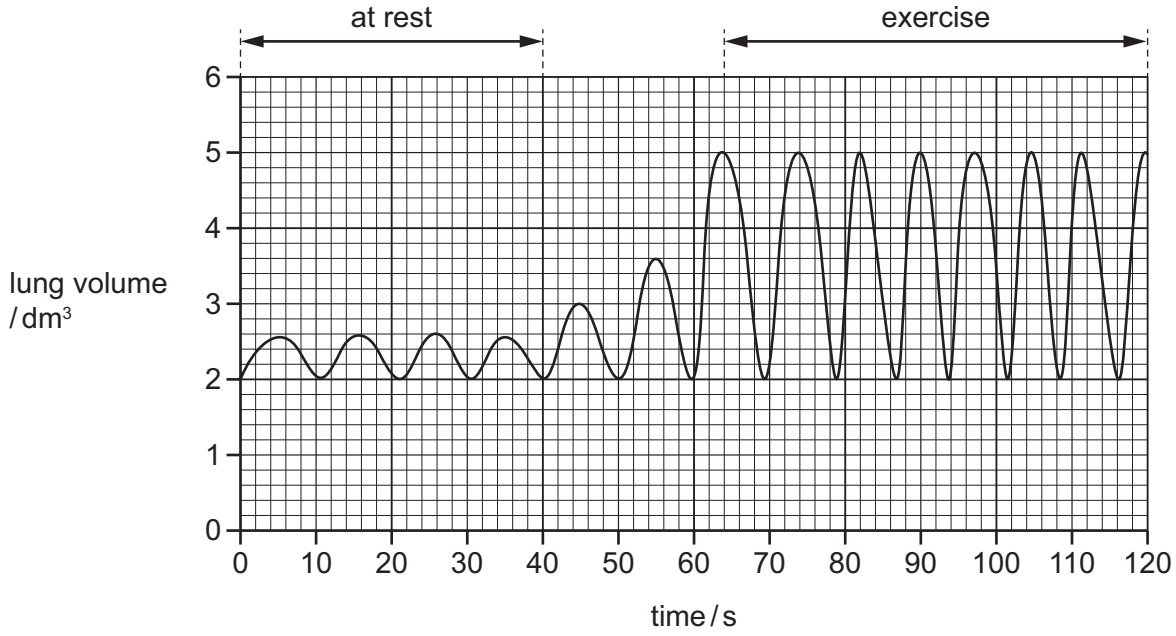


D



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14 The graph shows the changes in lung volume during breathing when a person was at rest and then when they began to exercise.



From resting to exercise, the volume of air breathed in at each breath increased from .....x..... dm^3 to .....y..... dm^3.

Looking at the graph, which numbers correctly complete the gaps in the sentence?

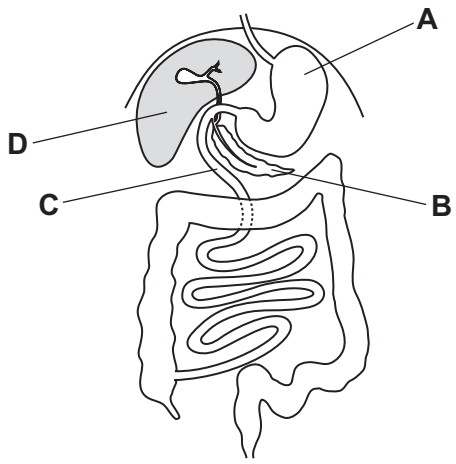
	x	y
A	0.5	3.0
B	0.5	5.0
C	2.0	5.0
D	2.0	5.0

15 What are the products of anaerobic respiration in muscle?

	alcohol	carbon dioxide	glucose	lactic acid	water
A	✓	✓	✓	✗	✗
B	✗	✓	✗	✓	✓
C	✓	✗	✓	✗	✓
D	✗	✗	✗	✓	✗

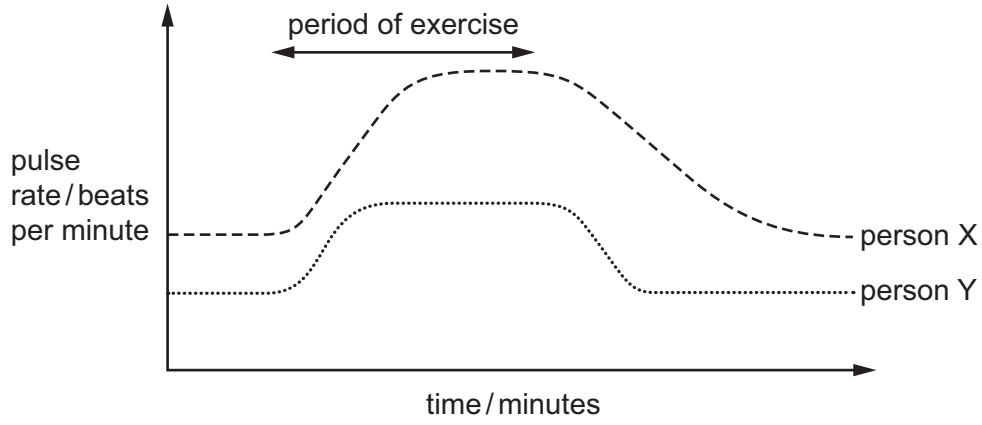
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16 Which label shows where lactic acid is broken down?



17 Two people carried out a short period of exercise on a treadmill. Each of the two people ran on the treadmill for the same amount of time and at the same speed.

The graph shows the pulse rates of these two people before, during and after the period of exercise.



Which interpretation of the graph is correct?

A Person X is fitter, and their heart rate increases more during exercise.

B Person X is fitter, and their heart rate recovers more quickly after exercise.

C Person Y is fitter, and their heart rate increases more during exercise.

D Person Y is fitter, and their heart rate recovers more quickly after exercise.

18 Which blood vessels carry deoxygenated blood?

A aorta and vena cava

B pulmonary artery and hepatic vein

C renal vein and pulmonary vein

D vena cava and pulmonary vein

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19 What describes the microorganism that causes cholera and its method of transmission?

A bacteria in contaminated blood

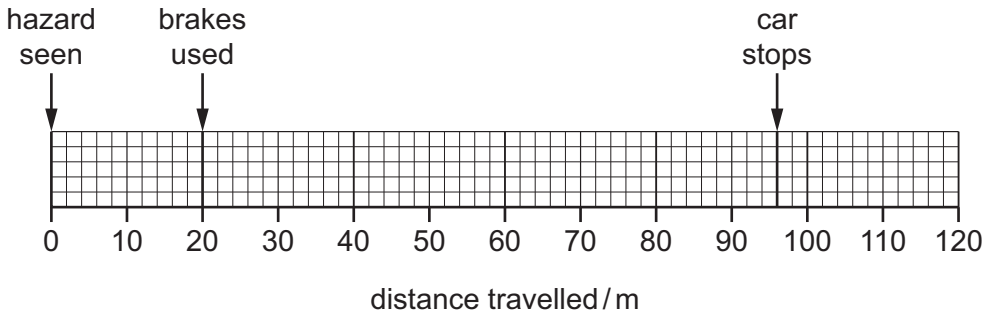
B bacteria in contaminated water

C virus in contaminated blood

D virus in contaminated water

20 The chart gives information about a car being driven at 110 km / h by someone who has **not** consumed alcohol.

It shows how far the car travels from the time the driver sees a hazard and reacts by using the brakes and how far the car will then travel before finally stopping.



If the same driver consumes alcohol before driving, the distance travelled before reacting to the hazard increases by 20%.

What would then be the total distance travelled by the car before stopping?

A 96 m **B** 100 m **C** 111.2 m **D** 115.2 m

21 Drugs can be used to treat infections in the body.

What are antibiotics used for?

A to destroy bacteria

B to destroy viruses

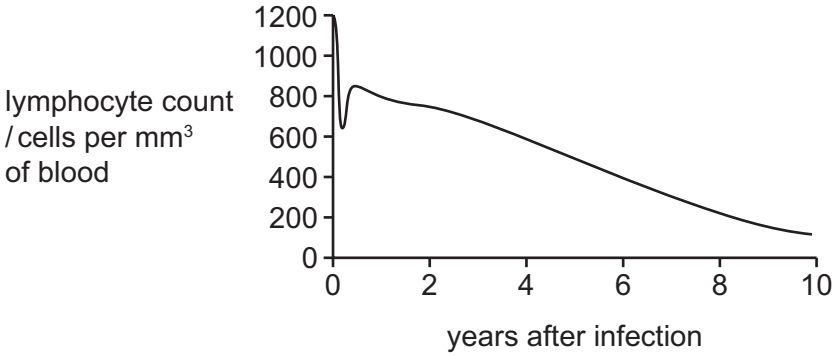
C to develop passive immunity

D to stimulate an immune response

22 Human immunodeficiency virus (HIV) affects the immune system resulting in decreased lymphocyte numbers.

The diagnosis of AIDS can be made when lymphocyte numbers decrease below 200 cells / mm^3 of blood.

The graph shows the lymphocyte numbers after HIV infection in a patient.



How many years after infection would this patient be diagnosed with AIDS?

A 0 years

B 3 years

C 7 years

D 9 years

23 Some people require a treatment called dialysis to remove waste products and excess salts from their blood.

For these individuals, which part of the body is **not** functioning correctly?

A bladder

B heart

C kidney

D ureter

24 Which change occurs in the eye as a person focuses on a vehicle approaching from a long distance?

A ciliary muscles relax

B iris circular muscles contract

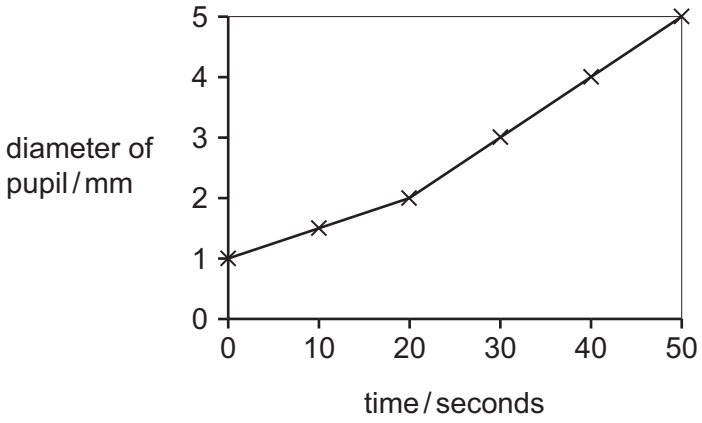
C lens becomes more convex

D pupil becomes larger

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25 A light was shone into a person's eye for 50 seconds. During this time, the intensity of the light was varied.

The graph shows changes in the person's pupil size.



Which statement explains the change in pupil size?

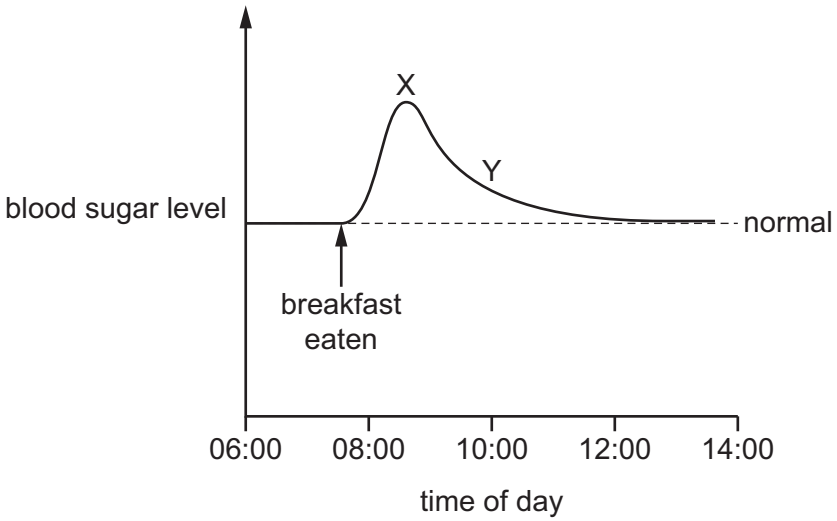
A The light slowly became brighter.

B The light suddenly became brighter.

C The light slowly became dimmer.

D The light suddenly became dimmer.

26 The graph shows the blood sugar level for a person over eight hours. They did **not** exercise during this time.



Which statement explains the shape of the graph between X and Y?

A The pancreas produces glucagon which causes excess sugar in the blood to be converted to glycogen.

B The liver produces insulin which causes excess sugar in the blood to be converted to glycogen.

C The pancreas produces insulin which causes excess sugar in the blood to be converted to glycogen.

D The liver produces glycogen which causes excess sugar in the blood to be converted to glucagon.

27 Which actions may lead to the contraction of hair erector muscles in the skin?

1 being sprayed with cold water

2 wearing a thick coat

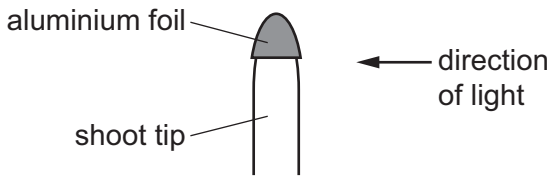
3 entering a hot room

4 entering a cold room

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

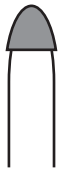
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28 An experiment on the growth of a young plant shoot was set up, as shown.

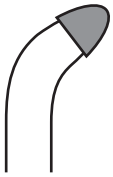


What does the shoot look like after 48 hours?

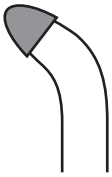
A



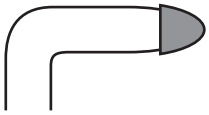
B



C



D



29 A scientist takes four pairs of samples from a wild cherry tree.

In which pair of samples could there be cells with different genotypes?

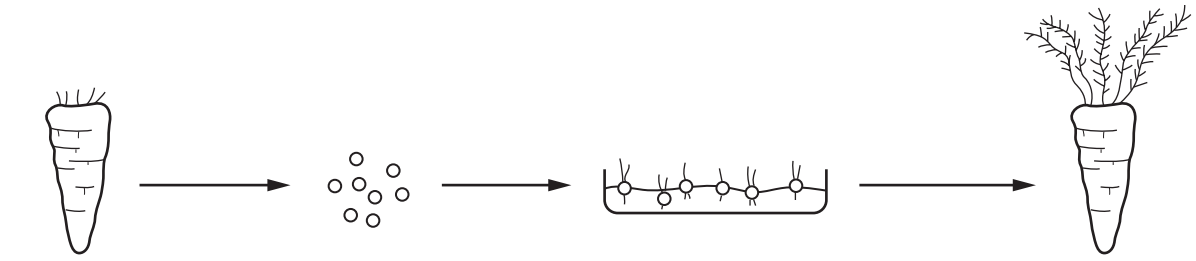
A two seeds

B two leaves

C two petals

D two root cuttings

30 The diagram shows how a large number of carrot plants can be produced from small pieces of carrot root.



Which row is correct for this method of plant production?

	asexual reproduction	genetically identical offspring	cell division by mitosis	cell division by meiosis
A	✓	✗	✓	✗
B	✓	✗	✗	✓
C	✓	✓	✓	✗
D	✗	✓	✗	✓

31 In plant reproduction, the following processes occur.

1 fertilisation

2 growth of a pollen tube

3 pollination

4 seed germination

In which order do these processes take place?

A $1 \rightarrow 4 \rightarrow 2 \rightarrow 3$

B $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$

C $3 \rightarrow 2 \rightarrow 1 \rightarrow 4$

D $4 \rightarrow 3 \rightarrow 1 \rightarrow 2$

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32 Which hormone causes the release of an egg cell from the ovary?

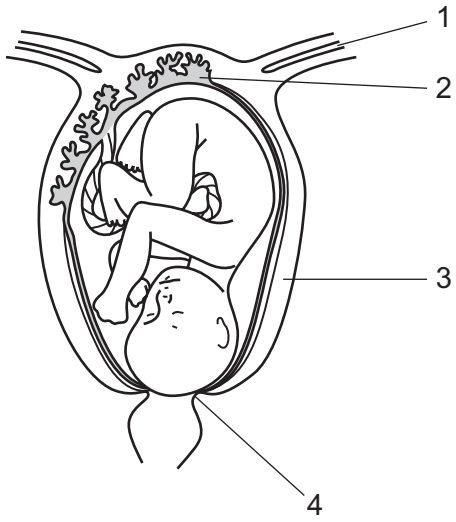
A follicle-stimulating hormone (FSH)

B luteinising hormone (LH)

C oestrogen

D progesterone

33 The diagram shows a baby about to be born.



Which labelled structures are the cervix and uterus?

	cervix	uterus
A	1	2
B	2	1
C	3	4
D	4	3

34 In a DNA molecule, bonds between pairs of bases hold the strands together.

Which pairs of bases are found in DNA?

1 A-C

2 A-G

3 A-T

4 C-G

5 C-T

6 T-G

A 1, 2, 3, 4, 5 and 6

B 1 and 6 only

C 2 and 5 only

D 3 and 4 only

35 The inheritance of the ABO blood groups in humans is controlled by three alleles (I^A, I^B and I^O), only two of which can be present in one individual.

What are the possible blood groups of children born to a homozygous group A woman and a heterozygous group B man?

A AB and B only

B AB and A only

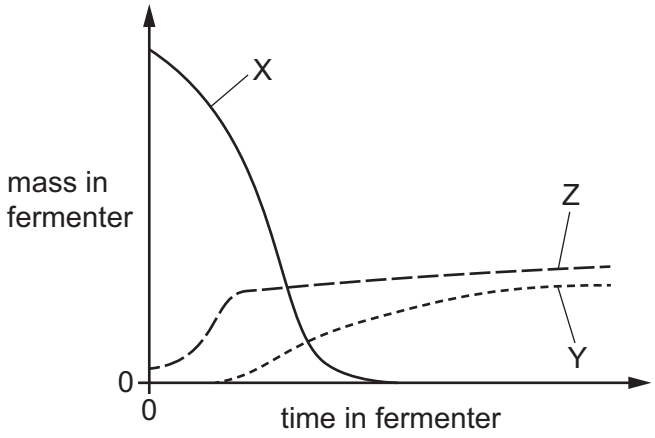
C A, B and AB only

D A, B, AB and O

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36 The antibiotic penicillin is produced by a fungus called *Penicillium*.

The graph shows the changes in the masses of *Penicillium* fungus, penicillin and sugar in a fermenter during the production of a batch of antibiotic.



What is represented by each curve on the graph?

	X	Y	Z
A	penicillin	*Penicillium* fungus	sugar
B	*Penicillium* fungus	penicillin	sugar
C	sugar	penicillin	*Penicillium* fungus
D	sugar	*Penicillium* fungus	penicillin

37 The diagram shows a food chain.

mahogany tree → caterpillar → songbird → hawk

Which organisms are present in the largest numbers in this food chain?

A carnivores

B consumers

C herbivores

D producers

38 Some bacteria and fungi are decomposers.

What is produced when decomposers break down plant and animal protein?

A nitrate ions

B ammonium ions

C nitrogen gas

D nitrite ions

39 What is the definition of a community?

A a group of organisms of one species living in an area at the same time

B all the populations of organisms of different species living in an ecosystem

C the number of different species that live in an area

D organisms and their environment interacting together

40 The list shows some changes that may occur in a lake that is polluted with nitrogen-containing fertiliser.

1 Concentration of oxygen decreases.

2 Decomposers feed on plants.

3 Green microorganisms grow and cover the surface.

4 Plants die.

In which order do these changes occur?

A $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$

B $2 \rightarrow 1 \rightarrow 4 \rightarrow 3$

C $3 \rightarrow 4 \rightarrow 2 \rightarrow 1$

D $4 \rightarrow 3 \rightarrow 1 \rightarrow 2$

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