Cambridge Assessment International Education

Cambridge O Level

BIOLOGY **5090/12**

Paper 1 Multiple Choice **May/June 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.

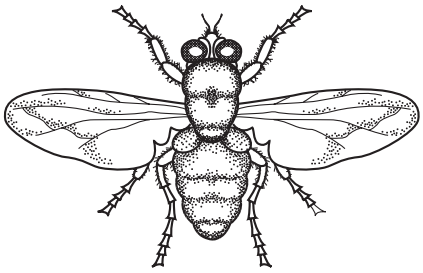
This document has **20** pages. Any blank pages are indicated.

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1 How permeable are the cell wall and the cell membrane in a plant cell?

	cell wall	cell membrane
A	fully	fully
B	fully	partially
C	partially	fully
D	partially	partially

2 The diagram shows an arthropod.



Using the key, what correctly identifies the arthropod in the picture?

1 has wings ..... go to 2

does not have wings ..... **A**

2 has 2 body parts ..... **B**

has 3 body parts ..... go to 3

3 has 6 legs ..... **C**

has 8 legs ..... **D**

3 Which statements about diffusion are correct?

	molecules move from a higher to a lower concentration	only occurs within living systems	rate slows down as the temperature increases
A	✓	✓	✗
B	✓	✗	✗
C	✗	✓	✓
D	✗	✗	✓

key

✓ = yes

✗ = no

4 Some ways in which molecules may move into and out of cells are listed.

1 Molecules move from a higher concentration to a lower concentration.

2 Molecules move from a lower concentration to a higher concentration.

3 Molecules move from a higher concentration to a lower concentration across a partially permeable membrane.

Which statement is correct?

A 1 describes osmosis and 3 describes active transport.

B 2 describes osmosis and 3 describes diffusion.

C 1 describes active transport and 2 describes osmosis.

D 2 describes active transport and 3 describes osmosis.

5 Food tests were carried out on a solution containing biological molecules.

The table shows the results of the tests.

name of test	result of test
biuret test	purple solution
Benedict's test	blue solution

Which conclusion can be drawn from these results?

A The solution contains protein but no glucose.

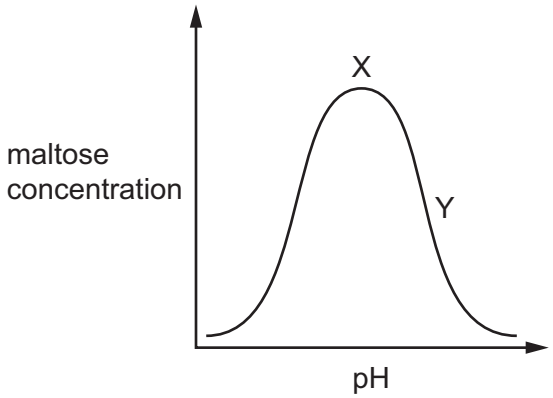
B The solution contains protein and glucose.

C The solution contains glucose but no protein.

D The solution does not contain glucose or protein.

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6 The graph shows the concentration of maltose produced when amylase digests starch at different pH values.



What explains the shape of the graph between point X and point Y?

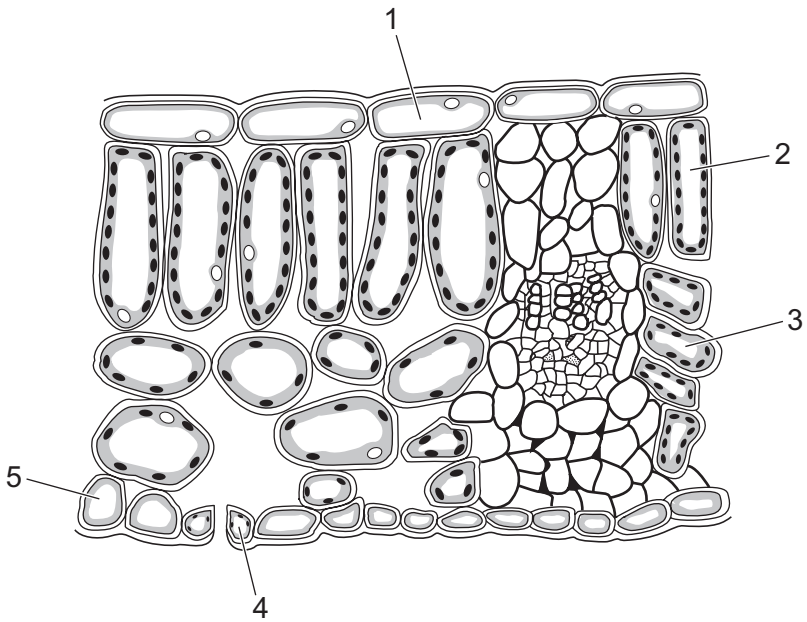
A The enzyme is completely denatured and does not work at all.

B The enzyme molecules have less kinetic energy.

C The shape of the enzyme active site is changing and does not fit the substrate so well.

D The substrate molecules have more kinetic energy.

7 The diagram shows a section through part of a leaf from a dicotyledonous plant.



Which cells carry out photosynthesis?

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

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8 Which row shows why plants need magnesium ions and nitrate ions?

	magnesium ions	nitrate ions
A	to make fatty acids	to make proteins
B	to make amino acids	to make chlorophyll
C	to make chlorophyll	to make cellulose
D	to make chlorophyll	to make amino acids

9 Root hairs take in water and ions from the soil.

Which table shows the correct concentrations of water and ions in the root hair?

A

substance	concentration in root hair
water	lower than the soil
ions	higher than the soil

B

substance	concentration in root hair
water	higher than the soil
ions	higher than the soil

C

substance	concentration in root hair
water	higher than the soil
ions	lower than the soil

D

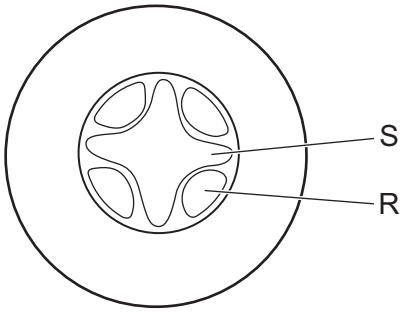
substance	concentration in root hair
water	lower than the soil
ions	lower than the soil

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[Turn over

10 A herbaceous plant, growing in a nutrient solution, is placed in a well-lit container. Humid air is passed through the container.

The diagram shows a section through a part of the plant.



The speeds of movement of the fluids in tissues R and S are measured. The humid air is then replaced by dry air and the speeds of movement of the fluids are measured again.

Which effect does the change to dry air have on the measurements?

	tissue R	tissue S
A	greatly increased upward movement	greatly increased downward movement
B	greatly increased downward movement	little change
C	little change	greatly increased downward movement
D	little change	greatly increased upward movement

11 Some of the nutrients in sweet potatoes are listed.

1 calcium

2 fibre

3 iron

4 vitamin C

Which nutrient will help to prevent each disease?

	anaemia	rickets	scurvy
A	3	1	4
B	3	4	4
C	4	1	3
D	4	2	3

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12 Four of the organs of the alimentary canal are listed.

J colon

K duodenum

L oesophagus

M stomach

Which sequence shows the order in which food passes through these organs?

A K → J → L → M

B L → K → M → J

C L → M → K → J

D M → L → J → K

13 A person who has coeliac disease has flattened villi in their ileum. If a person with coeliac disease eats the same quantity and types of food as a disease-free person, they will have lower levels of glucose in their hepatic portal vein.

Which row explains this?

	capillaries do not absorb the glucose molecules	the surface area of the ileum is reduced
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = yes

✗ = no

14 Which process does **not** result in an overall loss of energy from the organism?

A photosynthesis in a green plant

B respiration in an animal

C temperature control in humans

D the germination of seeds

15 When yeast cells respire anaerobically, which substance is used and which substances are produced?

	substance used	substances produced
A	alcohol	carbon dioxide and water
B	alcohol	lactic acid and water
C	sugar	alcohol and carbon dioxide
D	sugar	carbon dioxide and water

16 Which word equation represents aerobic respiration?

A carbon dioxide + water → glucose + oxygen

B carbon dioxide + oxygen → glucose

C glucose + oxygen → carbon dioxide + water

D glucose + oxygen → water

17 Which chamber of the heart has the thickest muscular walls?

A left atrium

B left ventricle

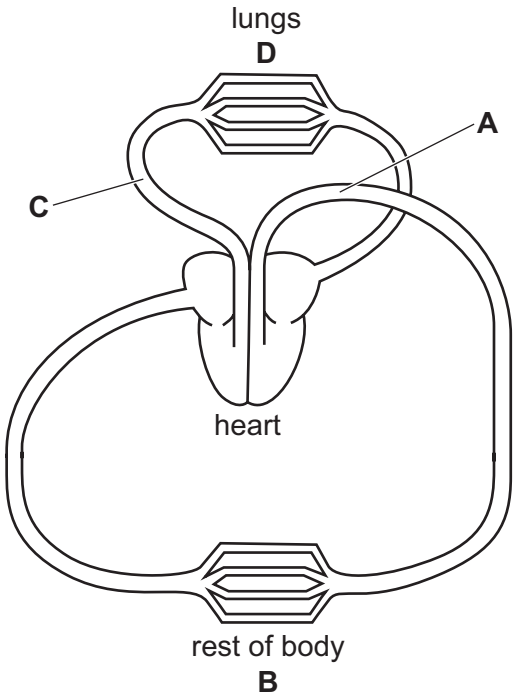
C right atrium

D right ventricle

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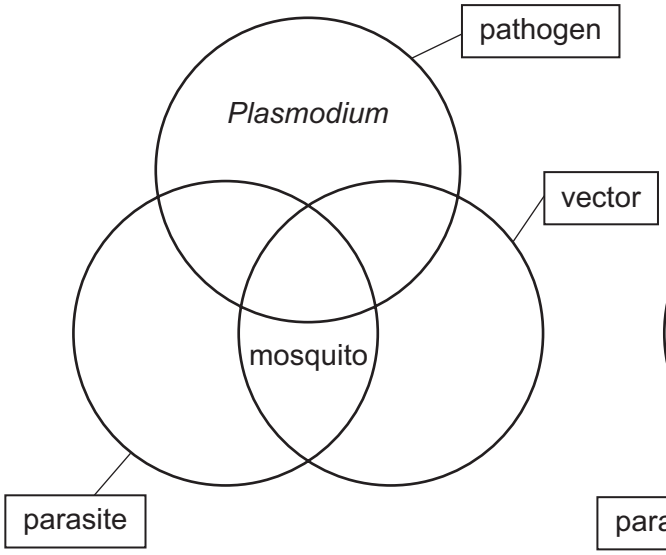
18 The diagram shows the human circulatory system.

At which point is the pressure of the blood circulating through the blood vessels the highest?

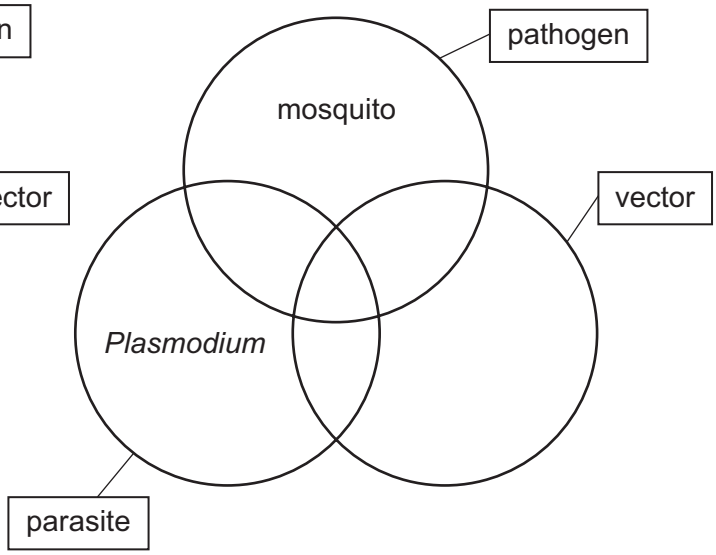


19 Which diagram describes the roles of a mosquito and *Plasmodium* in the disease malaria?

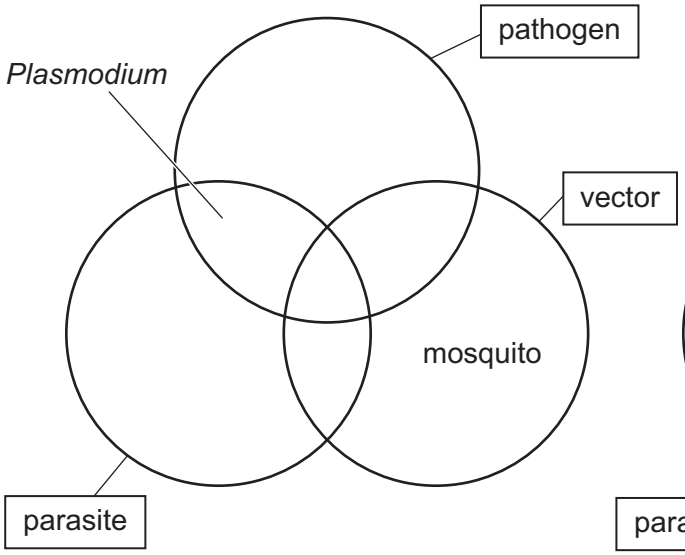
A



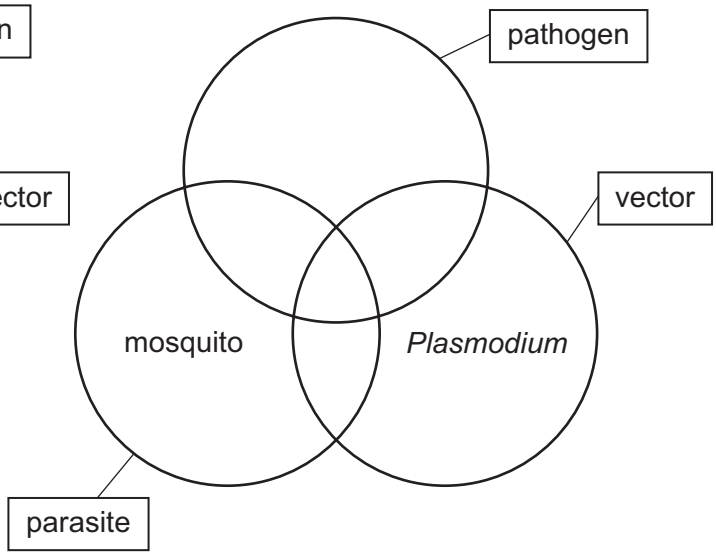
B



C

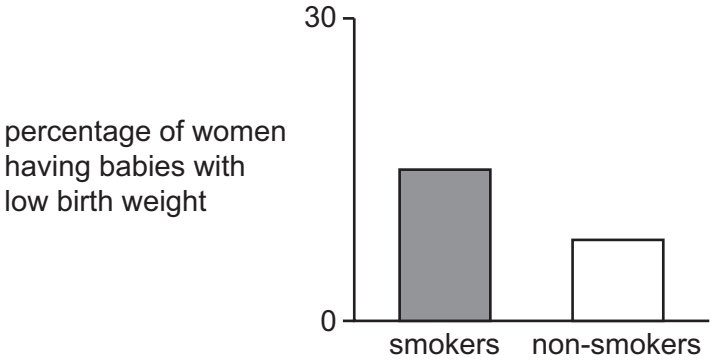


D



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20 The bar chart shows the percentage of women who had babies with low birth weight. Some of these women were smokers and some were non-smokers.



What is shown by the bar chart?

A More women smoke during pregnancy than do not.

B Smoking in pregnancy increases the risk of low birth weight.

C Smoking is bad for the health of a pregnant woman.

D Women whose babies have low birth weight are smokers.

21 Which disease might be treated successfully with an antibiotic?

A anaemia

B cholera

C HIV

D malaria

22 When babies are born, they have some passive immunity.

Which conditions are needed for passive immunity to develop?

A Antibodies produced by the mother have crossed the placenta.

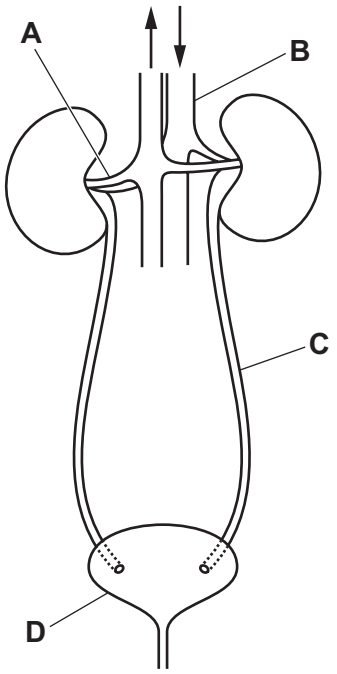
B The baby has developed in a very sterile environment.

C The baby has not yet been vaccinated or exposed to disease.

D The mother's diet is good enough for the baby to produce its own antibodies.

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23 In which structure is there a fluid with a low concentration of urea?



24 A person blinks when an insect flies into their eye.

What explains this reflex action?

A muscles in the eyelid cause the eye to blink → impulses are sent down the motor neurones → relay neurones → sensory neurones → receptor cells in the cornea detect the insect

B muscles in the eyelid cause the eye to blink → impulses are sent down the sensory neurones → relay neurones → motor neurones → receptor cells in the retina detect the insect

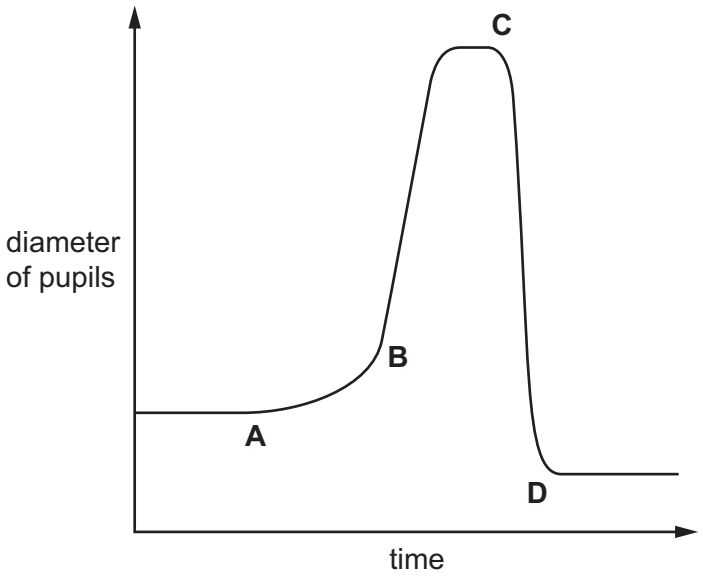
C receptor cells in the retina detect the insect → impulses are sent down the relay neurones → sensory neurones → motor neurones → muscles in the eyelid cause the eye to blink

D receptor cells in the cornea detect the insect → impulses are sent down sensory neurones → relay neurones → motor neurones → muscles in the eyelid cause the eye to blink

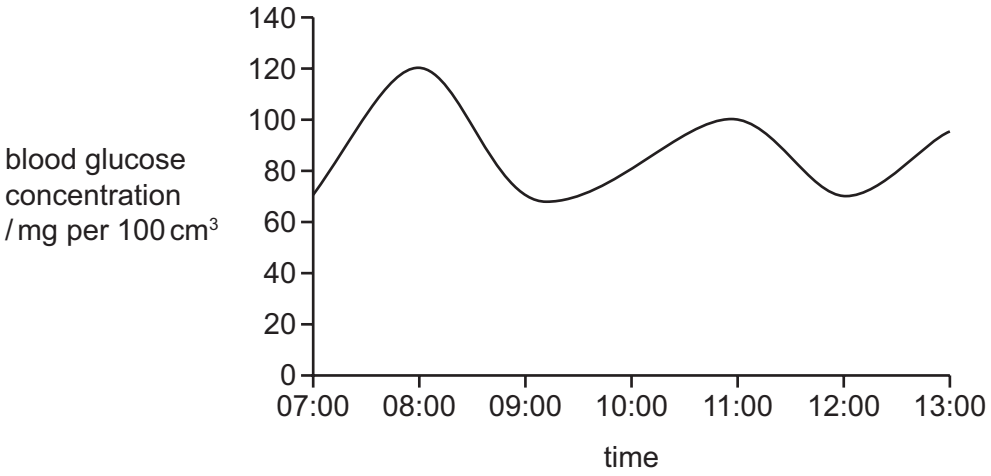
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25 The graph shows changes in the diameter of a person's pupils while outdoors on a sunny day.

At which time did the person take off their sunglasses?



26 The graph shows the blood glucose concentration for a person in the hours after eating breakfast at 07:00.



Which level of blood glucose concentration is approximately the set point?

A 70 mg / cm^3

B 80 mg / cm^3

C 100 mg / cm^3

D 120 mg / cm^3

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27 Which hormone causes blood glucose concentration to be lowered?

A adrenaline

B glucagon

C insulin

D testosterone

28 Which statement about auxin is correct?

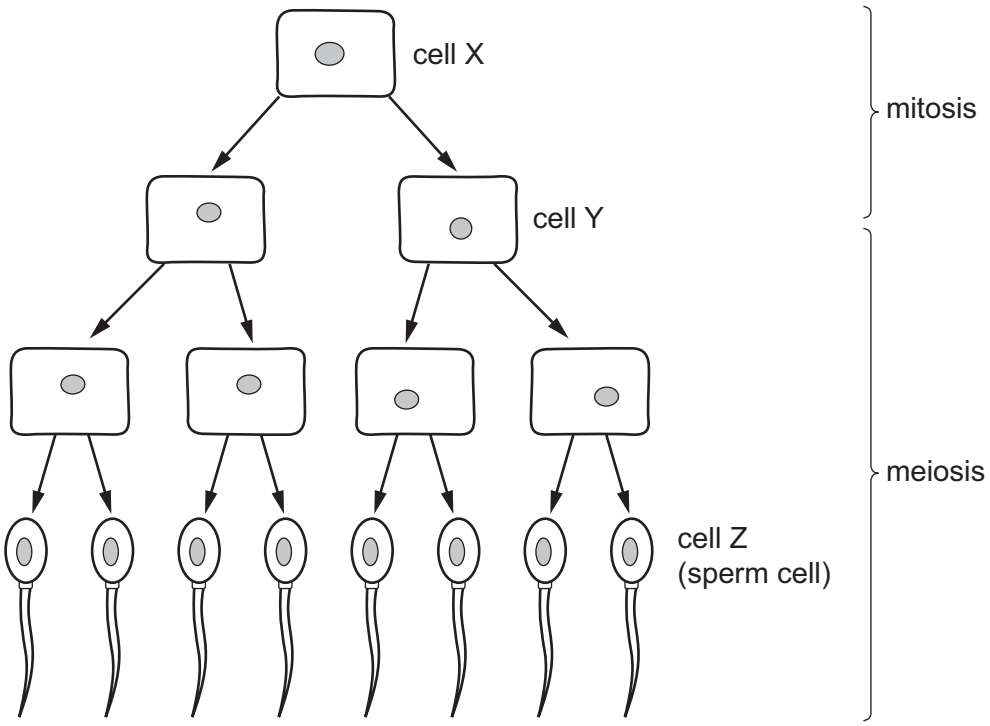
A Auxin is equally distributed in the plant in response to gravity and light.

B Auxin inhibits cell elongation.

C Auxin is made in the plant stem.

D Auxin spreads through the plant from the shoot tip.

29 The diagram shows some stages in cell division in a fruit fly.



Cell X contains 8 chromosomes.

How many chromosomes are in cell Y and in cell Z?

	cell Y	cell Z
A	4	4
B	4	8
C	8	4
D	8	8

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30 Which statement applies to organisms that reproduce asexually?

A Offspring always grow to the same height.

B Offspring are genetically identical.

C Organisms only reproduce asexually during extreme conditions.

D Reproduction happens by the fusion of diploid nuclei.

31 What is the function of the sepals of most flowers?

A to attract insects

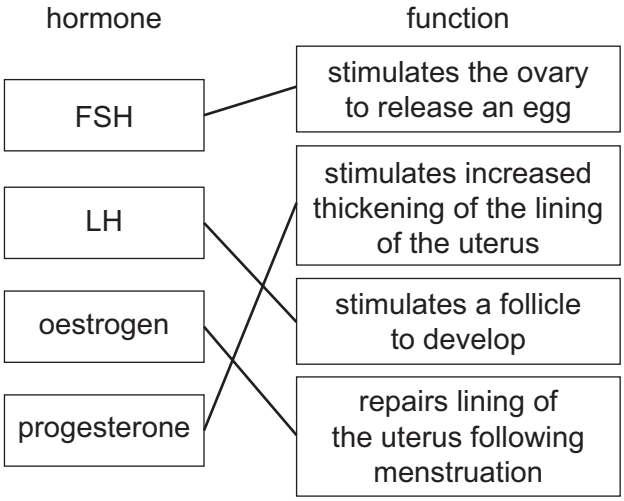
B to produce pollen

C to protect the flower buds

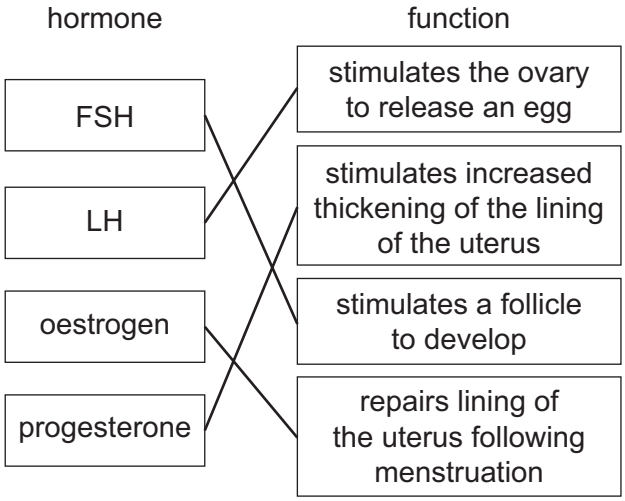
D to receive pollen

32 Which diagram matches the hormones with their functions in preparation for pregnancy?

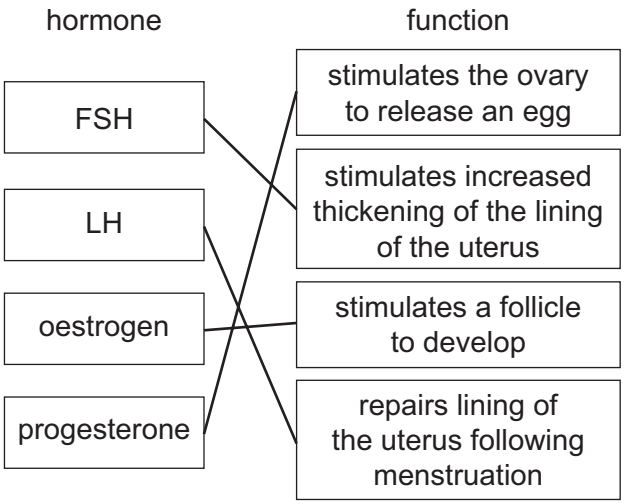
A



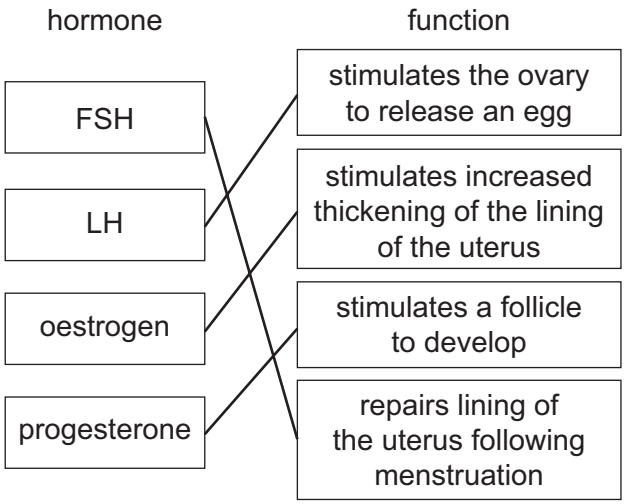
B



C



D



33 Which row describes the exchange of substances at the placenta?

	passing from mother to fetus	passing from fetus to mother
A	carbon dioxide, glucose and alcohol	oxygen and urea
B	carbon dioxide, nicotine and glucose	oxygen and urea
C	oxygen and urea	carbon dioxide and glucose
D	oxygen, glucose and antibodies	carbon dioxide and urea

34 In a strand of DNA containing 100 nucleotide pairs, 46 nucleotides contain the base A.

How many nucleotides in this DNA strand contain the base T?

A 23 **B** 46 **C** 54 **D** 154

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35 Two brothers had different blood groups. One was blood group A and the other was blood group B.

What can be concluded about their parents' blood group genotypes?

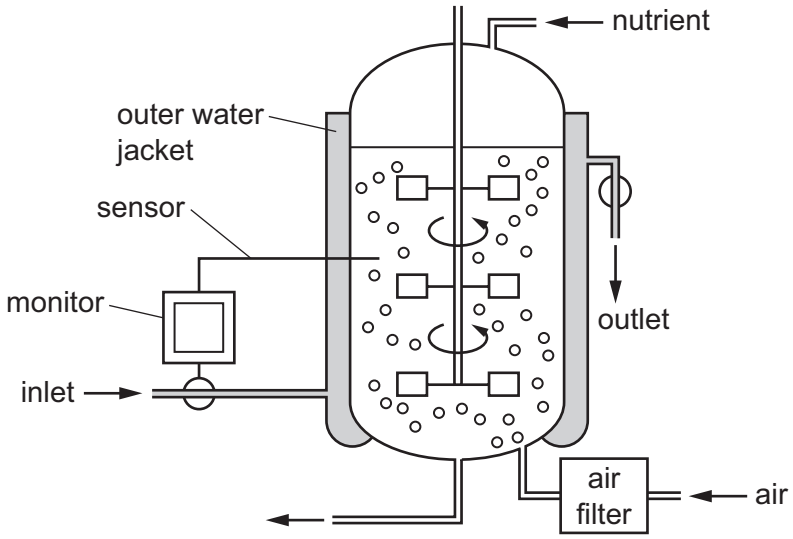
A Both of the parents must be heterozygous.

B Both of the parents must be homozygous.

C One parent (at least) must be heterozygous.

D One parent (at least) must be homozygous.

36 The diagram shows a fermenter that is used to grow the fungus *Penicillium*, to produce penicillin.



What is the function of the outer water jacket?

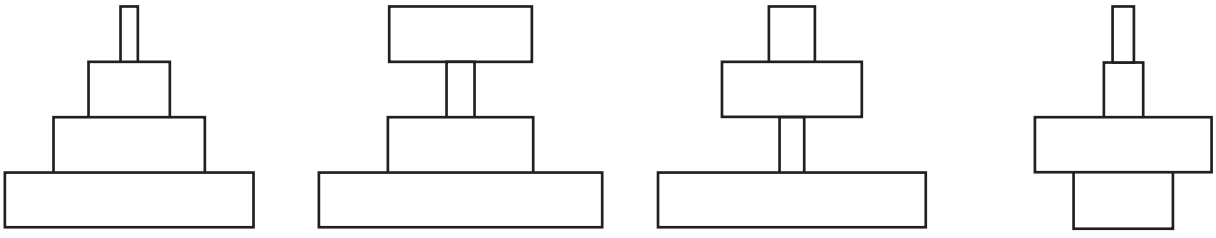
A to add extra nutrients for the *Penicillium*

B to maintain the fermenter at a constant pH

C to maintain the fermenter at a constant temperature

D to monitor the oxygen concentration in the fermenter

37 The diagram shows four ecological pyramids.



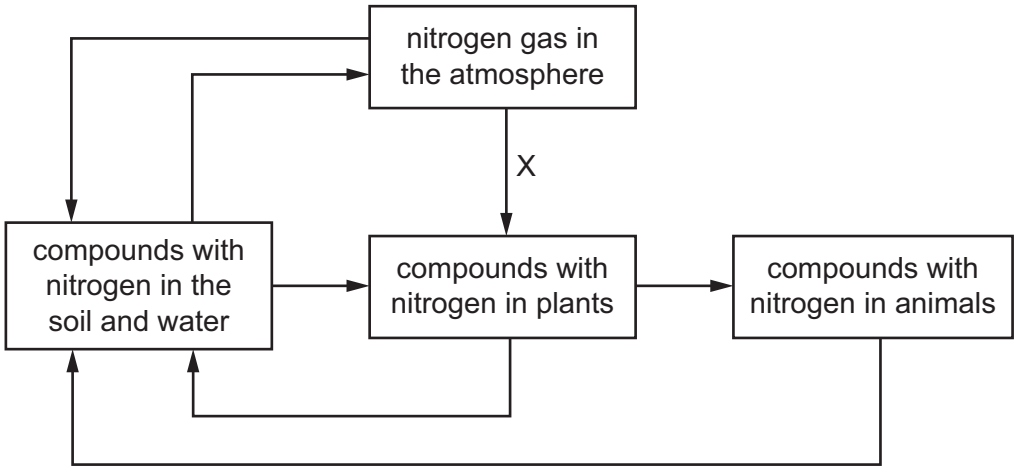
1 2 3 4

In a food chain, grass is eaten by cows. The cows have insects living on their skin. The insects are eaten by birds.

Which is the pyramid of biomass and which is the pyramid of numbers in this food chain?

	pyramid of biomass	pyramid of numbers
A	1	3
B	1	4
C	3	1
D	3	2

38 The diagram shows a simplified nitrogen cycle.



Which process in the cycle happens at stage X?

A decomposition

B denitrification

C nitrogen fixation

D nitrification

39 Which change would lead to an increase in biodiversity in an area?

A building a large number of blocks of family dwellings in a city

B increasing the number of cows in a pedigree herd

C replacing a forest with a large palm oil plantation

D stopping fishing in an area of sea for several years

40 Areas of tropical rainforests are often cut down and cleared. After cutting down the trees, the areas are normally burnt.

What are the effects of this activity?

	atmospheric carbon dioxide	number and variety of species	soil stability
A	decreases	decreases	increases
B	decreases	increases	decreases
C	increases	decreases	decreases
D	increases	decreases	increases

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