Cambridge Assessment International Education

Cambridge O Level

BIOLOGY **5090/11**

Paper 1 Multiple Choice **October/November 2025**

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.

1 What is a function of a plant cell wall?

A to control loss of ions from the cell

B to control movement of glucose into the cell

C to prevent evaporation of water from the cell

D to prevent the cell bursting when water enters

2 The international system for naming organisms is the binomial system.

Which **two** parts form the scientific name?

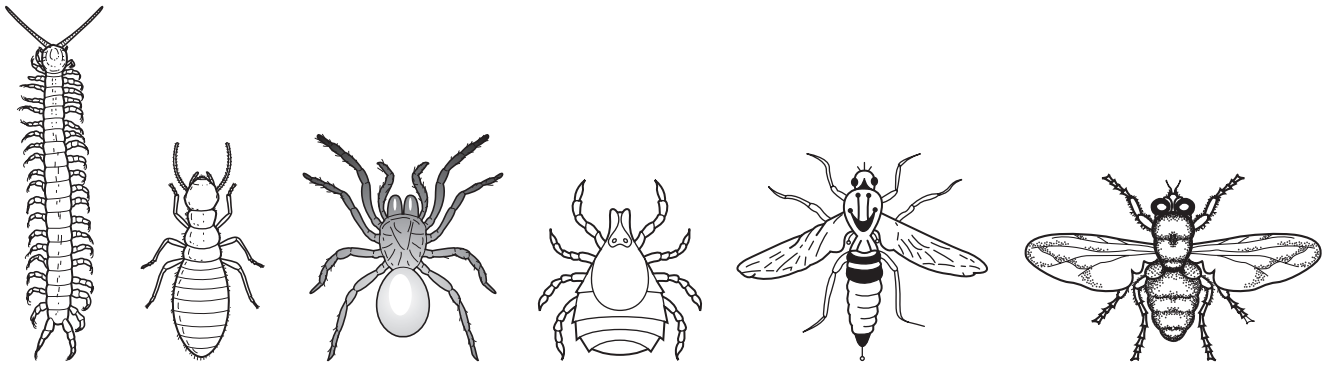
A kingdom and genus

B genus and species

C species and variety

D variety and kingdom

3 A student draws six different arthropods found in woodland.



1 2 3 4 5 6

When constructing a dichotomous key, which question could be used to separate arthropods 2, 5 and 6 from arthropods 1, 3 and 4?

A Does it have a segmented body?

B Does it have antennae?

C Does it have six legs?

D Does it have wings?

4 Contact lenses are placed on the surface of the eye to correct problems with vision.

One type of contact lens is partially permeable and is normally stored in a sterile sodium chloride solution.

The sodium chloride solution has the same concentration as the fluid that covers the surface of the eye.

A person makes a mistake and stores their contact lenses in distilled water rather than sodium chloride solution.

They then place a contact lens on the surface of their eye.

Which pair of statements describe what then happens?

1 Water from the eye fluid enters the contact lens by osmosis.

2 Water leaves the contact lens and enters the eye fluid by osmosis.

3 The contact lens shrinks.

4 The contact lens swells.

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

5 Which process involves the movement of molecules against a concentration gradient?

A active transport

B diffusion

C osmosis

D transpiration

6 Many reactions in cells are dependent on enzyme activity.

Which statement about enzymes is **not** correct?

A They are protein molecules.

B They catalyse biological reactions.

C They remain unchanged at the end of a reaction.

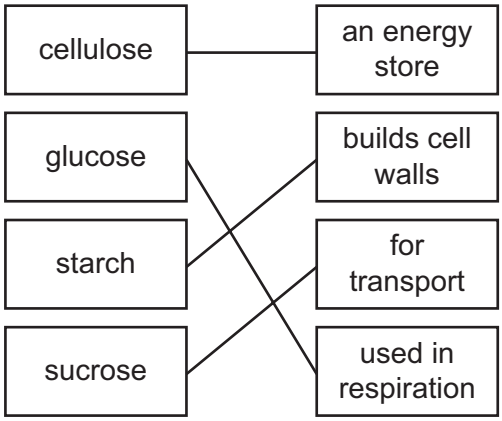
D They have active sites which are the same shape as their substrate molecules.

7 Which changes occur in the air spaces of a green leaf on a sunny day?

	carbon dioxide concentration	oxygen concentration
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

8 Which diagram correctly links the carbohydrates made as a result of photosynthesis with their uses?

A



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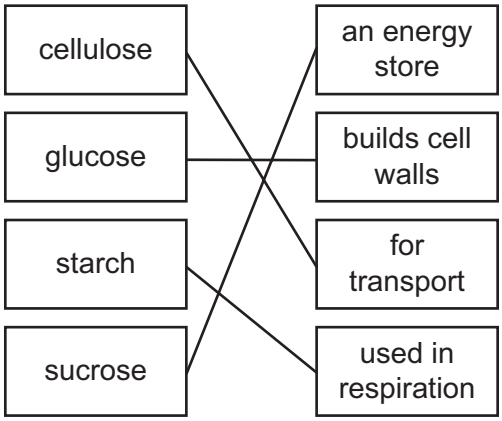

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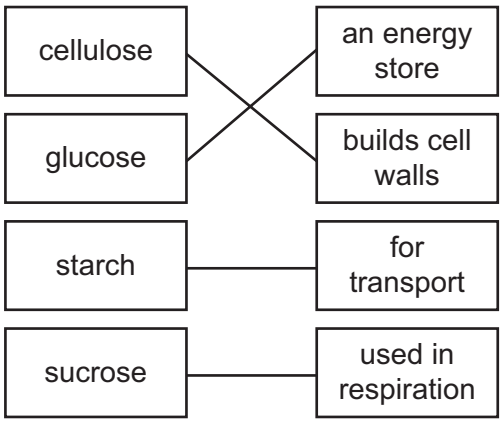

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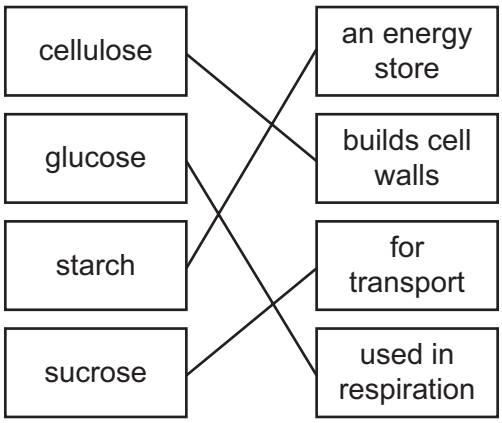
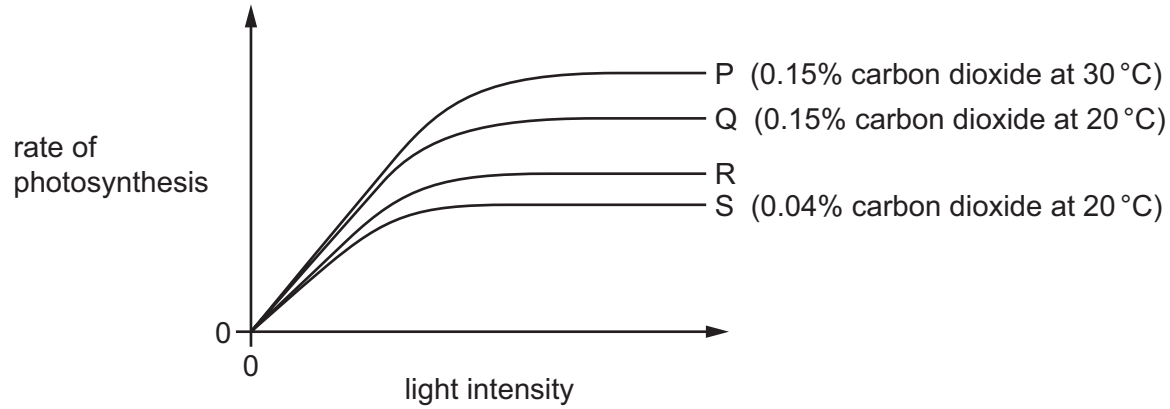


9 An investigation is carried out on the rate of photosynthesis in different environmental conditions.

The graph shows the results.



Which conditions could have produced the results for curve R?

	percentage carbon dioxide in air	environmental temperature / °C
A	0.004	20
B	0.04	30
C	0.4	20
D	4.0	30

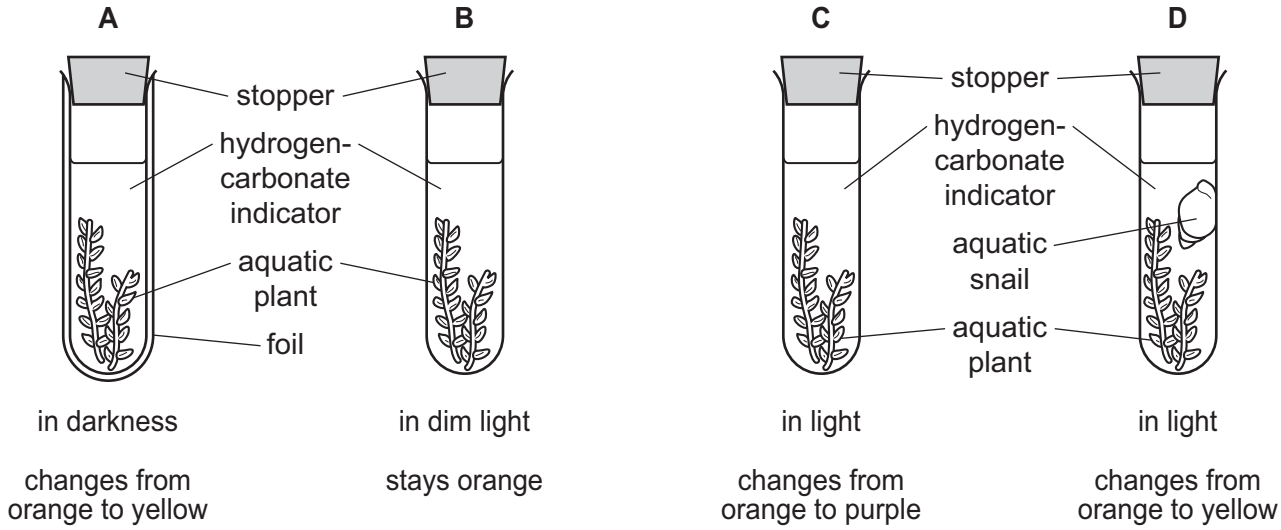
10 Hydrogencarbonate indicator changes colour according to the concentration of carbon dioxide present.

The table shows these changes.

colour of hydrogencarbonate indicator	concentration of carbon dioxide
orange	atmospheric carbon dioxide concentration
yellow	higher than atmospheric carbon dioxide concentration
purple	lower than atmospheric carbon dioxide concentration

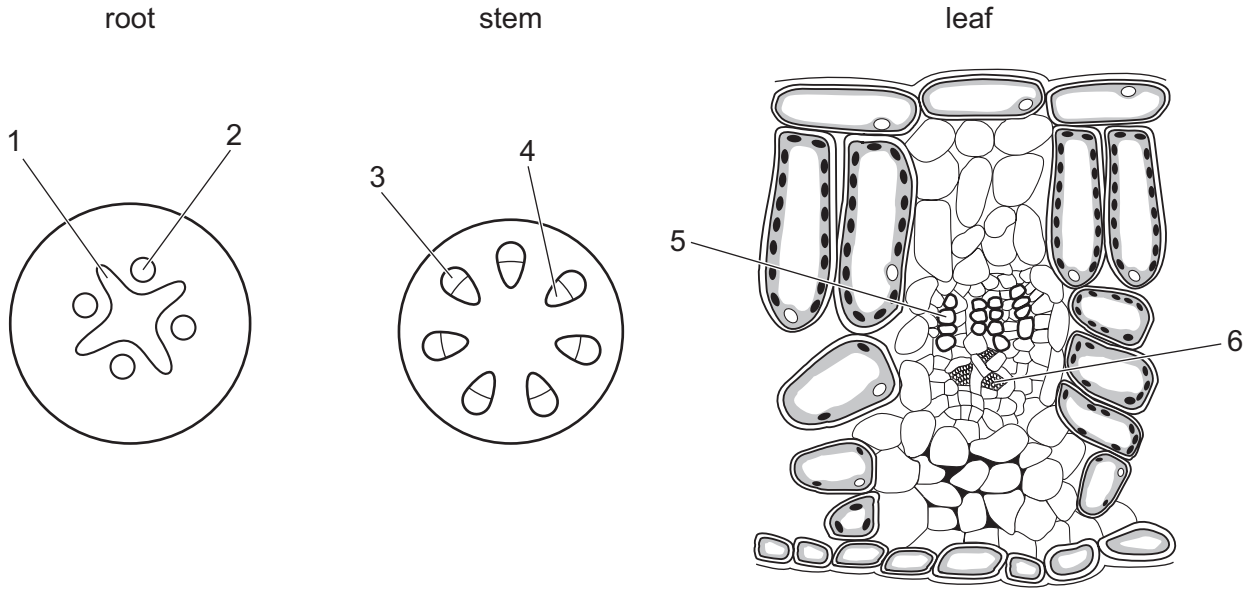
Four test-tubes were set up under different conditions. The colour of hydrogencarbonate indicator in each test-tube at the start of the experiment and after one hour is also shown.

Which test-tube shows that the rates of photosynthesis and respiration are the same?



11 The diagrams show sections through a dicotyledonous root, stem and leaf.

The vascular tissues are labelled using numbers 1–6.



The ends of pieces of roots, stems and leaf stalks are placed in water containing a red dye.

After several hours, the coloured water has travelled along some of the vascular tissues.

Which vascular tissues appear red?

	root	stem	leaf
A	1	3	6
B	1	4	5
C	2	4	6
D	2	3	5

12 Which nutrient deficiency causes scurvy?

A calcium

B iron

C vitamin C

D vitamin D

13 Which sets of muscles contract to cause the body to breathe **in**?

A diaphragm and external intercostal muscles

B diaphragm and internal intercostal muscles

C diaphragm muscles only

D external and internal intercostal muscles

14 Which processes use energy obtained from respiration?

1 contraction of intercostal muscles during breathing

2 nitrate ions entering a root hair cell against the concentration gradient

3 oxygen moving from the lungs into blood capillaries

4 production of antibodies by lymphocytes

5 water entering a bacterial cell by osmosis

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

15 During vigorous exercise, lactic acid builds up in the muscles. Blood leaving these muscles will have a high concentration of lactic acid.

Which process removes **most** of the lactic acid from the blood?

A It is broken down in the liver.

B It is excreted during sweating.

C It is expired during faster breathing.

D It is oxidised to release energy in muscles.

16 The table shows the mean rate of blood flow through some blood vessels.

blood vessel	mean rate of blood flow / mm per s
W	0.4
X	5.0
Y	15.0
Z	1200.0

Which row correctly identifies the blood vessels?

	W	X	Y	Z
A	main artery	small artery	small vein	capillary
B	small vein	small artery	main artery	capillary
C	capillary	small vein	small artery	main artery
D	capillary	small artery	small vein	main artery

17 What happens during blood clotting?

A Insoluble fibrin is converted to soluble fibrinogen.

B Insoluble fibrinogen is converted to soluble fibrin.

C Soluble fibrin is converted to insoluble fibrinogen.

D Soluble fibrinogen is converted to insoluble fibrin.

18 Which statement explains the association between smoking tobacco and emphysema?

A Tobacco smoke can cause mutations in lung cells.

B Tobacco smoke can lead to the breakdown of alveoli.

C Tobacco smoke may reduce the growth of a fetus.

D Tobacco smoke reduces the amount of oxygen carried by red blood cells.

19 What prevents pathogens from entering the human body?

A antibodies and lymphocytes

B antigens and memory cells

C red blood cells and lymphocytes

D stomach acid and mucus

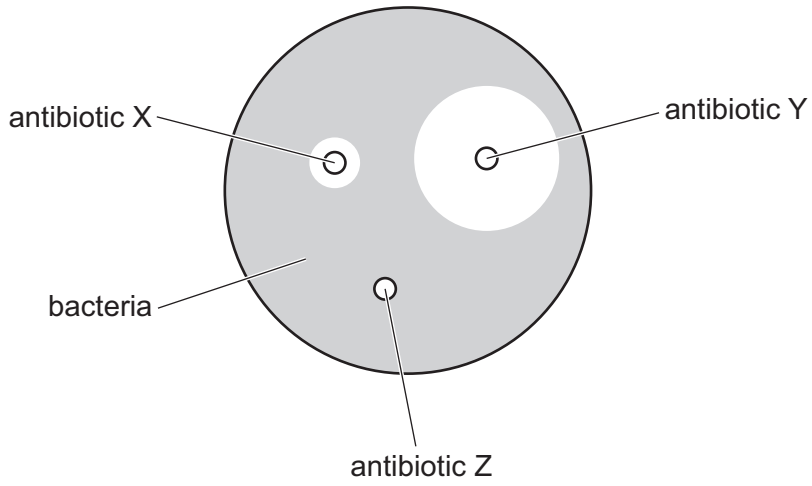
20 A doctor obtains some bacteria from an infected patient.

The bacteria are grown in a Petri dish containing nutrient agar jelly.

The bacteria produce a grey coating on the agar jelly.

The doctor then adds three paper discs, each containing a different antibiotic.

The diagram shows the Petri dish 24 hours later.



What can the doctor conclude from these results?

A The bacteria causing this patient's infection are **not** resistant to antibiotic Y.

B Antibiotic X would be more effective than antibiotic Y for treating this patient's infection.

C This patient is resistant to antibiotic Z.

D Antibiotic X is the **least** effective treatment for this patient's infection.

21 The table shows the concentration of five substances in the blood entering the kidney, in fluid entering the nephron and in the urine.

substance	concentration / mg per dm^3		
	blood entering the kidney	fluid entering the nephron	urine
urea	0.4	20.0	20.0
glucose	1.5	1.5	0.0
amino acids	0.8	0.8	0.0
ions	8.0	8.0	16.5
protein	82.0	0.0	0.0

Which substances are totally reabsorbed into the blood from the nephron?

A amino acids and glucose

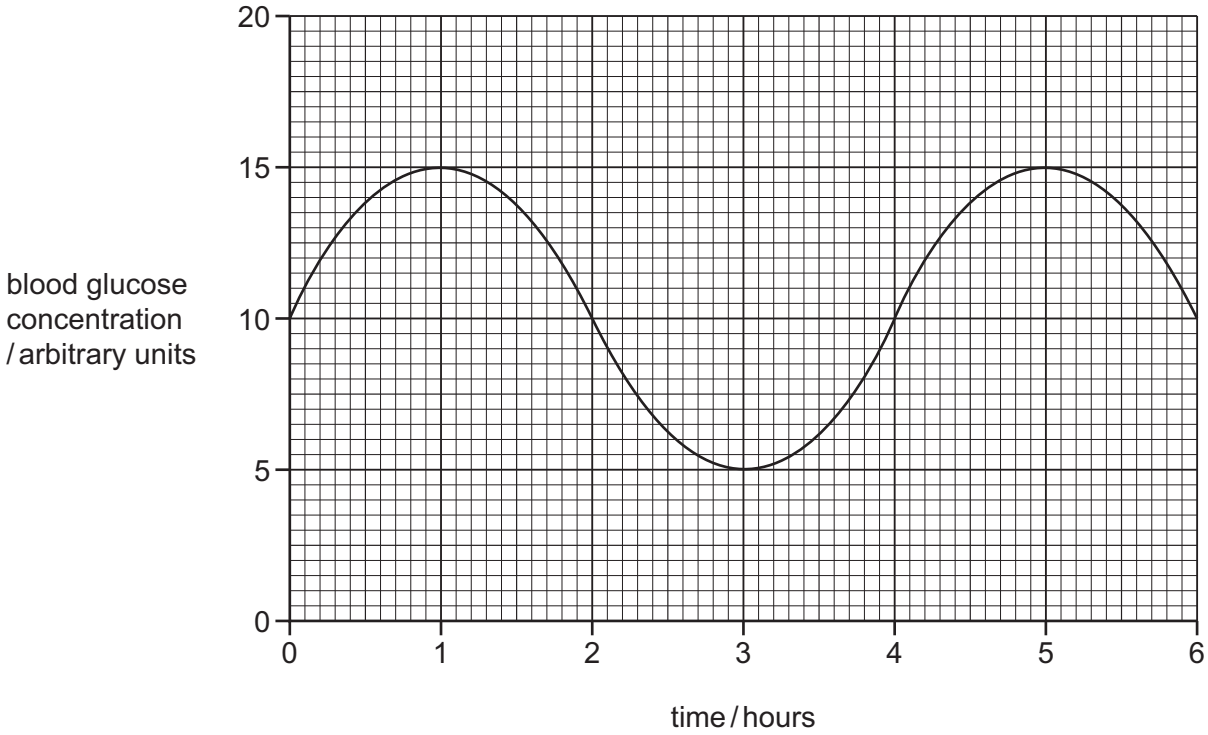
B glucose and ions

C protein and amino acids

D protein and glucose

[Turn over

22 The graph shows blood glucose concentration over 6 hours in a day.



What is the set point for blood glucose concentration shown by this graph?

A 5 arbitrary units

B 10 arbitrary units

C 15 arbitrary units

D 20 arbitrary units

23 Which hormone can be used to treat Type 1 diabetes?

A adrenaline

B oestrogen

C glucagon

D insulin

24 An athlete's resting body temperature is 37.0 °C.

After vigorous exercise for 30 minutes, the athlete's body temperature rises to 38.6 °C.

The athlete rests for 10 minutes.

After resting, the athlete's body temperature is measured again and is 37.2 °C.

Which events take place in the athlete's body during the 10-minute rest to lower their body temperature?

	arterioles near the surface of the skin	heat energy is lost through
A	contract	evaporation of sweat
B	contract	shivering
C	dilate	evaporation of sweat
D	dilate	shivering

25 Which endocrine gland produces follicle-stimulating hormone?

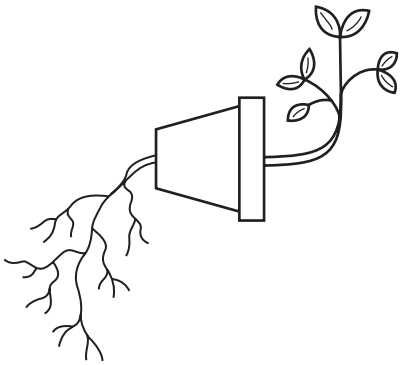
A adrenal gland

B ovary

C pancreas

D pituitary gland

26 The diagram shows a plant grown on its side without light.



Which row explains the responses shown by the roots and the shoot?

	roots	shoot
A	positive gravitropism	positive phototropism
B	negative phototropism	positive phototropism
C	positive gravitropism	negative gravitropism
D	negative gravitropism	positive gravitropism

27 The tips of growing shoots of a plant are cut off and placed on small blocks of jelly which contain **no** auxin.

Small pieces of impermeable clear glass are placed in some of the jelly blocks, as shown in diagram X. Some of the shoot tips are divided by impermeable clear glass pieces, as shown in diagram Y.

The tips are left on the small blocks of jelly with light coming from **one** side only.

After 12 hours, the number of arbitrary units of auxin is measured in each of the jelly blocks and the means, shown in the diagrams, are calculated.

diagram X

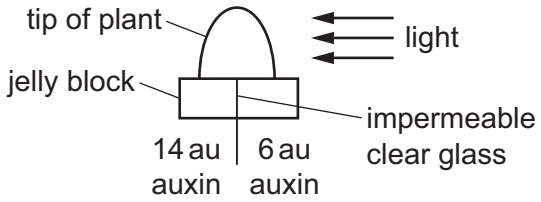
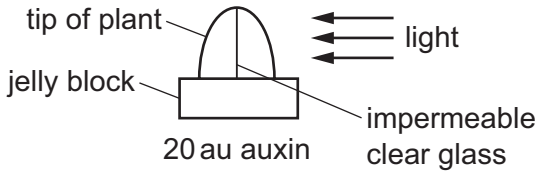


diagram Y



A student wrote down some conclusions from the results.

1 Auxin moves downwards out of the shoot tip.

2 The distribution of auxin in a shoot tip is affected by light intensity.

3 Some auxin is destroyed by light.

4 Auxin moves from areas of more light to areas of less light.

Which of the student's conclusions are correct?

A 1, 2, 3 and 4

B 1, 2 and 4 only

C 1 and 3 only

D 2, 3 and 4 only

28 Which part of the flower develops into a fruit?

A ovary

B ovule

C sepal

D stamen

29 Chromosomes, DNA molecules and genes are pieces of inherited material with different sizes.

Which statement describes the relationship between these pieces of inherited material?

A A chromosome is larger than a gene.

B A gene is larger than a chromosome.

C Multiple chromosomes make up a DNA molecule.

D Multiple DNA molecules make up a gene.

30 During the division of a nucleus by meiosis, changes can happen that produce a gamete with an abnormal number of genes or an abnormal number of chromosomes.

Which change can result in a child having Down's syndrome?

A a gamete with one extra chromosome

B a gamete with one less gene

C a gamete with one less chromosome

D a gamete with one extra gene

31 Which row shows possible effects of natural selection?

	natural selection can cause mutations to occur	natural selection can lead to the extinction of a species
A	no	no
B	no	yes
C	yes	no
D	yes	yes

32 All organisms in the same species show variation.

Some features of different types of variation are listed.

1 an example is body mass

2 has a limited number of possible forms with **no** intermediates

3 has any value from a minimum to a maximum

4 is unaffected by the environment

5 is usually caused by genes only

Which statements refer to discontinuous variation?

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

33 Bacteria reproduce by splitting into two. This can happen every 20 minutes in ideal conditions of sufficient water, food and at a warm temperature. Small numbers of bacteria do **not** usually make people ill.

When a student takes her lunch out of the fridge, it contains 4 bacteria. After 2 hours at room temperature, it contains 256 bacteria.

From the time that the food is taken out of the fridge, how long will it take before there are 16 384 bacteria in her food?

A 2 hours **B** 3 hours **C** 4 hours **D** 5 hours

34 What could be an advantage of genetically modifying crop plants?

A increased biodiversity in an area

B increased chance that the inserted genes will transfer to wild species

C increased nutritional content of crop plants

D increased use of pesticides

35 An investigation is done to find out how effective different biological washing powders are at digesting protein.

Four equal-sized cubes of cooked egg white (protein) are cut and their masses measured.

The cubes of protein are then placed in test-tubes containing 10 cm^3 of solutions of four different biological washing powders of the same concentration. The cubes of protein are left in the solutions at room temperature.

After 24 hours, the cubes of protein are removed from the test-tubes and their masses remeasured.

biological washing powder	mass of cube of protein / g	
	start of investigation	end of investigation
1	10.2	8.3
2	10.2	7.9
3	10.4	8.4
4	10.3	8.5

What is the percentage decrease in mass of the cube of protein in the **most** effective washing powder given to **one** decimal place?

A 17.5% **B** 19.2% **C** 22.5% **D** 29.1%

36 Which enzyme is added to fruit to aid juice production?

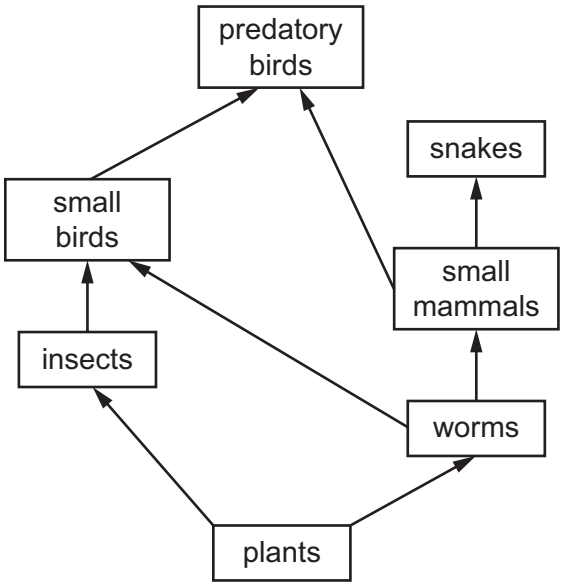
A lactase

B lipase

C pectinase

D protease

37 The diagram shows a food web.



Which organisms in this food web are primary consumers?

A insects

B plants

C small birds

D small mammals

38 The processes listed occur in living organisms in a food chain.

1 excretion

2 photosynthesis

3 respiration

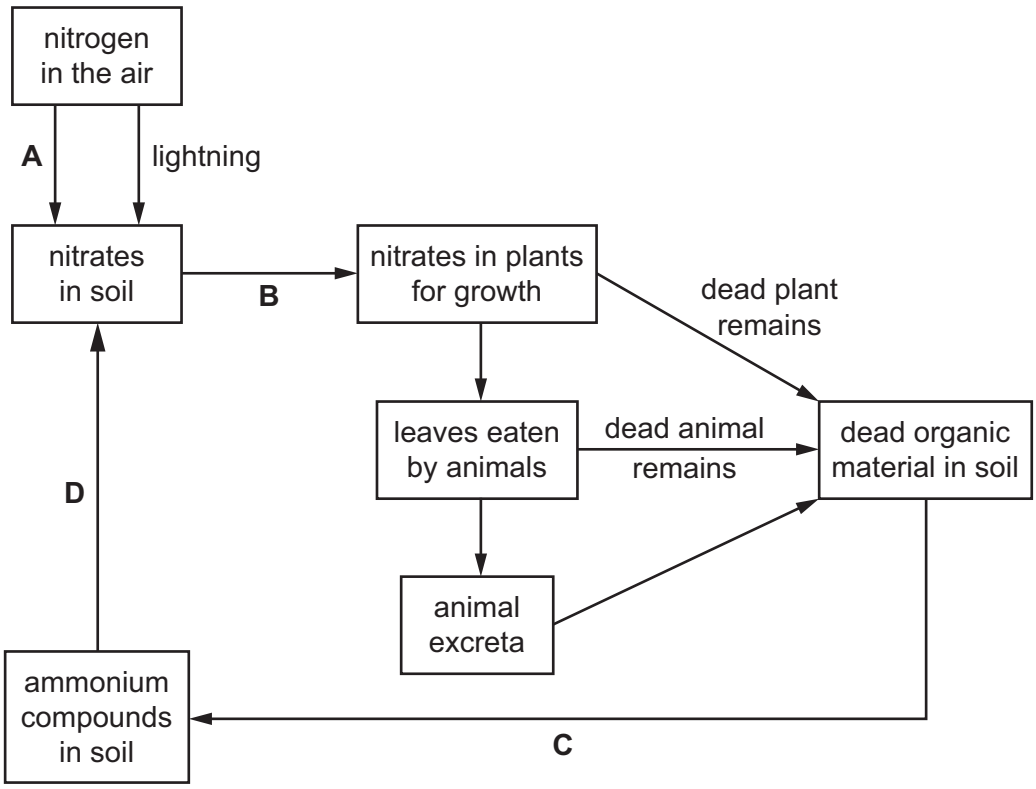
Which processes would result in a loss of energy from a food chain?

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

39 Trees in a forest need a constant supply of nitrates to continue growing.

The diagram shows some of the stages of the nitrogen cycle that provide the necessary nitrates.

Which stage in this cycle is **not** brought about by living bacteria?



40 What is a method of conserving fish stocks?

A fishing in protected areas

B fishing with nets with a small mesh size

C having closed fishing seasons

D only catching young, immature fish

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