UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

BIOLOGY **9700/11**

Paper 1 Multiple Choice **October/November 2012**
1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

4038084388

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

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 separate Answer Sheet.

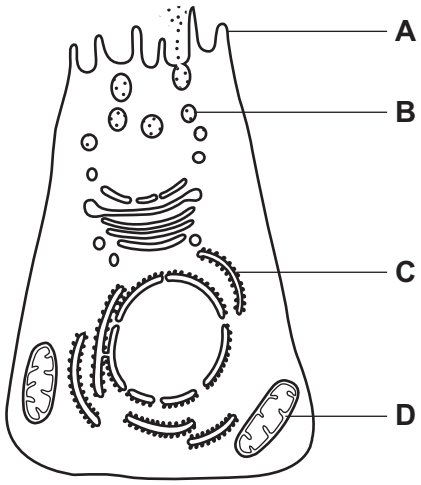
Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

This document consists of **16** printed pages.

1 The diagram is a drawing from an electron micrograph of a cell.

Which structure indicates that this is a secretory cell?



2 Four students were asked to suggest a set of four labels to add to a plan diagram of a transverse section of a dicotyledonous leaf.

Which student, **A**, **B**, **C** or **D**, suggested a correct set of labels?

	label 1	label 2	label 3	label 4
A	lower epidermis	phloem	spongy mesophyll	palisade mesophyll
B	phloem sieve tubes	upper epidermis	spongy mesophyll	xylem vessel elements
C	spongy mesophyll	endodermis	xylem vessel elements	palisade mesophyll
D	waxy cuticle	xylem	companion cells	spongy mesophyll

3 Which of the following are found in both eukaryotic and prokaryotic cells?

1 cellulose

2 deoxyribose

3 lipids

4 ribose

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

4 Which row correctly identifies all the locations of ribosomes in a eukaryotic cell?

	free in cytoplasm	in mitochondria	attached to ER	attached to nuclear envelope	in nucleus
A	✓	✓	✓	✓	✓
B	✓	✗	✓	✗	✗
C	✗	✓	✗	✓	✓
D	✗	✗	✓	✓	✗

key
✓ = present
✗ = absent

5 Which statement about the light microscope is correct?

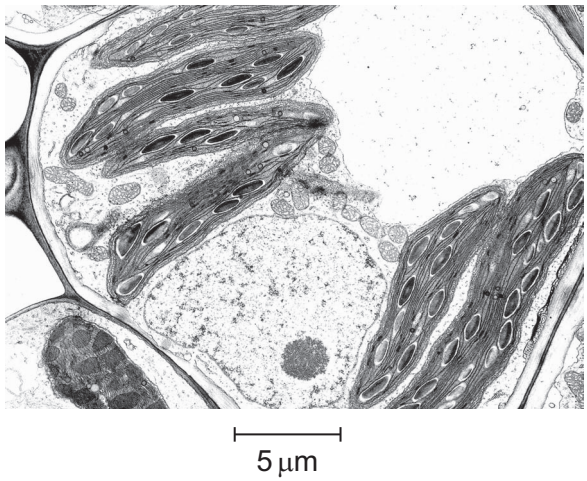
A As the smallest distance to see two points as distinct separate points decreases, the resolution also decreases.

B If the resolution is 220 nm, then a bacterium 0.2 μm in diameter will not be visible.

C If the wavelength of light is 600 nm, then two membranes 300 nm apart will be visible as two distinct membranes.

D Using visible light of a longer wavelength, such as red light, will improve the resolution.

6 The diagram shows the ultrastructure of a cell from a dicotyledonous leaf.



What is the magnification?

A ×280 **B** ×2800 **C** ×3570 **D** ×7000

7 Four students, 1, 2, 3 and 4, each carried out the reducing sugar test and the non-reducing sugar test on a sucrose solution.

Which observations demonstrate that they carried out the correct tests?

student	observations for reducing sugar test	observations for non-reducing sugar test
1	no colour change	changed colour
2	no colour change	red
3	blue	changed colour
4	blue	red

A 2 only

B 3 only

C 4 only

D 1, 2, 3 and 4

8 Which row is correct for each of the molecules?

	β-glucose	collagen	haemoglobin	sucrose
A	hexose sugar with a molecular formula $C_6H_{12}O_6$	structural function, found in tendons and blood vessel walls	contains the elements carbon, hydrogen, iron, nitrogen and sulfur	formed by releasing a molecule of water in a hydrolysis reaction
B	repeating monomer of the polysaccharide, cellulose	a molecule consists of three polypeptide chains, each containing a prosthetic group	each non-protein haem group contains a central iron ion	composed of two monosaccharides linked by a glycosidic bond
C	monomer of the 1,6 glycosidic branches of the polysaccharide, glycogen	molecules lie parallel to each other, with cross-links and staggered ends	has two identical α chains and two identical β chains	formed by condensation of two identical monosaccharides
D	in its ring structure, the hydroxyl group of carbon atom 1 is above the plane of the ring	polypeptide chains interact to produce a fibrous protein	has all four levels of protein structure and at least four types of bond	digestion yields glucose and fructose in equal proportions

9 Which of the bonds will be last to break as the temperature of an enzyme is increased?

A covalent

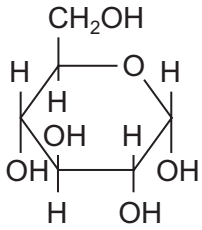
B hydrogen

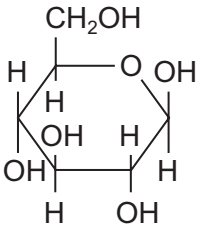
C hydrophobic interactions

D ionic

10 Which pair of monosaccharides form sucrose?

A





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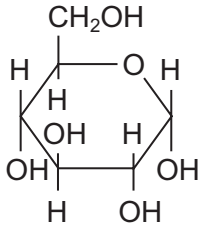

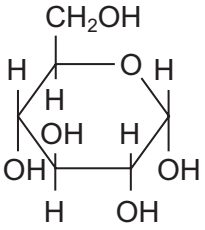

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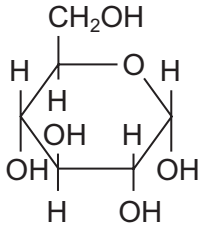

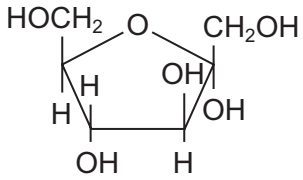

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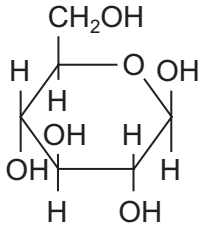
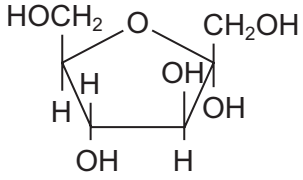




11 Which statement about triglycerides is correct?

A They are made up of three fatty acids combined with glycogen.

B They are more saturated with hydrogen compared with phospholipids.

C They form a bilayer in the membranes of cells.

D They have a lower ratio of oxygen to carbon compared with carbohydrates.

12 Which molecules contain C=O bonds?

1 amino acids

2 fatty acids

3 glycerol

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

13 Which of the statements about polysaccharides can be used to describe both amylose and glycogen?

1 contains 1,4 glycosidic bonds

2 contains 1,6 glycosidic bonds

3 polymer of α–glucose

A 1 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

14 What is the effect of an enzyme in an enzyme-catalysed reaction?

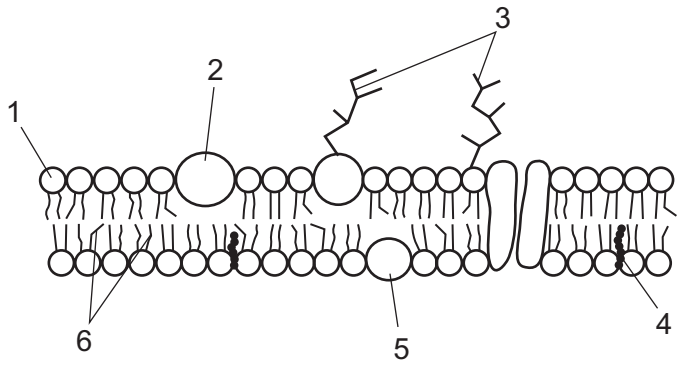
A decreases both the activation energy and the energy yield

B decreases the activation energy and has no effect on the energy yield

C increases both the activation energy and the energy yield

D increases the energy yield and decreases the activation energy

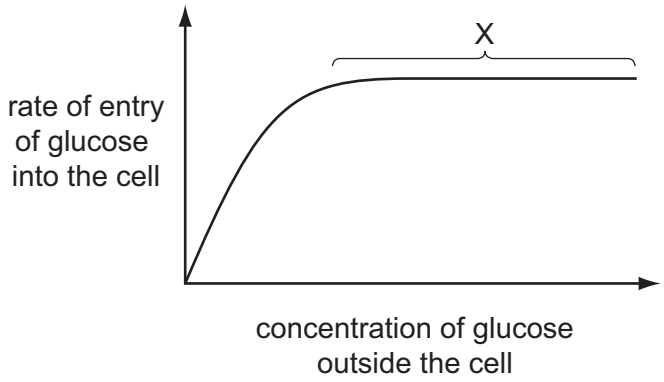
15 The diagram represents the fluid mosaic model of membrane structure.



Which two components contribute to the fluidity of the membrane?

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

16 The graph shows how the rate of entry of glucose into a cell changes as the concentration of glucose outside the cell changes.



What is the cause of the plateau at X?

A All the carrier proteins are saturated with glucose.

B The carrier proteins are denatured and no longer able to function.

C The cell has used up its supply of ATP.

D The concentrations of glucose inside and outside the cell are equal.

17 A molecule can enter a cell by two different passive processes.

Which process would increase the rate at which this molecule enters the cells?

A diffusion

B endocytosis

C facilitated diffusion

D osmosis

18 Which statement is **incorrect** for mitotic cell division?

A DNA is replicated semi-conservatively during mitosis.

B DNA is normally unchanged from one generation of cells to the next.

C The daughter cells have the potential to produce the same enzymes as the parent cell.

D The same quantity of DNA is distributed to the nuclei of two new cells.

19 The diagram shows the chromosomes of one cell which has been squashed during mitosis.

Which stage of mitosis is shown and what is the haploid chromosome number in this species?

	stage of mitosis	haploid chromosome number
A	anaphase	5
B	anaphase	10
C	metaphase	5
D	metaphase	10

20 What does the process of translation require?

A DNA, free nucleotide bases and mRNA

B DNA, mRNA and RNA polymerase

C mRNA, ribosomes and RNA polymerase

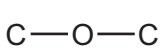
D mRNA, ribosomes and tRNA

21 Which features of DNA enable it to meet these requirements as a molecule of inheritance?

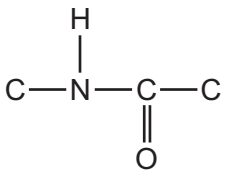
	requirement of DNA molecule			
	ability to remain stable	ability to contain information	ability to transfer information	ability to replicate
A	complementary base pairing	formation of mRNA for translation	sequence of nucleotides	sugar-phosphate backbone
B	formation of mRNA for translation	complementary base pairing	sugar-phosphate backbone	sequence of nucleotides
C	sequence of nucleotides	sugar-phosphate backbone	complementary base pairing	formation of mRNA for translation
D	sugar-phosphate backbone	sequence of nucleotides	formation of mRNA for translation	complementary base pairing

22 Which diagram shows the bond linking the individual units of a nucleic acid?

A



B



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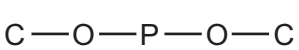

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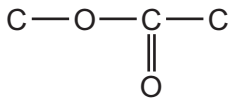


23 Which row correctly identifies xylem vessel elements and sieve tube elements?

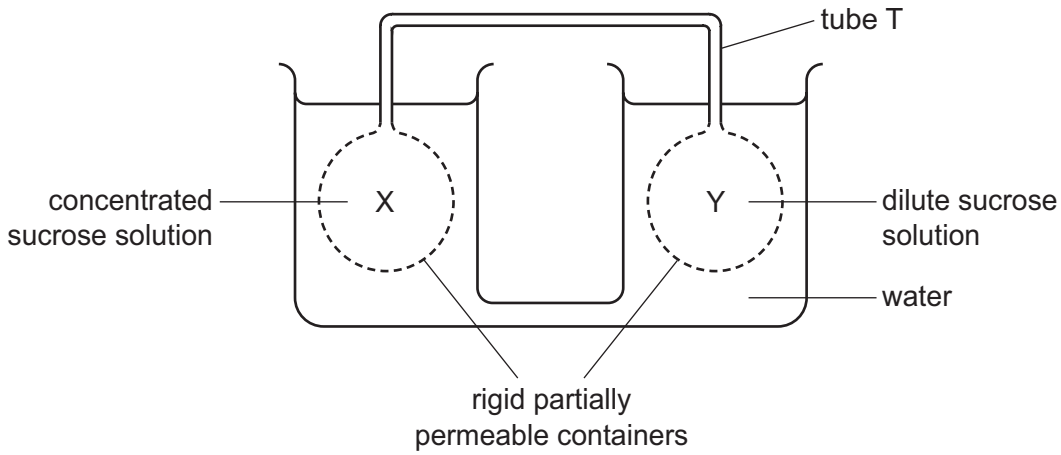
	xylem vessel element		sieve tube element	
	cytoplasm	nucleus	cytoplasm	nucleus
A	✓	✓	✗	✗
B	✗	✓	✗	✗
C	✗	✗	✓	✓
D	✗	✗	✓	✗

key

✓ = present

✗ = absent

24 The diagram shows a model which can be used to demonstrate mass flow.



X and Y are filled with sucrose solutions of different concentrations, causing water to move in or out of X and Y by osmosis or as a result of hydrostatic pressure. Sucrose solution then moves through tube T joining X and Y.

Which description is correct?

	water potential in X compared with Y	direction of movement of sucrose solution in tube T
A	less negative	from X to Y
B	less negative	from Y to X
C	more negative	from X to Y
D	more negative	from Y to X

25 Which of the following statements explain why a stem is both cut and connected to a potometer under water?

1 To prevent plasmolysis of xylem vessel elements

2 To prevent the collapse of xylem vessel elements

3 To prevent air entering xylem vessel elements

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

26 What happens during ventricular systole in a mammalian heart?

A aortic pressure increases

B atrioventricular valves open

C semilunar valves close

D ventricular pressure decreases

27 Which two statements about the Bohr effect are correct?

1 Increasing the partial pressure of oxygen increases the percentage of oxyhaemoglobin.

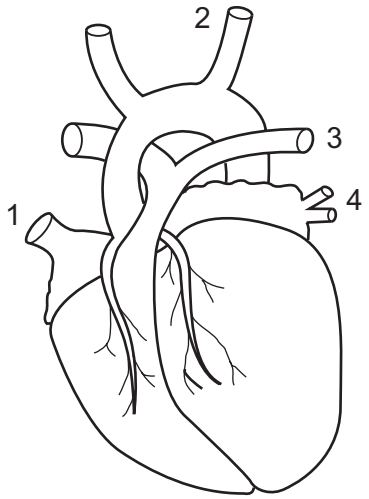
2 Decreasing the partial pressure of carbon dioxide decreases the percentage of oxyhaemoglobin.

3 Increasing the partial pressure of carbon dioxide shifts the dissociation curve of haemoglobin to the left.

4 In low concentrations of carbon dioxide haemoglobin has a high affinity for oxygen.

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

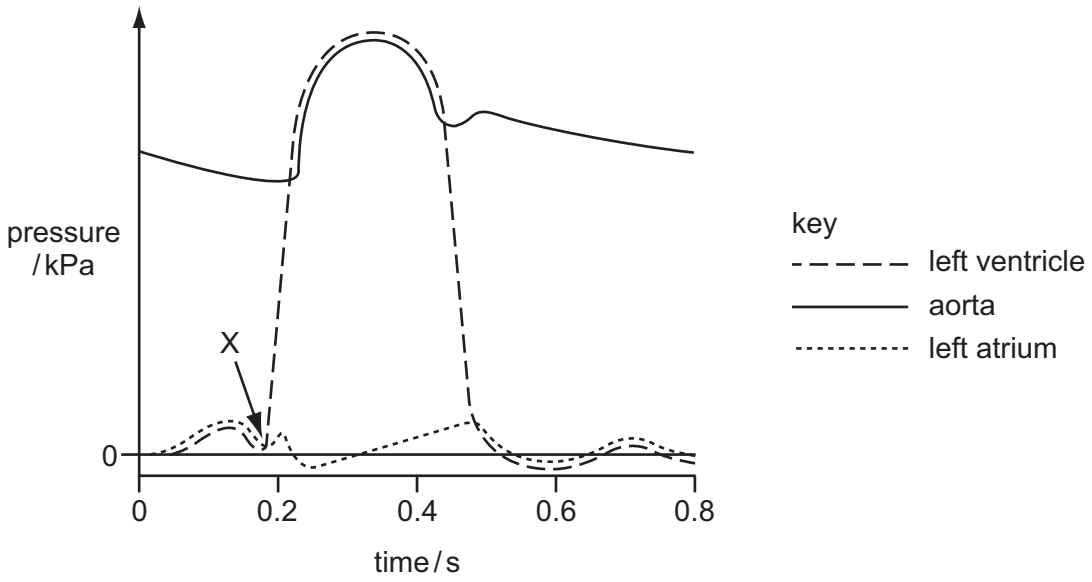
28 The diagram shows the heart and some of its blood vessels.



Which combination of numbers correctly identifies the blood vessels that supply blood to the heart and carry blood from the heart?

	to the heart	from the heart
A	1 and 2	3 and 4
B	2 and 3	1 and 4
C	3 and 4	1 and 2
D	4 and 1	2 and 3

29 The diagram shows pressure changes in the left side of the heart during the cardiac cycle.



What happens at X?

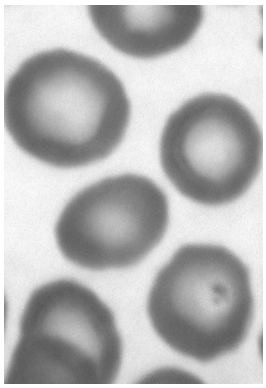
A atrioventricular valves close

B atrioventricular valves open

C semilunar valves close

D semilunar valves open

30 The photograph shows a type of blood cell.



Which statements about these cells are correct?

1 Oxygen diffuses through the phospholipid bilayer.

2 Sodium ions diffuse through the phospholipid bilayer.

3 Water passes in and out of these cells by osmosis.

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

31 Which symptom is specific to emphysema?

A excess mucus secretion by the goblet cells

B inflammation of the bronchial epithelium

C loss of elasticity of the alveolar walls

D thickening of the smooth muscle of the bronchi

32 Haemoglobin can bind to carbon dioxide, carbon monoxide and oxygen.

1 carbon dioxide

2 carbon monoxide

3 oxygen

Which gases share a binding site?

A 1 and 2 only

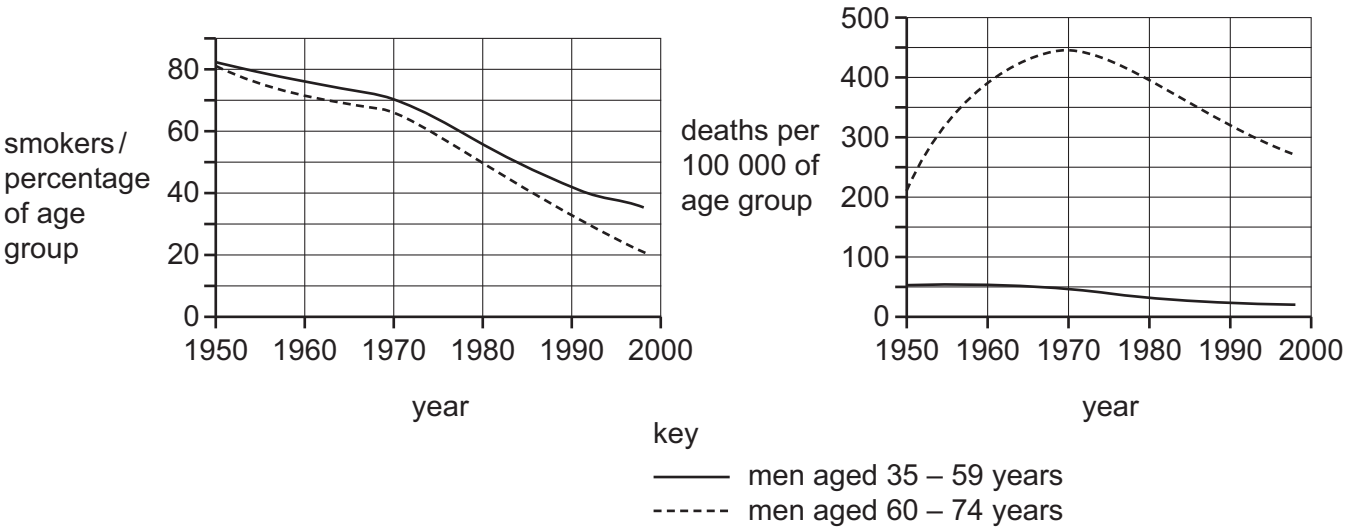
B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

[Turn over

33 Some studies suggest that smoking increases the risk of developing lung cancer. The two graphs show the percentage of smokers and the deaths from lung cancer in men of two age groups between 1950 and 1998.



Which statement is **not** supported by the data in the graphs?

A Deaths from lung cancer in men aged 35-59 years decreased by 50 % over the period of the study.

B Deaths from lung cancer in men aged 60-74 years increased up to 1970.

C The data for men aged 60-74 years between 1950 to 1970 suggests that lung cancer takes up to 20 years to develop.

D The number of men aged 35-59 years who were smokers decreased by approximately 60 % over the period of the study.

34 Which row correctly matches a function with B-lymphocytes and T-lymphocytes?

	function	B-lymphocytes	T-lymphocytes
A	may become plasma cells	✗	✗
B	may secrete antibodies	✗	✓
C	provides a cell-mediated response	✓	✓
D	provides a humoral response	✓	✗

key
✓ true
✗ false

35 What happens when people are injected with dead bacteria?

A B-lymphocytes produce antibodies.

B B- lymphocytes produce antigens.

C T- lymphocytes produce antibodies.

D T- lymphocytes produce antigens.

36 Some children are born with Severe Combined Immune Deficiency (SCID). These children do not normally have any T-lymphocytes and suffer from many diseases.

How may these children be cured?

A bone marrow transplantation

B continual use of antibiotics

C transfusion of antibodies

D vaccination against all diseases

37 Which of the following increase the risk of contracting TB?

1 drinking unpasteurised milk

2 eating shellfish which have fed on raw sewage

3 living in overcrowded conditions

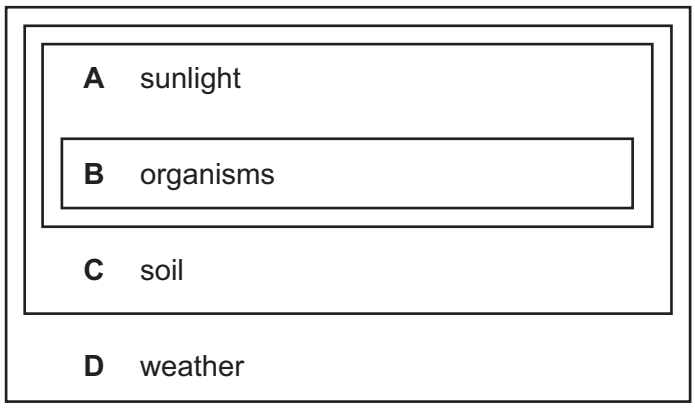
A 2 only

B 1 and 2

C 1 and 3

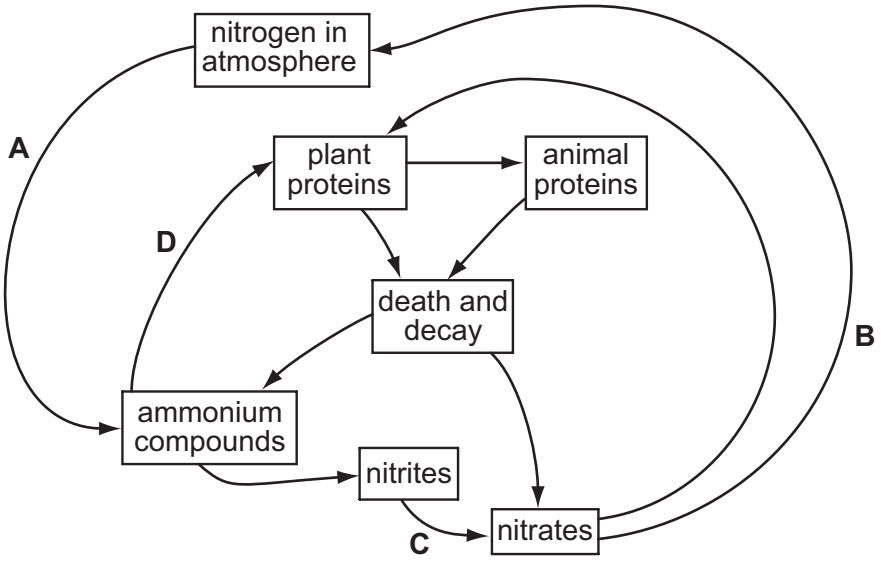
D 2 and 3

38 Which box encloses a community?

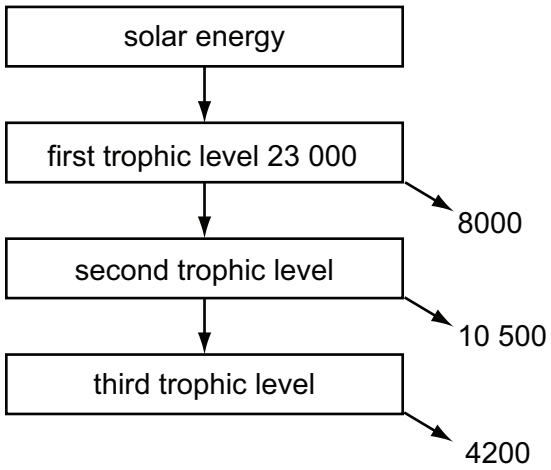


39 The diagram shows a simplified nitrogen cycle.

Which arrow represents the activity of nitrogen-fixing bacteria?



40 The diagram shows some values for gross primary productivity (GPP) and energy flow in an ecosystem, measured in $kJ\,m^{-2}\,y^{-1}$.



What percentage of GPP in the producers can be transferred to the tertiary consumers?

A 1.3 % **B** 6.7 % **C** 18.3 % **D** 19.6 %