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

BIOLOGY **9700/01**

Paper 1 Multiple Choice **May/June 2007**

1 hour

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

8585139293

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 **17** printed pages and **3** blank pages.

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1 The diameter of living cells varies considerably.

Typical diameters are:

a prokaryote, such as *Streptococcus*	-	750 nm
a eukaryotic cell, such as a white blood cell	-	15 μm

Given these measurements, the diameter of the white blood cell is how many times greater than the prokaryote?

A x 2 **B** x 20 **C** x 50 **D** x 200

2 In constructing a plan diagram of a transverse section of a dicotyledonous leaf, which feature should **not** be included?

A chloroplasts in the palisade mesophyll layer

B cuticle on the upper epidermis

C vascular bundles in the leaf lamina

D xylem in the vascular bundles

3 Membranous sacs containing products of metabolism are formed by the endoplasmic reticulum in cells.

Where are these products used?

A inside and outside the cell

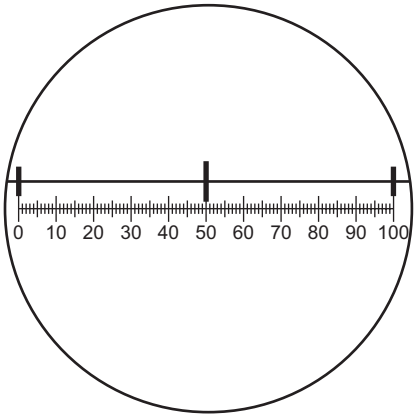
B inside lysosomes only

C inside the cell only

D outside the cell only

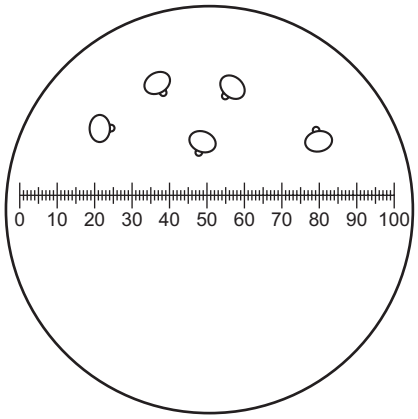
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4 The diagram shows a graduated slide, with divisions of 0.1 mm viewed using an eyepiece graticule.



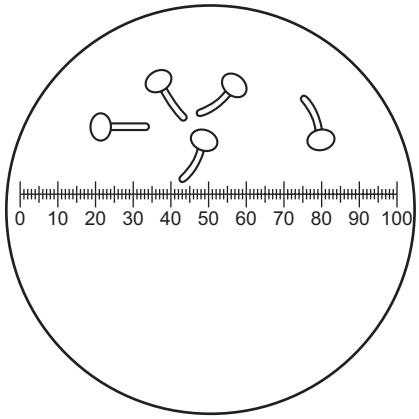
Pollen grains were grown in a sugar solution and viewed using the eyepiece graticule. Diagram 1 shows the pollen grains at first and diagram 2 shows them after four hours.

diagram 1



at start

diagram 2



after 4 hours

What is the growth rate of the pollen tubes?

A $5\,\mu mh^{-1}$ **B** $10\,\mu mh^{-1}$ **C** $5\,mmh^{-1}$ **D** $10\,mmh^{-1}$

5 In 1985, a giant bacterium, *Epulopiscium fishelsoni*, was discovered.

Which cell structure(s) would be present in *Epulopiscium* enabling biologists to classify this organism as prokaryotic?

A a cellulose cell wall outside the plasma membrane

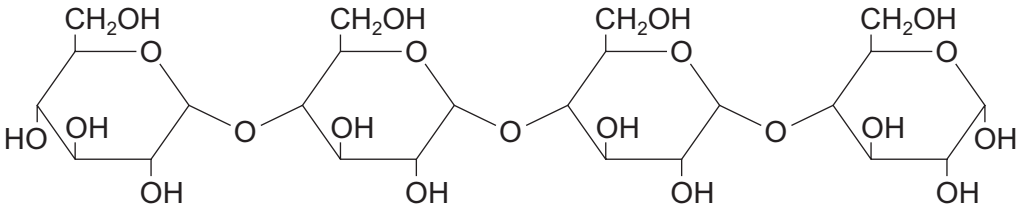
B a pair of centrioles close to the nuclear area

C circular DNA lying free in the cytoplasm

D smooth endoplasmic reticulum throughout the cytoplasm

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6 This molecule is a polymer of reducing sugars.



Which of the following procedures could be carried out in order to test for the presence of the reducing sugars in this molecule?

1 add hydrolytic enzyme and then heat with Benedict's reagent

2 dissolve in water, neutralise and then heat with Benedict's reagent

3 boil with ethanol and then heat with Benedict's reagent

4 boil with hydrochloric acid, neutralise and then heat with Benedict's reagent

A 1 and 2

B 1 and 4

C 1, 2 and 4

D 1, 2, 3 and 4

7 Which correctly matches the functional and structural features of cellulose, collagen, glycogen and triglyceride?

		function	structure		
			fibrous	molecule held together by hydrogen bonds	branched chains
A	cellulose collagen	support strengthening	✓ ✓	✗ ✓	✓ ✗
B	cellulose triglyceride	support energy source	✓ ✗	✓ ✗	✗ ✗
C	collagen glycogen	strengthening storage	✓ ✗	✓ ✗	✓ ✓
D	glycogen triglyceride	storage energy source	✗ ✗	✓ ✓	✓ ✗

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8 Which describes the structure of amylopectin?

A a branched chain with 1,2 and 1,4 glycosidic bonds

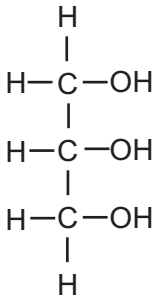
B a branched chain with 1,4 and 1,6 glycosidic bonds

C an unbranched chain with only 1,4 glycosidic bonds

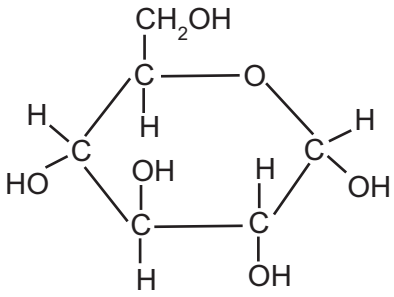
D an unbranched chain with 1,4 and 1,6 glycosidic bonds

9 Which molecule is found in glycogen?

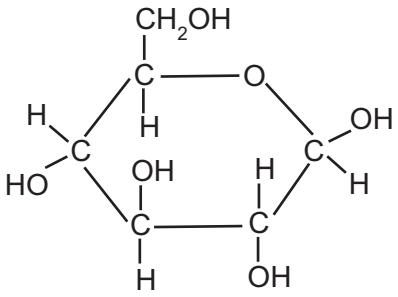
A



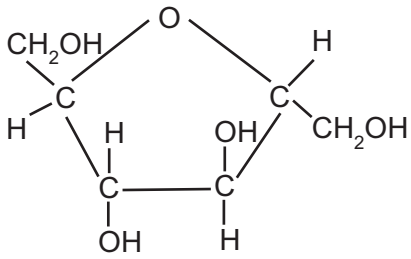
B



C



D



10 High concentrations of urea break all bonds, except covalent bonds, in protein molecules.

Which level of protein structure would remain unchanged when a protein is treated with urea?

A primary

B secondary

C tertiary

D quaternary

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11 Which bonds are the last to break when an enzyme is heated?

A disulphide

B hydrogen

C hydrophobic interactions

D ionic

12 During the production of apple juice, enzymes are used to break down the components of the cell walls.

Which carbohydrate will be produced by this hydrolysis?

A amylose

B cellulose

C α glucose

D β glucose

13 The rate of enzyme catalysed reactions in human cells is regulated.

Which of the following may be involved in such regulation?

1 a change in enzyme concentration

2 a change in substrate concentration

3 inhibition by the final product of the reaction

A 1 only

B 3 only

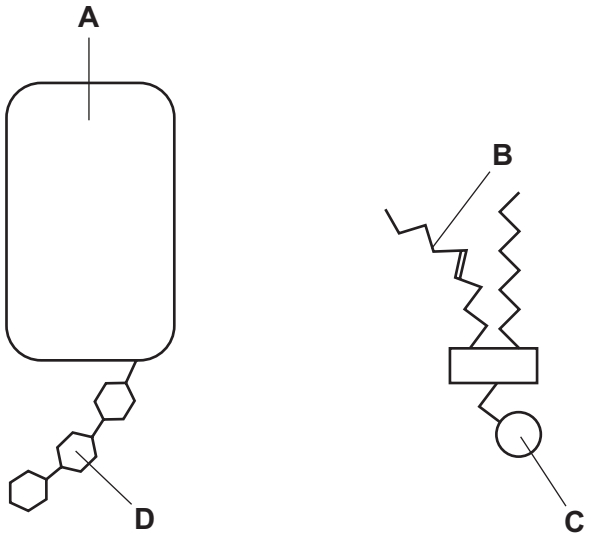
C 1 and 2 only

D 1, 2 and 3

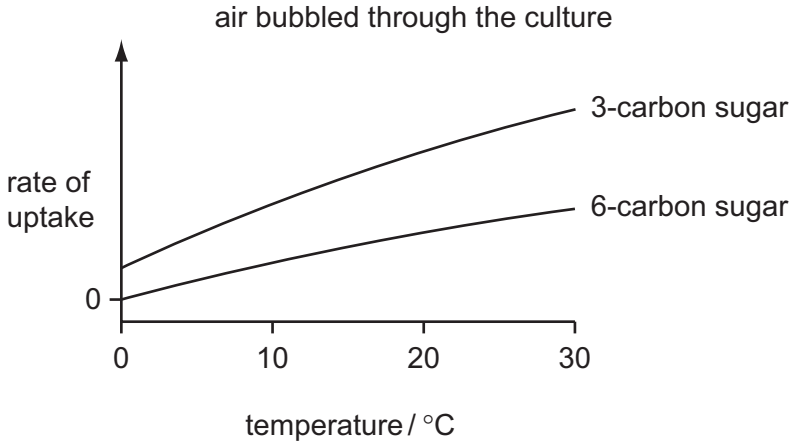
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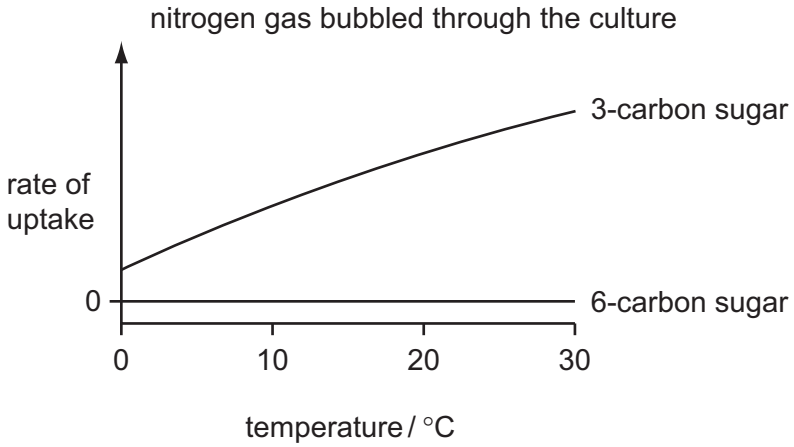
14 The diagrams show two kinds of molecules found in cell surface membranes.

Which part affects the fluidity of the membrane?



15 The graphs show the rate of uptake of sugars by a culture of animal cells, under different conditions.





How are the sugars taken up by the cells when air is bubbled through the culture?

	3-carbon sugar	6-carbon sugar
A	active transport	active transport
B	active transport	diffusion
C	diffusion	active transport
D	diffusion	diffusion

16 Which process allows the movement of molecules that are too large to pass **in** through a cell surface membrane?

A active transport

B endocytosis

C exocytosis

D facilitated diffusion

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17 Which structure organises spindle formation during mitosis in animal cells?

A centriole

B centromere

C nucleolus

D nucleus

18 Which processes involve mitosis?

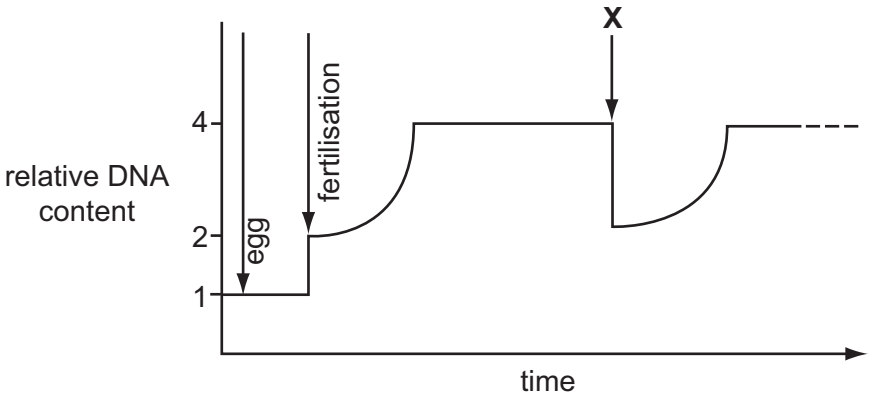
A growth, reduction division and asexual reproduction

B growth, repair and asexual reproduction

C growth, repair and semi-conservative replication

D repair, reduction division and asexual reproduction

19 The graph represents the changes in the quantity of DNA present in one nucleus at different stages in the life cycle.



Which stage takes place at **X**?

A interphase

B metaphase

C prophase

D telophase

20 Which type of sugar and bonds are found in a DNA molecule?

	type of sugar	bonds linking complementary bases
A	hexose	hydrogen
B	hexose	peptide
C	pentose	hydrogen
D	pentose	peptide

21 A length of double-stranded DNA contains 120 nucleotides and codes for polypeptide X.

What is the maximum length of polypeptide X?

A 20 amino acids

B 40 amino acids

C 60 amino acids

D 120 amino acids

22 In a DNA molecule, the base sequence AGT codes for the amino acid serine.

What is the base sequence of the anti-codon on the tRNA to which serine becomes attached?

A AGU

B GAU

C TCA

D UCA

23 What occurs in the apoplast and symplast pathways?

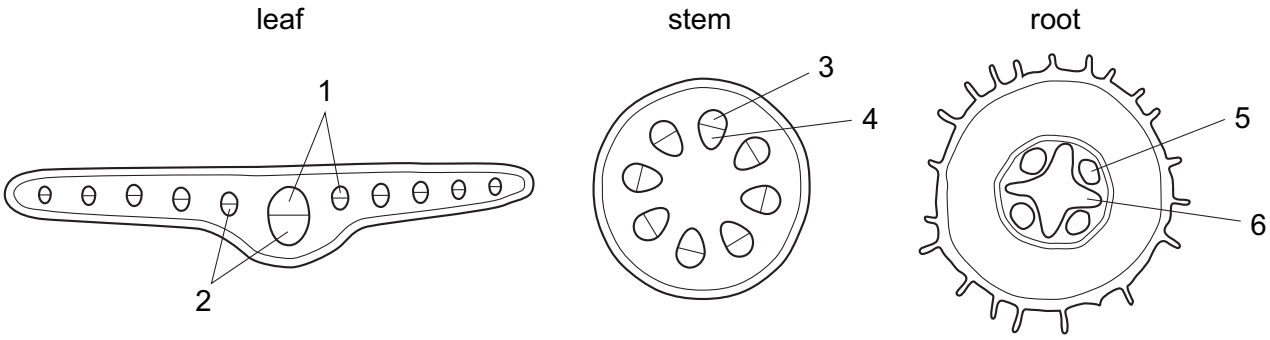
	water enters cell wall	water enters cytoplasm through plasma membrane	water enters vacuoles	water moves from cell to cell through plasmodesmata	water moves from cell to cell through intercellular spaces
A	apoplast	apoplast	apoplast	symplast	symplast
B	apoplast	symplast	symplast	symplast	apoplast
C	symplast	apoplast	apoplast	apoplast	symplast
D	symplast	symplast	symplast	apoplast	apoplast

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24 In an animal cell, which process is dependent upon cell surface area and which process is dependent upon cell volume?

	cell surface area	cell volume
A	carbon dioxide produced	oxygen used
B	glucose absorbed	hormones detected
C	hormones detected	carbon dioxide produced
D	oxygen used	glucose absorbed

25 The diagrams show transverse sections of parts of a plant.



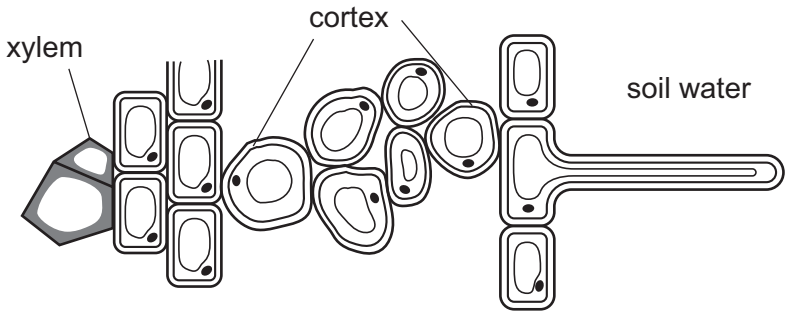
In the cross sections, what do 1, 2, 3, 4, 5 and 6 represent?

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

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26 Land flooded by the sea is not suitable for growing plants long after the salty flood water has drained away.

The diagram represents a transverse section through a part of the root of a plant.



Which values of water potential (kPa) in the xylem and soil water help to explain why the land flooded with salty water is unsuitable for growth of plants?

	xylem	soil water
A	–700 kPa	0 kPa
B	–1800 kPa	–700 kPa
C	0 kPa	–1800 kPa
D	–700 kPa	–1800 kPa

27 In mammals, some carbon dioxide is transported by red blood cells in combination with haemoglobin.

What is the product of this combination?

A carbamino-haemoglobin

B carbonic acid

C carboxyhaemoglobin

D haemoglobinic acid

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28 A red blood cell, entering the right side of the heart, passes by or through the following structures.

1 atrioventricular valve
2 semilunar valve
3 right atrium
4 right ventricle
5 sinoatrial node

In which order will the red blood cell pass the structures?

A $3 \rightarrow 1 \rightarrow 4 \rightarrow 5 \rightarrow 2$

B $3 \rightarrow 5 \rightarrow 1 \rightarrow 2 \rightarrow 4$

C $5 \rightarrow 3 \rightarrow 1 \rightarrow 4 \rightarrow 2$

D $5 \rightarrow 3 \rightarrow 2 \rightarrow 4 \rightarrow 1$

29 What correctly describes the cause and effect of carcinogens on lung tissue?

A Cells of the alveoli walls divide more rapidly than normal by reduction division causing a tumour to develop.

B Cilia are paralysed, mucus accumulates in the lungs, causing DNA to change, reduction division and a tumour to develop.

C DNA changes, causing bronchial epithelial cells to divide in an uncontrolled way by mitosis and a tumour to develop.

D Haemoglobin carries less oxygen, causing bronchial cells to divide in an uncontrolled way by mitosis and a tumour to develop.

30 What is a correct description of part of the respiratory system?

	part of respiratory system	cartilage present	ciliated epithelium present	goblet cells present	smooth muscle present
A	alveolus	✗	✓	✗	✗
B	bronchus	✓	✓	✓	✓
C	bronchiole	✗	✓	✓	✗
D	trachea	✓	✓	✓	✗

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31 Which statement describes the vital capacity of a human lung?

A the additional volume of air that can be exhaled after breathing out normally

B the additional volume of air that can be inhaled after breathing in normally

C the volume of air inhaled and then exhaled during a single tidal breath

D the volume of air that can be exhaled following a maximum inhalation

32 Which statement explains why people suffering from malaria and people suffering from tuberculosis can both live in northern Europe, but only tuberculosis can be passed on to other people there?

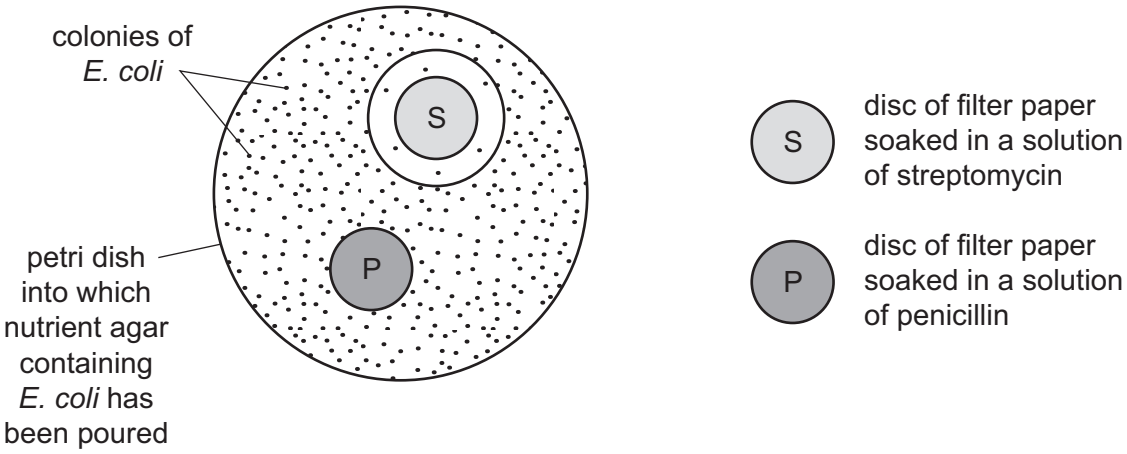
A *Anopheles* mosquitoes only breed in sub-tropical and tropical areas.

B Antibiotics can be used to cure people with tuberculosis.

C Migrant workers can carry the diseases with them.

D Tuberculosis bacteria cannot survive in sub-tropical and tropical areas.

33 The diagram shows the effects of the antibiotics streptomycin and penicillin on the bacterium *Escherichia coli*.

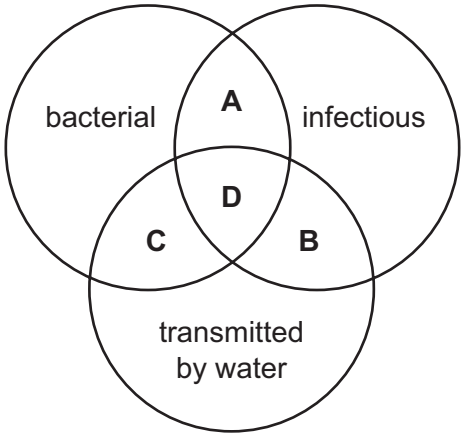


What can you deduce about the response of *E. coli* to the effects of the antibiotics?

	completely resistant	not completely resistant
A	S and P	–
B	S	P
C	P	S
D	–	S and P

34 The diagram refers to properties of diseases.

Which area of the diagram refers to properties that are common to **both** tuberculosis and cholera?



35 What causes the measles vaccine to be less effective in children from less economically developed countries?

A Their diet does not contain enough carbohydrate.

B Their diet does not contain enough protein.

C They are carriers of the disease.

D They rapidly become reinfected.

36 What is the function of the plasma cells during an immune response?

A to secrete antibodies

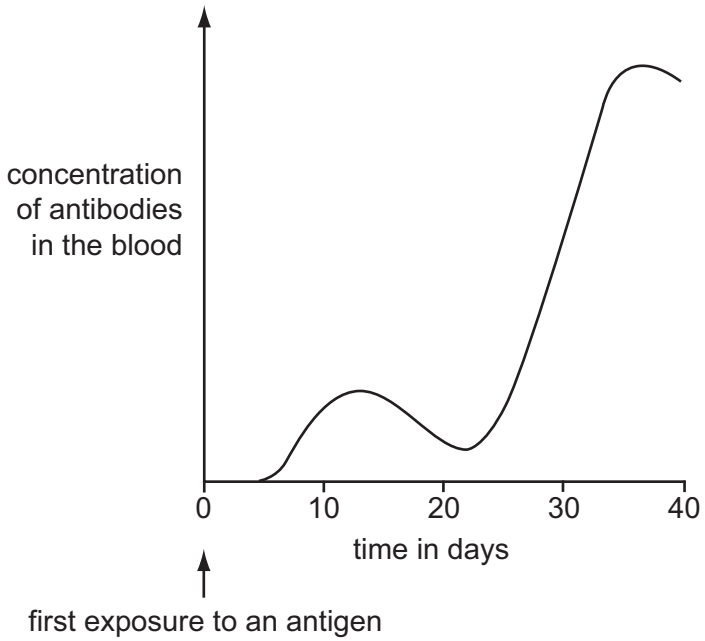
B to engulf bacteria

C to kill cells infected with viruses

D to change into memory cells

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37 The graph shows the amount of antibody produced in response to an antigen.



From the graph, which statement is correct?

A It takes 25 days to achieve active immunity.

B Memory cells for this antigen are present in the body within 20 days.

C T helper cells are activated on day 12.

D The second exposure to the antigen occurred on day 25.

38 What limits the number of trophic levels in a food chain?

A biomass of the autotrophs

B efficiency of energy conversion between levels

C net productivity of the ecosystem

D species diversity in the ecosystem

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39 The following are definitions of three ecological terms.

1 all of the organisms and their environment

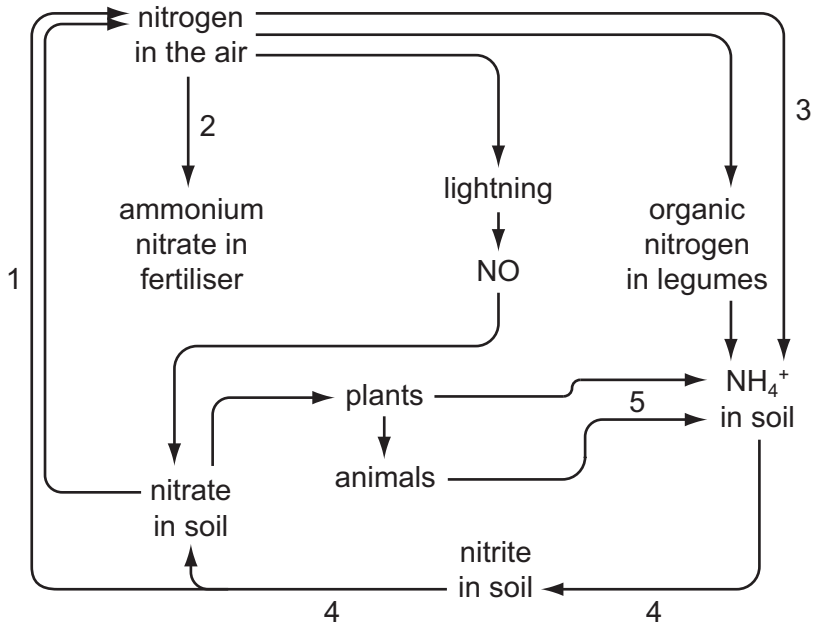
2 group of individuals of one species living in an area

3 all of the organisms living in a habitat

What are the correct definitions of a community and a population?

	community	population
A	1	2
B	2	1
C	3	1
D	3	2

40 The diagram shows the circulation of nitrogen in nature.



What is correct?

	denitrification	nitrification	nitrogen fixation
A	1	4	5
B	2	5	4
C	3	2	1
D	1	4	3

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