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

BIOLOGY **9700/12**

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)

* 2 9 6 9 2 3 5 3 7 2 *

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.

IB12 11_9700_12/4RP
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1 Which eyepiece and objective lens combination of a light microscope enables you to see the greatest number of cells in the field of view?

	eyepiece lens	objective lens
A	×5	×10
B	×5	×40
C	×10	×10
D	×10	×40

2 What are the characteristics of a prokaryotic cell?

	endoplasmic reticulum	genetic material
A	absent	DNA
B	absent	RNA
C	present	DNA
D	present	RNA

3 The following are all features of eukaryotic cells.

1 chloroplast

2 Golgi apparatus

3 lysosome

4 mitochondrion

5 nucleus

Which of these has a single membrane?

A 1 and 2

B 2 and 3

C 3 and 4

D 4 and 5

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4 Plant cells are fixed, stained and viewed through a light microscope.

What would be clearly visible at x400 magnification?

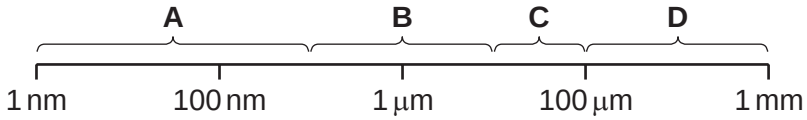
A cristae of mitochondria

B grana of chloroplasts

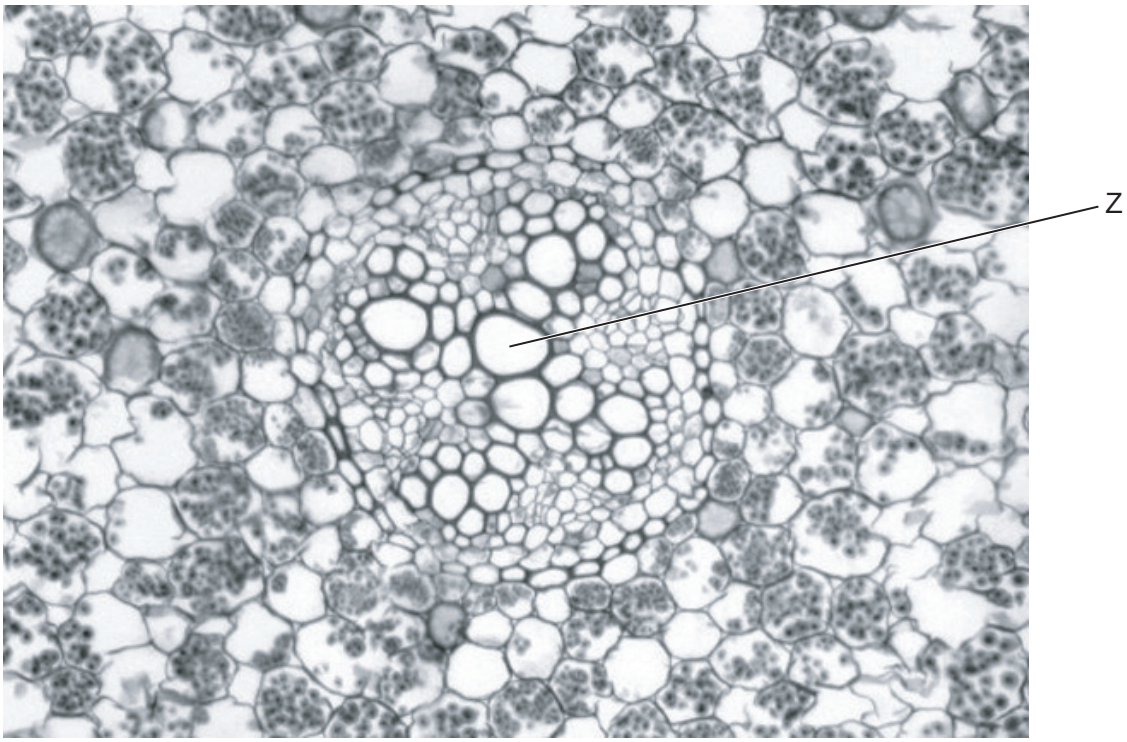
C nucleoli

D ribosomes

5 Which size range would include most prokaryotic cells?



6 The photomicrograph shows some plant tissues and the magnification is ×200.



What is the diameter of the cell marked Z?

A 5 μm **B** 10 μm **C** 50 μm **D** 100 μm

7 Heating with which solution breaks glycosidic bonds?

A Benedict's solution

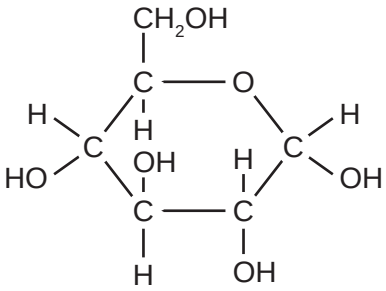
B dilute hydrochloric acid

C dilute sodium hydroxide

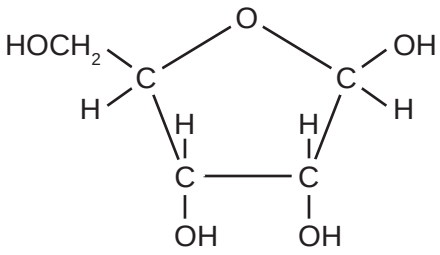
D ethanol

8 The diagram shows four molecules.

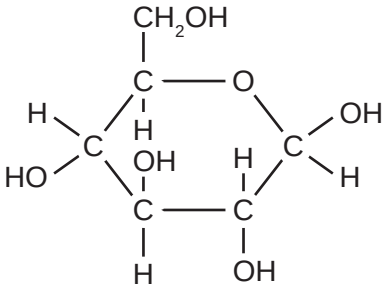
P



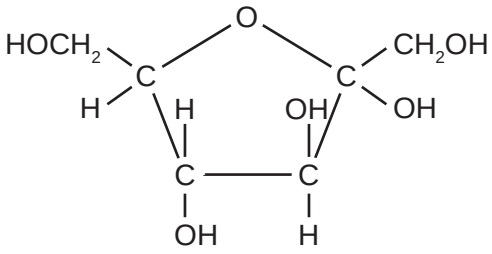
Q



R



S



Which two molecules condense to form sucrose?

A P and Q **B** P and S **C** R and Q **D** R and S

9 Which molecules have a structural formula that contains C=O bonds?

1 glucose

2 glycerol

3 protein

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3 only

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10 Haemoglobin consists of two α chains and two β chains. Approximately 5 % of all humans have one amino acid in the β chain different from normal.

Which level(s) of protein structure could be changed in these humans?

A primary only

B primary and quaternary only

C primary, secondary and tertiary only

D quaternary only

11 Which of the statements about polysaccharides can be used to describe both glycogen and amylopectin?

1 contains 1,4 glycosidic bonds

2 contains 1,6 glycosidic bonds

3 polymer of α–glucose

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

12 Which row shows the types of bond found at different levels of protein structures?

	level of protein structure	bonds			
		peptide	hydrogen	ionic	hydrostatic
A	primary	✓	✗	✗	✓
B	secondary	✗	✓	✓	✗
C	tertiary	✗	✓	✓	✓
D	quaternary	✓	✗	✓	✓

key

✓ = present

✗ = absent

13 What is the role of enzymes in metabolism?

A to catalyse the hydrolysis of large molecules only

B to increase the number of collisions between molecules

C to lower the activation energy required to start a reaction

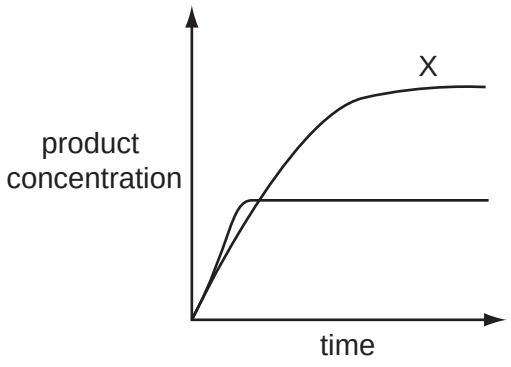
D to supply the activation energy required to start a reaction

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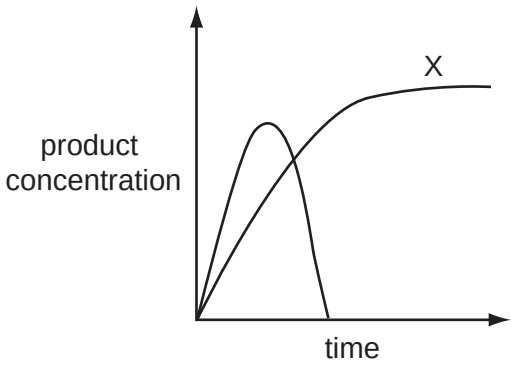
14 Two enzyme experiments were carried out. The first, experiment X, was carried out at a constant temperature of 37 °C. During the second experiment the temperature was increased from 37 °C to 80 °C. All other factors were kept the same.

Which graph shows the results?

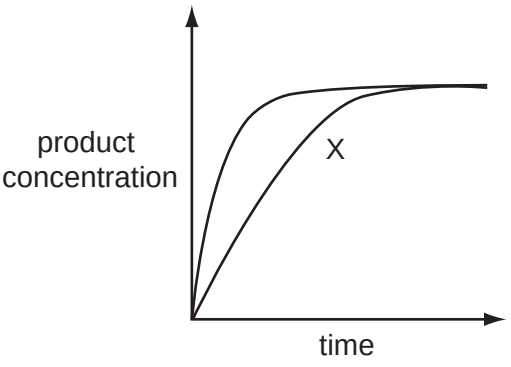
A



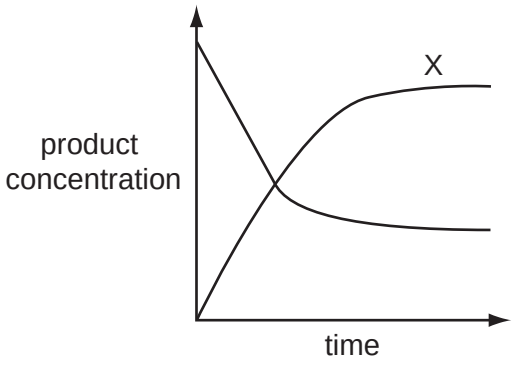
B



C



D



15 Which role of the cell surface membrane is **not** a result of the properties of the phospholipids?

A to allow cytokinesis to occur in mitotic cell division

B to allow entry and exit of the water-soluble gases, oxygen and carbon dioxide

C to allow phagocytosis of a bacterium into cells

D to allow surface membranes to stabilise by binding with water molecules

16 An increase in which component would make the cell surface membrane more fluid?

A cholesterol

B glycolipids

C glycoproteins

D proteins

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17 Which processes that move substances across cell surface membranes result in an equilibrium?

1 active transport

2 diffusion

3 facilitated diffusion

4 osmosis

A 1, 2 and 3 only

B 1, 2 and 4 only

C 1, 3 and 4 only

D 2, 3 and 4 only

18 Diagrams 1 and 2 show how the transverse section through a leaf changes when moved from one solution W to a different solution Y.

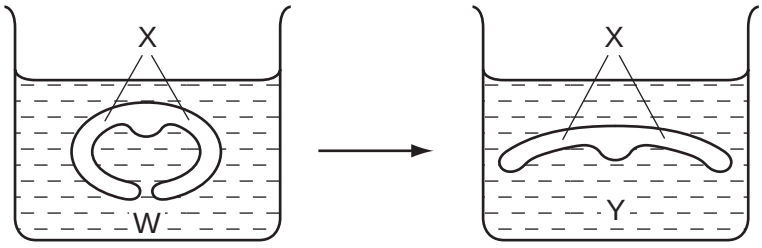


diagram 1 diagram 2

How has the water potential changed in diagram 2?

	difference in cells at X in solution Y compared to the same cells in solution W	difference in solution Y compared to solution W
A	less negative	less negative
B	less negative	more negative
C	more negative	less negative
D	more negative	more negative

19 Immediately after which stage in mitosis in an animal cell does the cytoplasm start to divide?

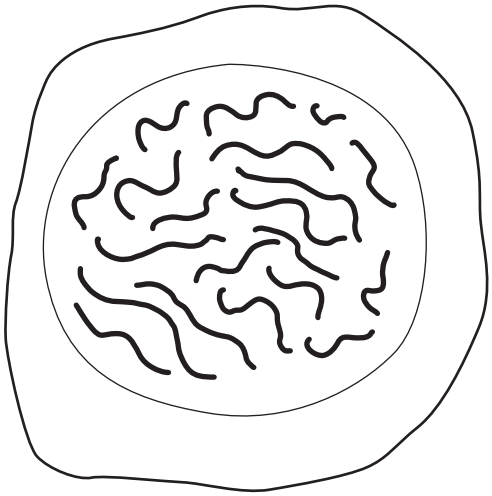
A anaphase

B metaphase

C prophase

D telophase

20 The diagram shows a cell of an organism formed by reduction division.



What is the diploid number for this organism?

A 10 **B** 20 **C** 40 **D** 46

21 Which is **not** a description of a gene?

A a length of DNA which carries coded information as a sequence of nucleotides that can result in the formation of a polypeptide chain

B any section of a molecule that has two strands, each with a sequence of nucleotides that are complementary to each other and are held together by hydrogen bonding

C a sequence of nucleotides which can be copied by complementary base pairing and then be translated at a ribosome

D a sequence of nucleotides that can be transcribed using a polymerase enzyme and free activated nucleotides and which results in the formation of a messenger RNA molecule

22 Which row in the table correctly shows situations in which **both** DNA and RNA are both involved?

	replication	transcription	translation
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✗
D	✗	✗	✓

key

✓ involved

✗ not involved

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23 The diagram shows the stages in the production of a polypeptide.

DNA nucleotide sequence template strand	T A C G A C A A T C G C
mRNA sequence	A U G C U G U U A G C G
amino acid sequence	met leu leu ala

Which feature of the triplet code is illustrated by the information given?

A An amino acid can be coded for by more than one triplet.

B The triplet code is non-overlapping and is only read in one direction.

C The triplet code is universal for the DNA of all organisms.

D There are some triplets that code for 'start' and 'stop'.

24 What is correct about the uptake and transport of water in plants?

1 water transported by the symplast pathway enters root hair cells down a water potential gradient

2 water is transported in xylem by the symplast and apoplast pathways to reach the leaves

3 water transported by the apoplast pathway through plasmodesmata must pass through cell surface membranes of endodermal cells

A 1 only

B 3 only

C 1 and 3 only

D 2 and 3 only

25 Which combination of conditions increases the rate of transpiration in plants?

	light intensity	humidity	temperature
A	high	high	low
B	high	low	high
C	low	high	low
D	low	low	high

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26 Which statement explains why sucrose, rather than glucose, is transported by phloem?

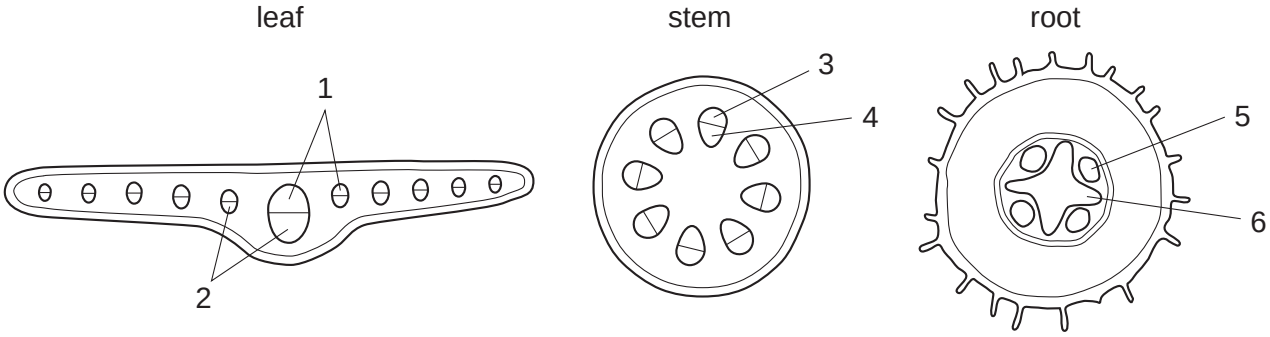
A Sucrose can pass through plant cell surface membranes more easily.

B Sucrose is a disaccharide and is more easily converted to starch.

C Sucrose is a larger molecule.

D Sucrose is a non-reducing sugar, so is less reactive.

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

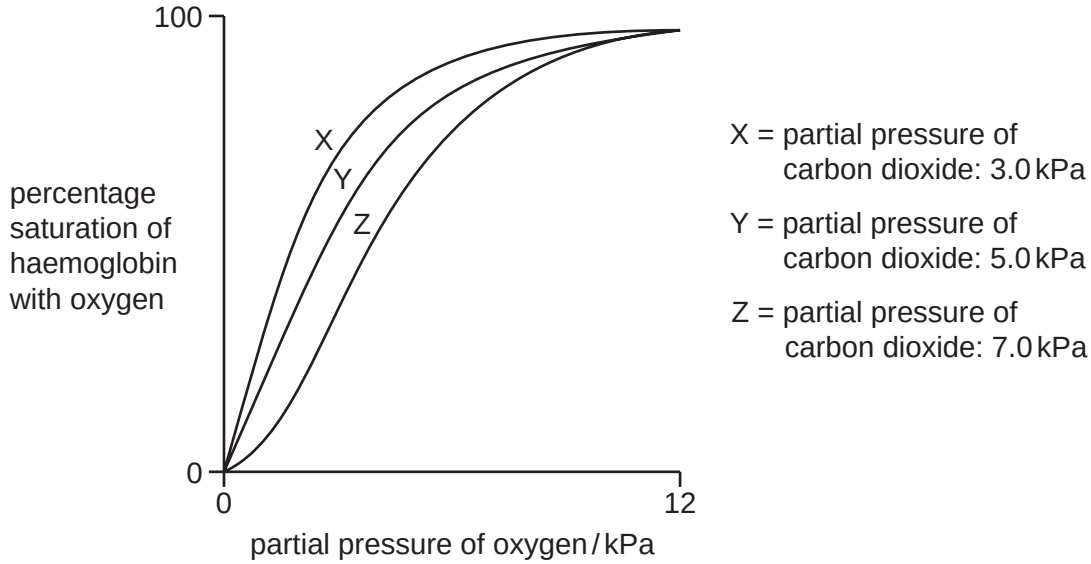


In the transverse sections, what do 1, 2, 3, 4, 5 and 6 represent?

	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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28 The diagram shows the effect of three different concentrations of carbon dioxide on the oxygen dissociation curve for human haemoglobin.



What effect does carbon dioxide have on haemoglobin?

A it makes it less efficient at taking up oxygen and also less efficient at releasing it

B it makes it less efficient at taking up oxygen and more efficient at releasing it

C it makes it more efficient at taking up oxygen and also more efficient at releasing it

D it makes it more efficient at taking up oxygen and less efficient at releasing it

29 Why does the number of red blood cells in a human increase after several weeks at high altitude?

A red blood cells are short-lived

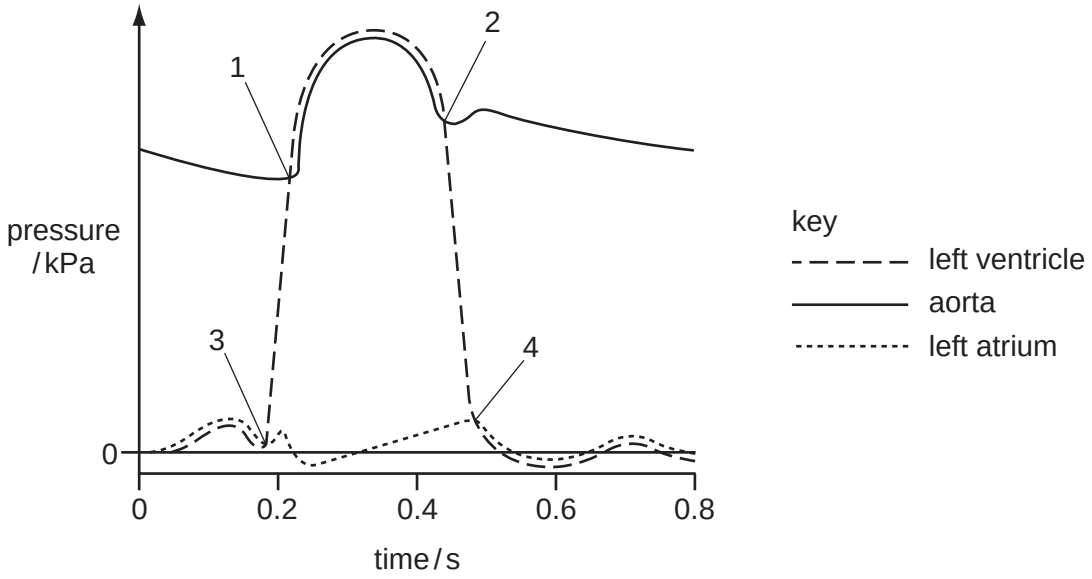
B there is a high partial pressure of oxygen

C to remove glucose from the tissues

D to supply the tissues with enough oxygen

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30 The graph shows the pressure changes in the left atrium, left ventricle and aorta during a cardiac cycle.



With reference to the semilunar valve and atrioventricular valve, what is happening at points 1, 2, 3 and 4?

	semilunar valve		atrioventricular valve	
	opens	closes	opens	closes
A	1	2	3	4
B	1	2	4	3
C	2	3	1	4
D	2	3	4	1

31 Normal venous pressure in the feet is 3.3 kPa. When a person stands very still venous blood pressure in the feet rises to 5.0 kPa.

What causes the high pressure?

A Muscles in the walls of the veins contract, reducing the diameter of the veins.

B Skeletal muscles in the legs are not squeezing blood upward in the veins.

C Systolic blood pressure increases.

D The valves in the veins of the legs allow blood to flow to the feet.

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32 Some people find it difficult to breath out large volumes of air from their lungs. Their breathing is noisy and rapid.

Which disease are they likely to be suffering from?

A atherosclerosis

B coronary heart disease

C emphysema

D lung cancer

33 Which of the following can result in heart failure?

1 increase in blood pressure

2 deposits of fatty material in arteries and veins

3 reduced oxygen supply to cardiac muscle

4 increased risk of blood clotting

A 3 and 4 only

B 1, 2 and 3 only

C 1, 2 and 4 only

D 1, 3 and 4 only

34 An adult human has approximately 5 dm^3 of blood, which circulates about once a minute.

100 cm^3 of arterial blood carries 19 cm^3 of oxygen. 100 cm^3 of venous blood carries 12.5 cm^3 of oxygen.

What is the approximate volume in cm^3 of oxygen taken up per minute in the lungs?

A 32.5 **B** 65 **C** 325 **D** 950

35 Which of the following increases the risk of contracting measles?

1 drinking unpasteurised milk

2 eating shellfish which have fed on raw sewage

3 living in overcrowded conditions

A 3 only

B 1 and 2

C 1 and 3

D 2 and 3

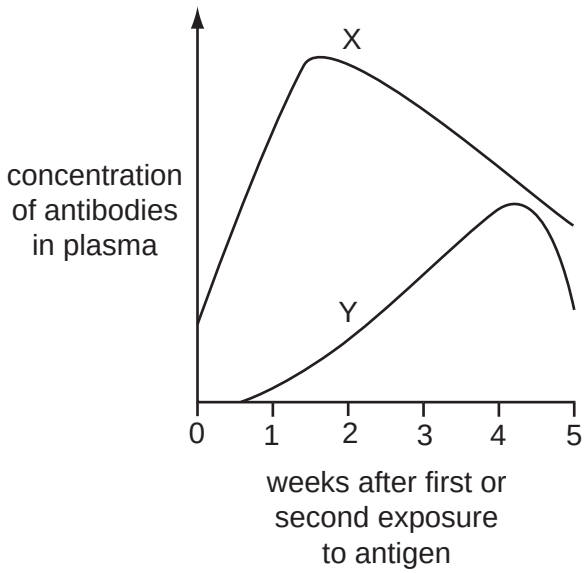
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36 To prevent a disease, dead bacteria may be injected into the body.

What type of immune response is produced?

	natural	active
A	no	no
B	no	yes
C	yes	no
D	yes	yes

37 The graph shows the primary and secondary responses of the immune system to antigens.



What are responses X and Y?

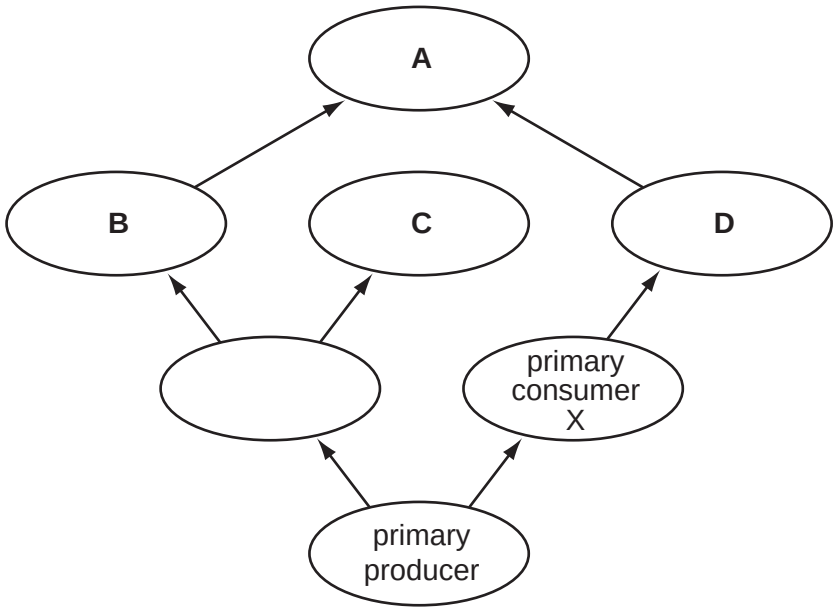
	X	Y
A	primary response	secondary response caused by cloning of B–lymphocytes formed during the primary response
B	primary response	secondary response caused by cloning of T–lymphocytes formed during the primary response
C	secondary response caused by cloning of B–lymphocytes formed during the primary response	primary response
D	secondary response caused by cloning of T–lymphocytes formed during the primary response	primary response

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38 A primary consumer, X, is removed from a community due to a lethal viral infection.

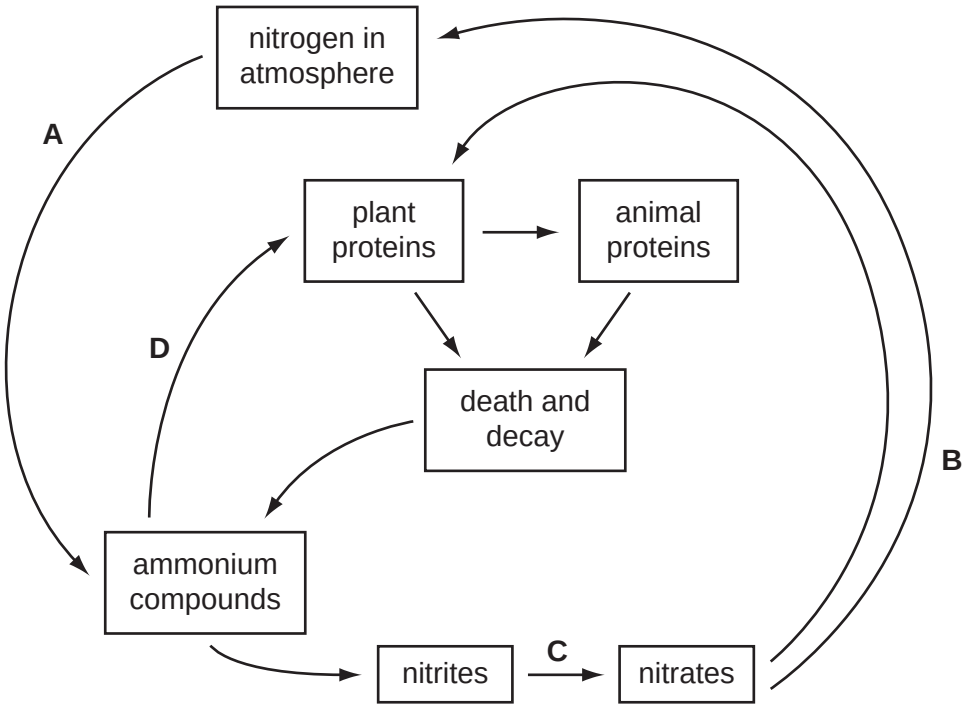
After a time, the size of the populations of some of the organisms shown in the food web changed.

Which population of organisms increased?



39 The diagram shows a simplified nitrogen cycle.

During which stage does nitrification take place?



40 The total rate at which producers synthesise organic material is called gross primary productivity (GPP). The rate at which producers store organic material as new tissue is called net primary productivity (NPP).

What shows the relationship between GPP and NPP?

A NPP = GPP × respiration

B NPP = GPP ÷ respiration

C NPP = GPP + respiration

D NPP = GPP – respiration

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