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

BIOLOGY **9700/01**

Paper 1 Multiple Choice **October/November 2007**

1 hour

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

2278287053

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.

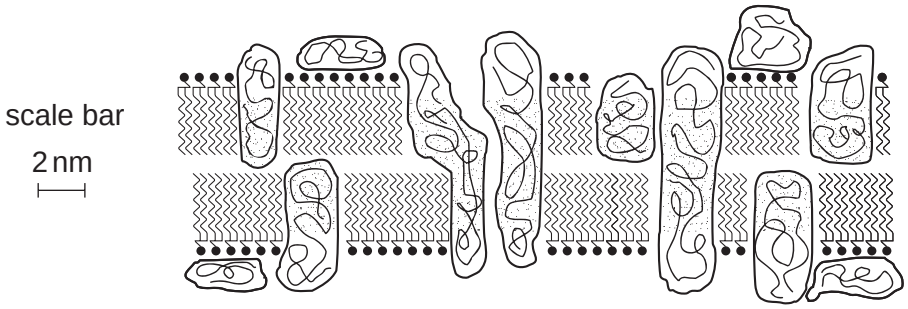
Read the instructions on the Answer Sheet very carefully.

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 **19** printed pages and **1** blank page.

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1 The diagram shows part of a membrane around a vacuole of a plant cell.



What is the width of the membrane?

A 7.5×10^{-3} m

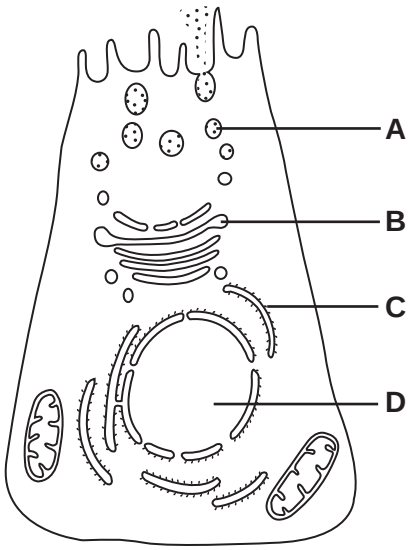
B 7.5×10^{-6} m

C 7.5×10^{-9} m

D 7.5×10^{-12} m

2 The diagram is taken from an electron micrograph of a cell which secretes digestive enzymes.

Where are these enzymes made?



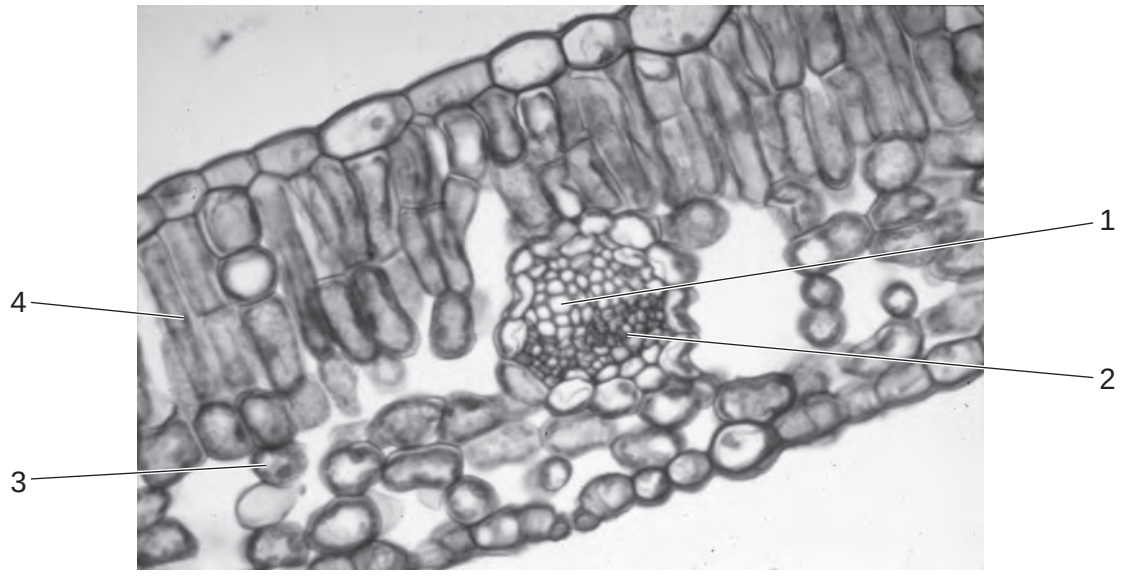
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3 A specimen is viewed under a microscope using green light with a wavelength of 510 nm.

If the same specimen is viewed under the same conditions, but using red light with a wavelength of 650 nm instead, what effect will this have on the magnification and on the resolution of the microscope?

	magnification	resolution
A	decreased	decreased
B	increased	increased
C	remains the same	increased
D	remains the same	decreased

4 The diagram shows a transverse section of part of a dicotyledonous leaf.



What are the correct labels for 1, 2, 3 and 4?

	1	2	3	4
A	phloem	xylem	palisade mesophyll	spongy mesophyll
B	phloem	xylem	spongy mesophyll	palisade mesophyll
C	xylem	phloem	palisade mesophyll	spongy mesophyll
D	xylem	phloem	spongy mesophyll	palisade mesophyll

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5 A student is asked to study two photographs, taken at the same magnification, of a palisade mesophyll cell, one using a high quality light microscope and the other using an electron microscope.

The student observed

1 the cisternae of the Golgi apparatus

2 the grana in the chloroplasts

3 the two membranes of the nuclear envelope

4 the vacuole enclosed by a tonoplast

Which features can be seen because of the higher resolution of the electron microscope?

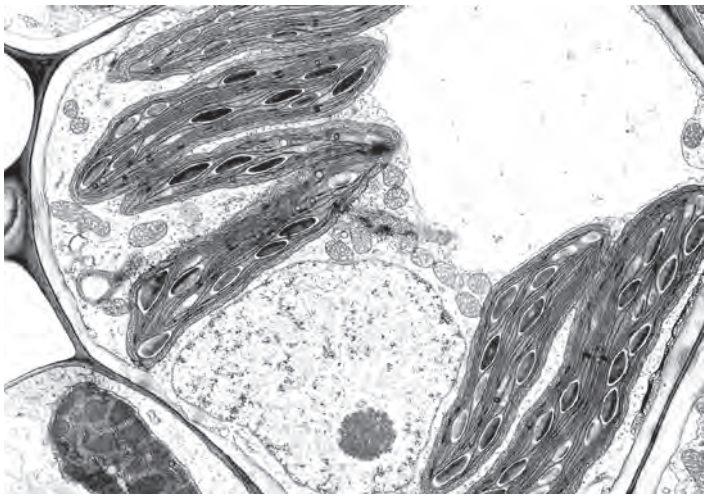
A 1, 2 and 3

B 1, 2 and 4

C 1, 3 and 4

D 2, 3 and 4

6 The diagram shows a photomicrograph. Its magnification is ×2800.



What is the diameter of the nucleolus?

A 2.5 μm **B** 5 μm **C** 10 μm **D** 20 μm

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7 When solutions of dilute sodium hydroxide and copper(II) sulphate (biuret test) were added to an unknown substance, a purple colour was observed.

This test indicates the presence of which bond in the unknown substance?

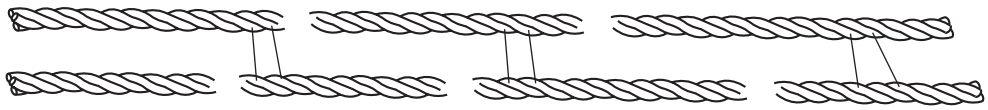
A disulphide

B hydrogen

C ionic

D peptide

8 The diagram shows part of a macromolecule in the form of triple helices, lying side by side with covalent cross links between them.



What is the name of the molecule?

A cellulose

B collagen

C glycogen

D triglyceride

9 Which of the following is a polysaccharide present in human muscle?

A amylose

B collagen

C glycogen

D haemoglobin

10 An investigation was carried out into the effect of various chemicals on the permeability of the plasma membrane and tonoplast of beetroot cells. Beetroot cell vacuoles contain a red pigment, which cannot pass out of the cells because it cannot diffuse through their tonoplasts and plasma membranes.

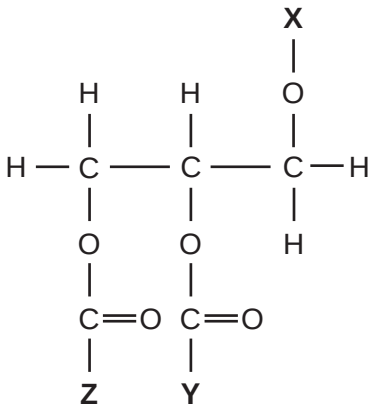
1 cm^3 cubes were cut from beetroot and washed in running water for twenty minutes to remove any pigment released from damaged cells.

They were then placed in different solutions and the results observed. In each case the solution turned red.

What shows the correct behaviour of phospholipids and proteins in different solutions?

	solution	phospholipids dissolve	solution	protein denatures
A	dilute HCl	✓	water at 40 °C	✓
B	dilute HCl	✓	ethanol	✓
C	ethanol	✓	dilute HCl	✓
D	water at 40 °C	✓	ethanol	✓

11 The diagram shows a phospholipid molecule.



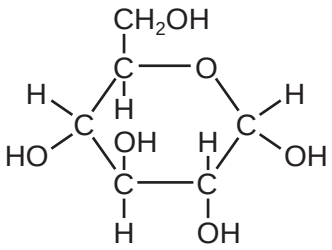
What are **X**, **Y** and **Z**?

	X	**Y**	**Z**
A	hydrocarbon chain	hydrocarbon chain	phosphate-containing group
B	hydrocarbon chain	glycerol	phosphate-containing group
C	phosphate-containing group	hydrocarbon chain	hydrocarbon chain
D	phosphate-containing group	glycerol	hydrocarbon chain

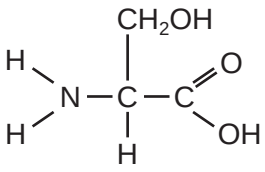
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12 The diagrams show four different molecules.

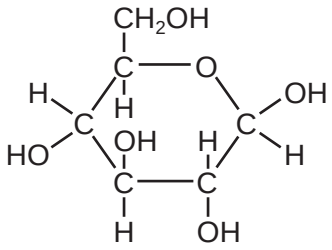
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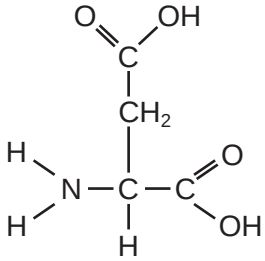
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R



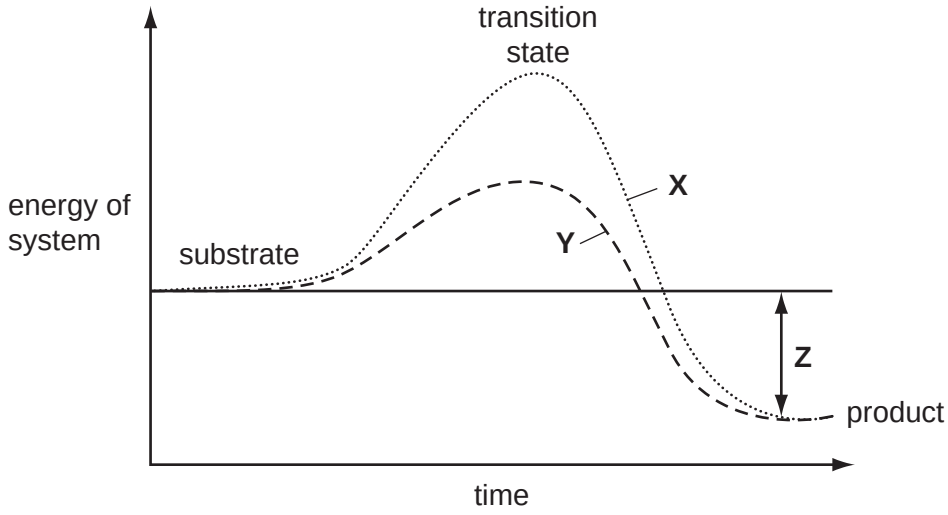
S



Which shows the correct information about the molecule or molecules?

	contains a carboxyl group	forms 1,6 glycosidic bonds in glycogen	forms peptide bonds by condensation
A	P	P	P and Q
B	Q	R	P and R
C	R	R	R and Q
D	S	P	Q and S

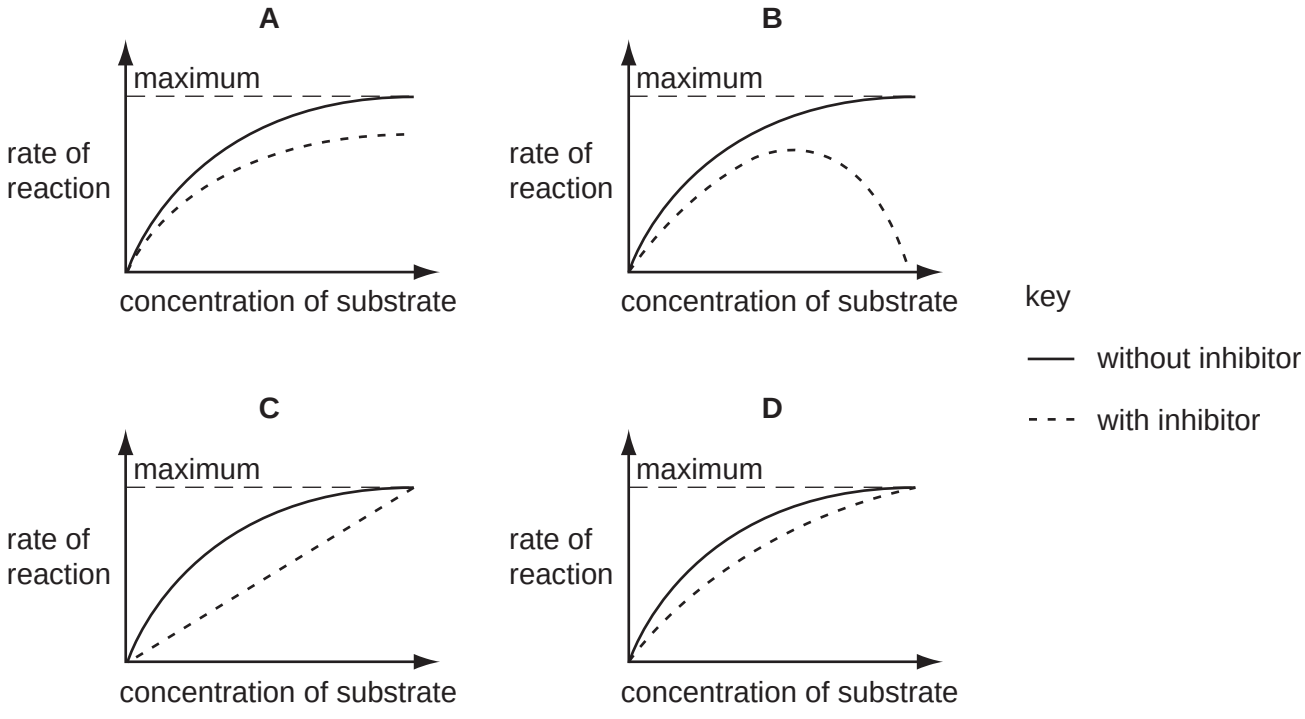
13 The graph shows the effect of an enzyme on a reaction.



Which combination identifies **X**, **Y** and **Z**?

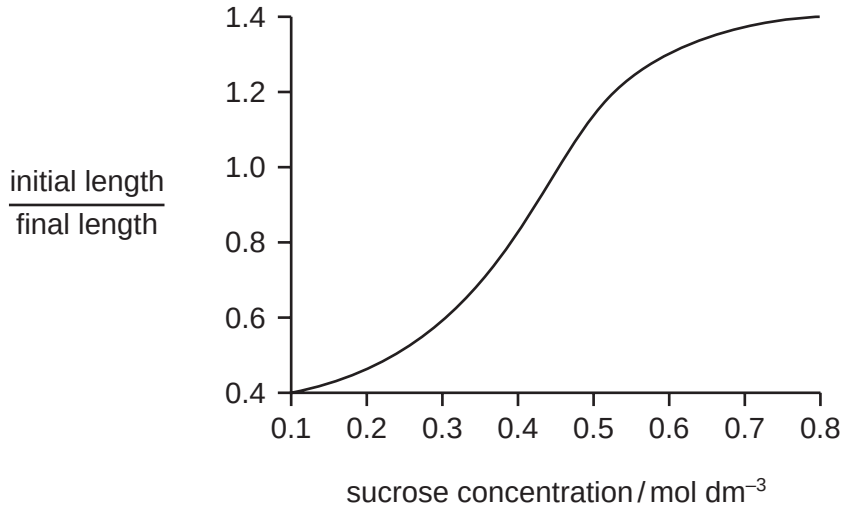
	X	Y	Z
A	catalysed reaction	uncatalysed reaction	activation energy
B	catalysed reaction	uncatalysed reaction	energy lost during reaction
C	uncatalysed reaction	catalysed reaction	energy gained by product
D	uncatalysed reaction	catalysed reaction	overall energy change

14 Which graph represents the action of a non-competitive inhibitor?



15 Strips of plant tissue were immersed in a range of sucrose solutions of different concentrations. Their lengths were measured before immersion and after 30 minutes.

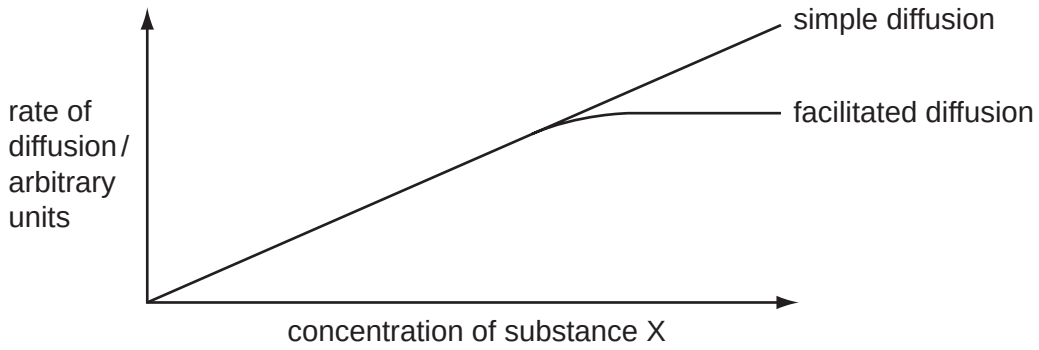
The graph shows the ratio of initial length to final length.



What is a correct description of the change in the cells and in their water potential as the sucrose concentration increases?

	change in the cells	change in the water potential
A	more turgid	less negative
B	less turgid	more negative
C	more turgid	more negative
D	less turgid	less negative

16 The graph shows rates of simple diffusion and facilitated diffusion, of substance X across a cell surface membrane, as the concentration of substance X increases.



Why does the rate of facilitated diffusion level off whereas the rate of simple diffusion does not?

A Facilitated diffusion is limited by the number of protein channels in the membrane.

B Facilitated diffusion is limited by the number of protein pumps in the membrane.

C Facilitated diffusion requires ATP which will eventually be used up.

D Only facilitated diffusion is affected by the kinetic energy of the molecules that are diffusing.

17 Which part of a phospholipid molecule makes up most of the thickness of a cell surface membrane?

A glycerol

B hydrocarbon chains

C hydrophilic head

D phosphate group

18 Which of the following is true of cancer?

A Each mitotic division produces more than two daughter cells.

B Mitosis has stopped.

C Mitosis is uncontrolled.

D Mitosis results in cells with variable numbers of chromosomes.

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19 Each of the following events takes place during mitosis.

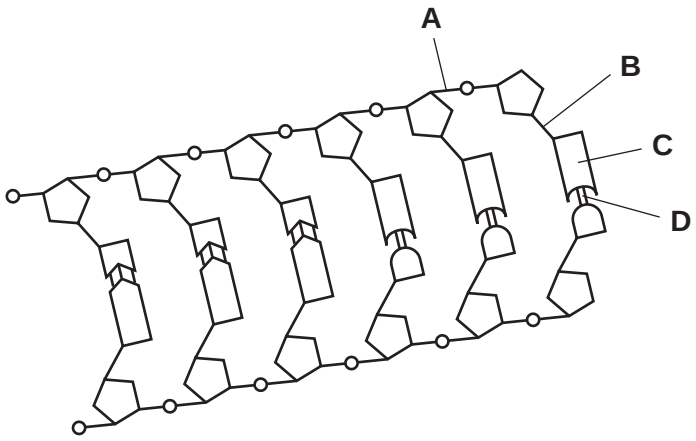
1 centromeres divide
2 chromatids move to opposite poles of the cell
3 chromosomes line up along the equator of the spindle
4 chromosomes uncoil
5 two chromatids are joined by a centromere

In which order do the events take place?

	first →				last
A	1	2	4	5	3
B	3	1	2	4	5
C	4	5	3	1	2
D	5	3	1	2	4

20 The diagram shows part of a DNA molecule.

Where are hydrogen bonds found?



21 Which type of molecule is the end product of translation?

A amino acid
B DNA
C mRNA
D polypeptide

22 An unidentified single-stranded molecule was described as having the following features.

- complementary base pairing along some of its length
- an area that can attach to a ribosome
- a site to which a specific amino acid attaches

What is the unidentified molecule?

A DNA polymerase

B messenger RNA

C RNA polymerase

D transfer RNA

23 Some antibacterial drugs can affect the synthesis of proteins.

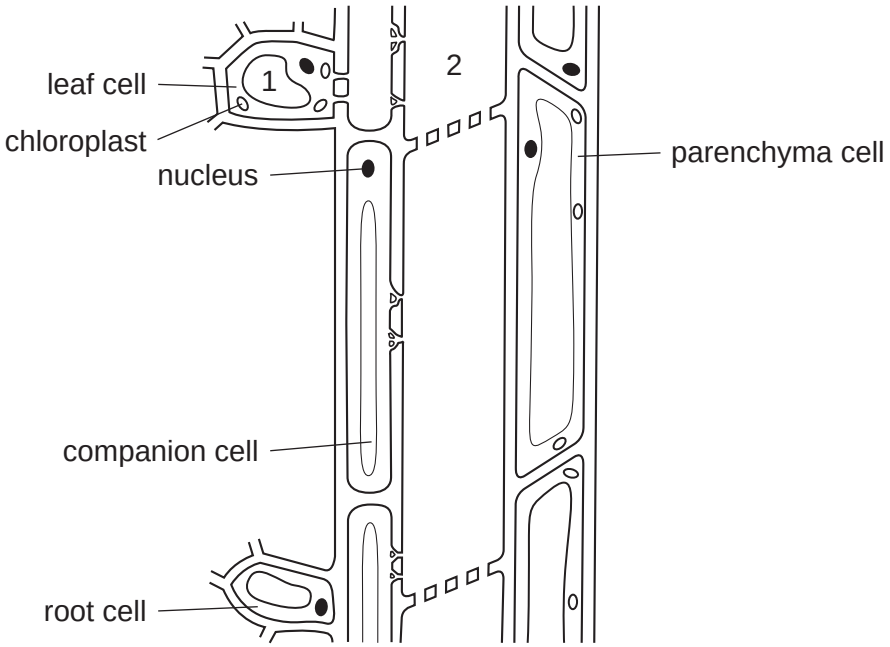
antimicrobial drug	rifampicin	streptomycin	tetracycline
mode of action	binds to RNA polymerase	genetic code misread during translation	prevents binding of tRNA to ribosome

Which is the correct set of immediate effects of these drugs?

antimicrobial drug	rifampicin	streptomycin	tetracycline
A	defective protein synthesised	mRNA does not bind to ribosome	amino acids not added to growing chain
B	mRNA not synthesised	defective protein synthesised	amino acids not added to growing chain
C	mRNA not synthesised	mRNA does not bind to ribosome	transcription prevented
D	transcription prevented	defective protein synthesised	mRNA does not bind to ribosome

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24 The diagram represents the phloem pathway, with adjacent cells, from leaf to root in a plant.



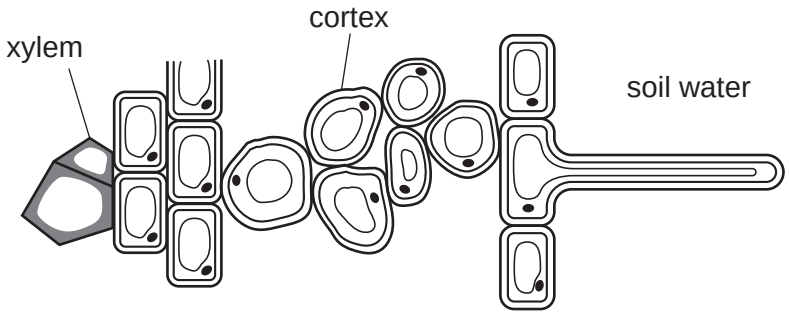
Which process is occurring between 1 to 2 and what is the effect on the water potential at 2?

	process from 1 to 2	water potential at 2
A	active transport of sucrose	becomes more negative
B	active transport of sucrose	becomes less negative
C	diffusion of sucrose	becomes more negative
D	diffusion of sucrose	becomes less negative

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[Turn over

25 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 water passes from the soil into the xylem across the cortex?

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

26 Translocation in plants moves sucrose from sources to sinks.

Which of the following can be a source and which a sink?

	source	sink
A	germinating seeds	green leaves
B	green leaves	storage roots
C	phloem	germinating seeds
D	storage roots	phloem

27 The red blood cell count of humans increases when they remain at high altitudes.

What is the effect of this?

A It increases the Bohr effect.

B It increases the rate of oxygen transport.

C It reduces the amount of haemoglobin per cell.

D It reduces the heart rate.

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28 A molecule of haemoglobin contains four haem groups. The haem groups contain iron atoms which can bond reversibly with oxygen.

How many oxygen atoms can be carried by one haemoglobin molecule?

A 4 **B** 8 **C** 12 **D** 16

29 What is systolic blood pressure?

A the blood pressure in the arteries when the heart is relaxing

B the blood pressure in the left ventricle at the end of a contraction

C the maximum blood pressure in the arteries

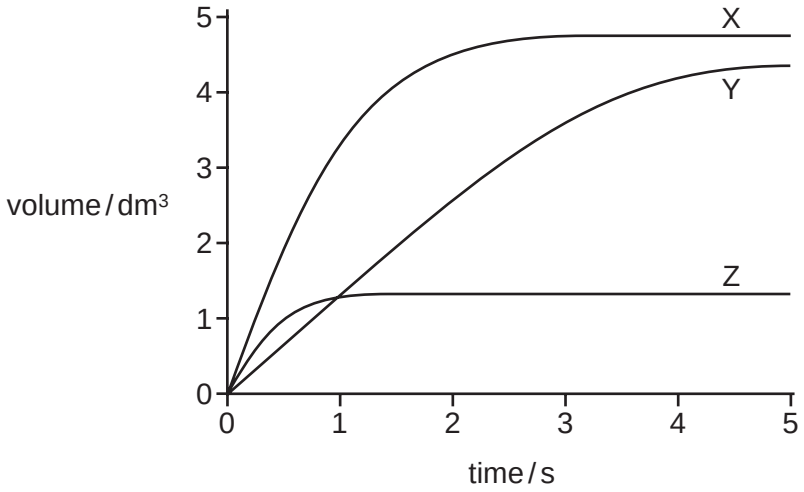
D the maximum blood pressure in the right ventricle

30 Which cells or tissues are **incorrectly** paired with their function?

	cells / tissues	function
A	cartilage	reinforces the trachea
B	ciliated epithelial cells	move mucus over the surface of the trachea
C	goblet cells	produce enzymes to destroy bacteria
D	smooth muscle	constriction of the bronchioles

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31 The graph shows the volume of air breathed out quickly and with force, following a deep breath in, for three different people, X, Y and Z.



What is an explanation for the differences shown?

	chronic bronchitis	emphysema	healthy lung function
A	X	Y	Z
B	X	Z	Y
C	Y	Z	X
D	Z	Y	X

32 Which statement is an example of epidemiological evidence linking smoking to lung cancer?

A Chemical analysis of tar from cigarettes shows that it contains carcinogens.

B Dogs made to inhale the smoke from cigarettes develop lung tumours.

C The incidence of lung cancer increases in a population as more cigarettes are smoked.

D When tar from cigarettes is rubbed onto the skin of mice, the mice develop skin tumours.

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33 Some facts about diseases are listed.

1 may be inherited from a parent
2 may be carried by a vector
3 may be caused by stress
4 may be passed on by contact
5 may enter through the mouth with food

Which numbered statements apply to infectious diseases?

A 1, 2 and 3

B 1, 3 and 5

C 2, 3 and 4

D 2, 4 and 5

34 Which disease is **not** likely to be passed directly from parent to child?

A cholera

B HIV / AIDS

C malaria

D tuberculosis

35 Which diseases can be cured by the use of antibiotics?

A cholera and tuberculosis

B HIV / AIDS and smallpox

C HIV / AIDS and tuberculosis

D smallpox and cholera

36 Which sequence of events correctly describes the action of a phagocyte when a pathogen is encountered?

A endocytosis → digestion by lysosome enzymes → phagocytic vacuole formation → exocytosis

B endocytosis → phagocytic vacuole formation → digestion by lysosome enzymes → exocytosis

C exocytosis → phagocytic vacuole formation → digestion by lysosome enzymes → phagocytosis

D phagocytosis → digestion by lysosome enzymes → phagocytic vacuole formation → endocytosis

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37 Where are antibodies and antigens found?

	on surface of pathogen	on surface of macrophage	in blood plasma
A	antibody	antibody	antigen
B	antibody	antigen	antibody
C	antigen	antibody	antigen
D	antigen	antigen	antibody

38 Which statement explains why two species **cannot** permanently occupy the same ecological niche?

A The two species could not interbreed.

B The two species may be part of separate food webs.

C The two species would compete for the same resources.

D The two species would have different nutritional requirements.

39 Following an environmental disaster of a major volcanic eruption, the atmosphere contains greatly increased amounts of dust.

How does this affect the following organisms?

	nitrifying bacteria	primary consumer	producer	secondary consumer
A	decrease	increase	increase	increase
B	increase	decrease	decrease	decrease
C	increase	no change	no change	decrease
D	no change	increase	decrease	no change

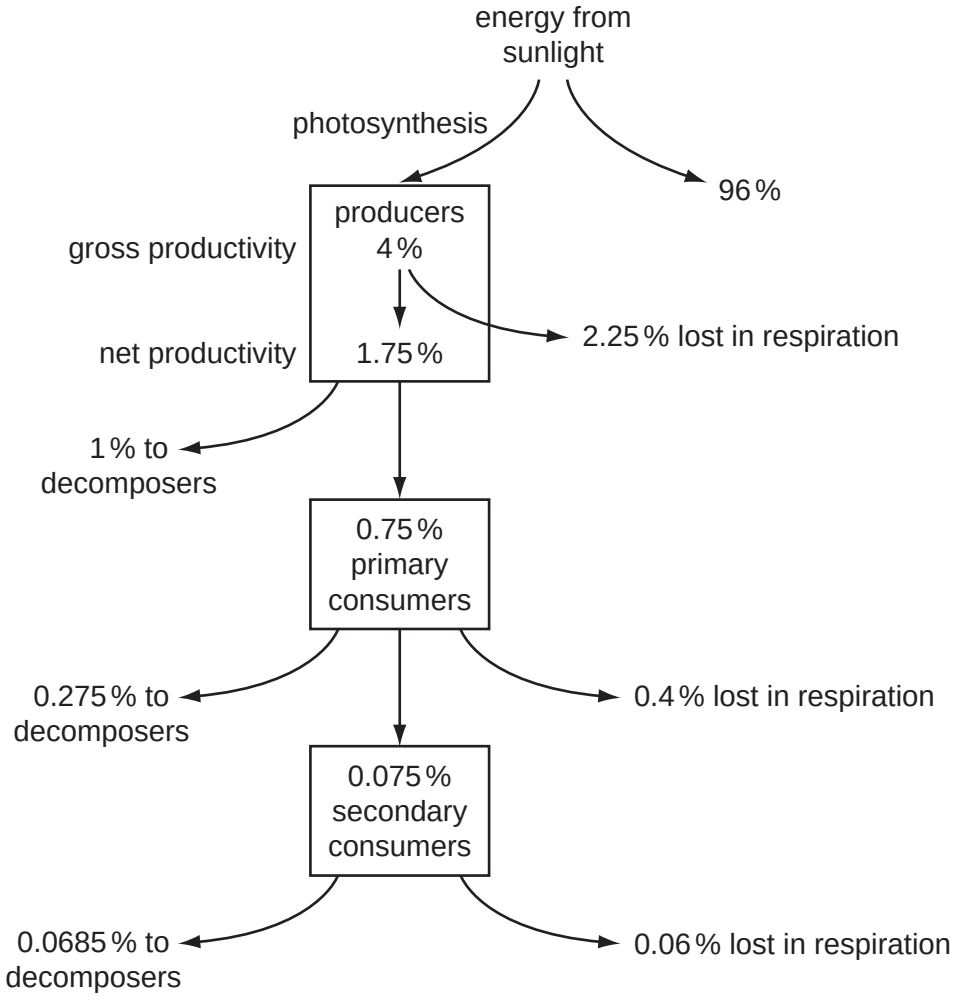
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40 The diagram shows the flow of energy through an ecosystem. Photosynthesis is the **gross productivity**. Producers lose some energy in respiration and the energy left is the **net productivity**.

This can also be expressed as an equation:

Net Productivity (NP) = Gross Productivity (GP) – Respiration (R)

Some of the net productivity passes to herbivores.



Which calculation gives the proportion of **net** productivity passing to herbivores?

A $\frac{0.075}{1.75}$ **B** $\frac{0.75}{4}$ **C** $\frac{0.75}{1.75}$ **D** $\frac{(0.75+0.075)}{1.75}$

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