Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/12**

Paper 1 Multiple Choice **October/November 2018**

1 hour

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

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READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, 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.
DO **NOT** WRITE IN ANY BARCODES.

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.
Electronic calculators may be used.

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

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CAMBRIDGE International Examinations

1 What is the diameter of a typical prokaryote, such as *Streptococcus*?

A 7.5×10^{1} nm

B 7.5×10^{2} nm

C 7.5×10^{0} μm

D 7.5×10^{1} μm

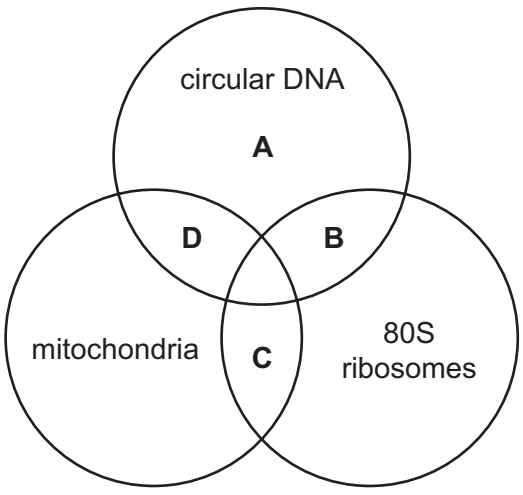
2 A specimen of plant tissue is first observed under a microscope using red light with a wavelength of 650 nm.

The same specimen is then observed under the same conditions, but using green light with a wavelength of 510 nm.

What happens to the magnification and resolution when using green light compared to red light?

	magnification	resolution
A	decreases	decreases
B	increases	increases
C	remains the same	decreases
D	remains the same	increases

3 Which structures are present in a *Vibrio cholerae* cell?



4 The removal of a plant cell wall by enzyme digestion leaves an intact membrane-bound structure called a protoplast.

Which statement explains why protoplasts are easily damaged?

A Mitochondria stop producing ATP to maintain membrane integrity.

B Net movement of water is no longer limited by turgor.

C Secretory vesicles are unable to fuse with the cell surface membrane.

D The shape of the cell structures is changed by the loss of cell shape.

5 Which statements are correct for a green plant?

1 ATP is produced by mitochondria.

2 ATP is produced by chloroplasts.

3 ATP forms part of the DNA.

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

6 Which processes occur in eukaryotes and prokaryotes?

1 hydrolysis

2 mitosis

3 transcription

4 translation

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

7 A sample of a solution was tested for reducing sugar and the result was negative.

Another sample of the same solution was then tested for non-reducing sugar and the result was positive.

Which step in the test for non-reducing sugar breaks the glycosidic bonds?

A addition of Benedict's reagent

B addition of sodium hydroxide

C boiling with hydrochloric acid

D heating to 80 °C

8 Which row correctly identifies three polysaccharides

	α-glucose straight chain	α-glucose branching chain	β-glucose straight chain
A	amylose	amylopectin	cellulose
B	amylose	glycogen	amylopectin
C	glycogen	amylose	amylopectin
D	glycogen	amylose	cellulose

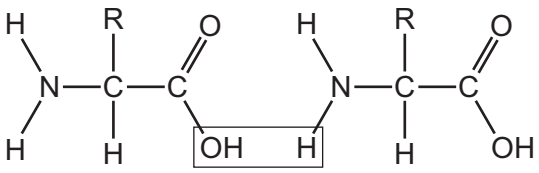
9 Which row describes a triglyceride?

	hydrophobic	insoluble in alcohol
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

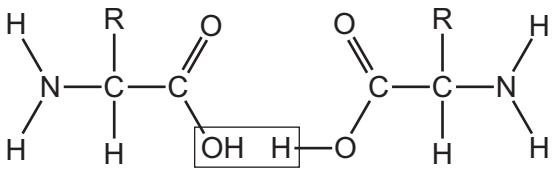
key
✓ = correct
✗ = not correct

10 Which diagram shows where a peptide bond would be formed?

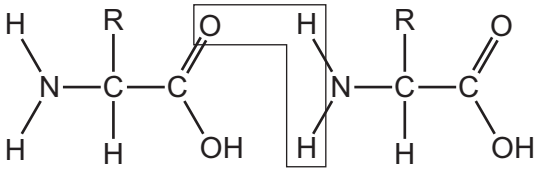
A



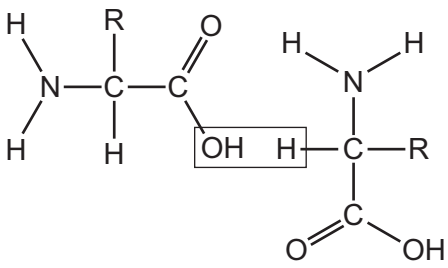
B



C



D



11 Which statements about collagen molecules are correct?

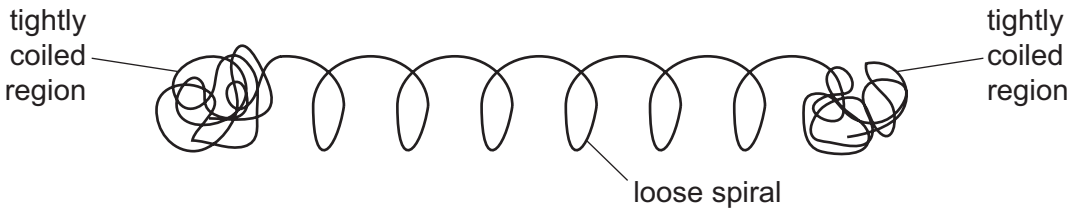
1 Both types of secondary structure occur within the molecules.

2 Large numbers of hydrogen bonds stabilise the molecules.

3 Repeated amino acid sequences determine the tertiary structure.

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

12 The protein glutenin gives bread dough its elasticity. The diagram represents a polypeptide of glutenin.



What describes the structure of glutenin?

A quaternary structure because there are both globular and fibrous regions

B quaternary structure because there are both spiral and tightly coiled regions

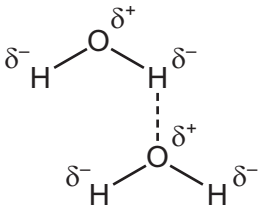
C secondary structure because the loose spiral is an α-helix

D tertiary structure because the different regions form a 3D shape

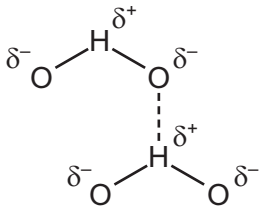
13 Which diagram correctly shows hydrogen bonding between water molecules?

The symbol δ indicates the partial charge on an atom in the water molecule.

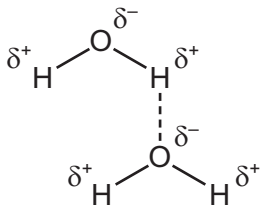
A



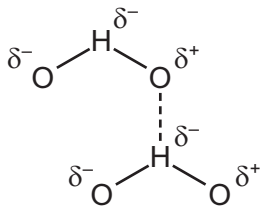
B



C



D



14 Aspirin inhibits an enzyme by reacting with an amino acid that forms an essential part of the 3D structure of the enzyme. Part of the aspirin molecule binds firmly with the amino acid.

What describes this inhibition?

1 competitive inhibition

2 non-competitive inhibition

3 reversible inhibition

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

15 The table shows the Michaelis-Menten constant, K_m, for three enzymes.

enzyme	K_m / mmoldm^{-3}
C	1.5×10^{-2}
P	3.0×10^{-4}
F	5.0×10^{-6}

Which interpretation of the information is correct?

A Enzyme C has a V_{max} which is half that of enzyme P.

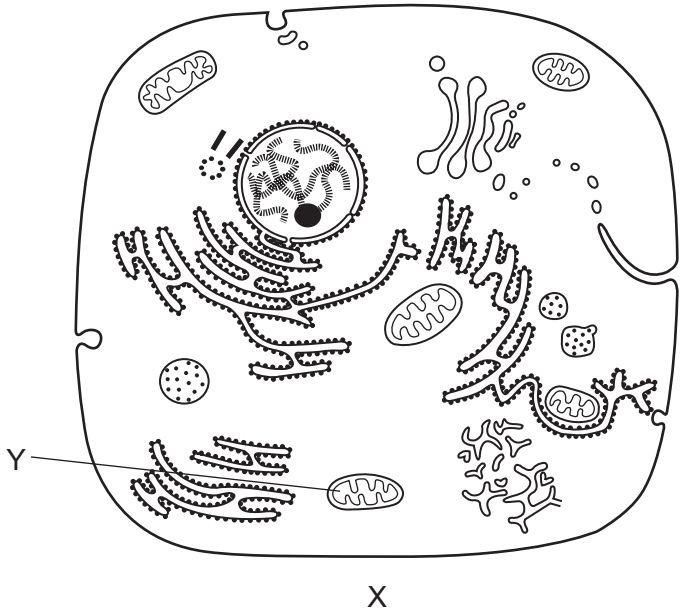
B Enzyme C will reach V_{max} in the shortest time interval.

C Enzyme F has the greatest affinity for its substrate.

D Enzyme P has a V_{max} of 6.0×10^{-3} mmoldm^{-3}.

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16 The diagram is a drawing from an electron micrograph of a typical animal cell.



How many layers of phospholipids will a molecule of oxygen cross to travel directly from X, outside the cell, to Y, the matrix of the mitochondrion?

A 3 **B** 4 **C** 5 **D** 6

17 How could water molecules cross the cell surface membrane of animal cells?

1 carrier proteins

2 channel proteins

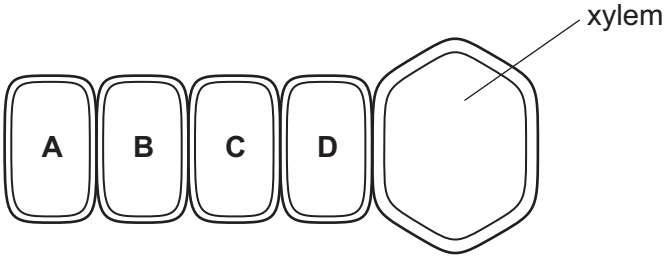
3 cholesterol molecules

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

18 The diagram shows a xylem vessel in a root and four adjacent parenchyma cells.

As water moves up the xylem vessel, it is replaced by water from cell **D**. Water in cell **D** is replaced by water in cell **C**, resulting in a flow of water from cell **A** to the xylem.

Which cell has the least negative water potential?



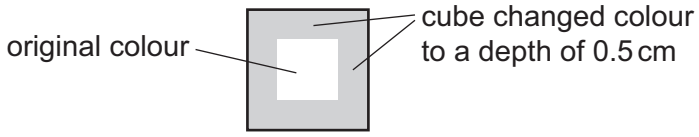
19 Agar cubes can be used to demonstrate the effect of changing surface area to volume ratio on diffusion.

Three different agar cubes made using a dilute acid were placed into an indicator solution that diffused into the cubes. When the indicator came into contact with the acid it changed colour.

The cubes were 1 cm^3, 2 cm^3 and 3 cm^3 and were left in the indicator solution for 10 minutes. All other variables were kept the same. The results were recorded as diagrams.

The results for the 2 cm^3 cube are shown.

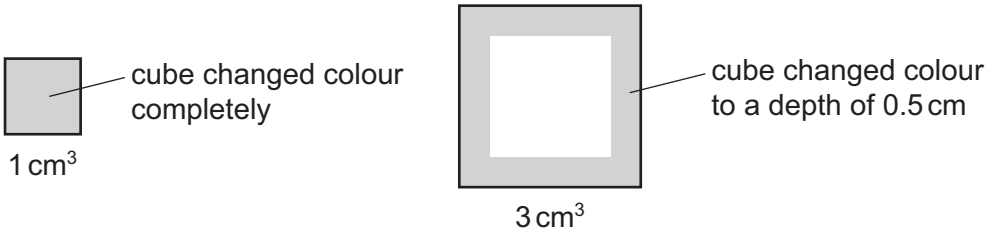
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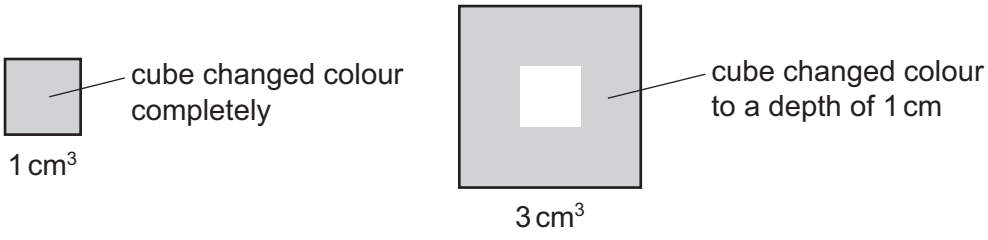
Which diagrams represent the results for the 1 cm^3 and the 3 cm^3 cubes?

not to scale

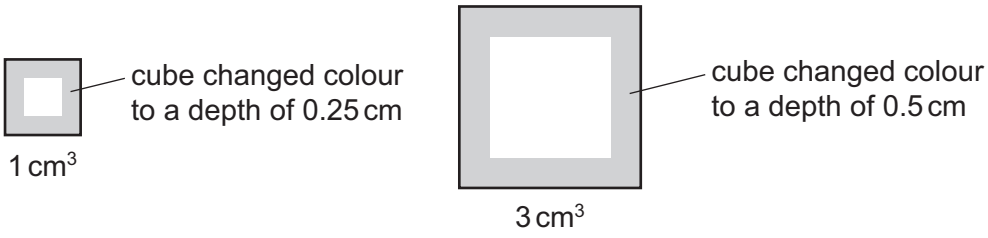
A



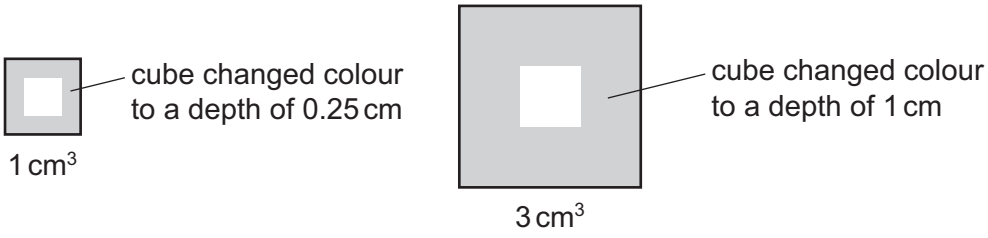
B



C

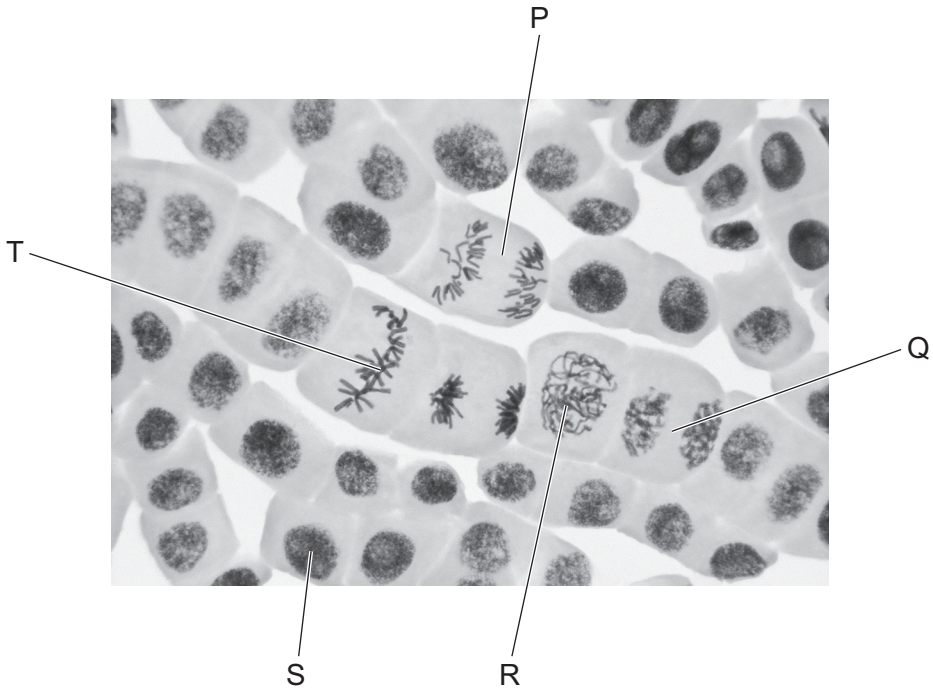


D



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20 The photomicrograph shows cells in different stages of mitosis.



Which statements are correct?

1 Cell T shows metaphase.

2 DNA replication occurs in cell R.

3 The amount of DNA in cell P is the same as in cell T.

4 The correct order for the stages is S → R → T → P → Q.

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

21 Which changes in a group of mammalian cells, dividing by mitosis, would be necessary for the formation of a tumour?

1 Mitosis is no longer inhibited by cell to cell contact.

2 Cells acquire the ability to migrate and set up new colonies.

3 Cells become able to divide indefinitely.

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

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22 Which row shows some of the events during a mitotic cycle in the correct time sequence?

	time →			
A	centromere of each chromosome splits	nucleoli become visible	nuclear envelope breaks into small vesicles	spindle microtubules produced
B	nuclear envelope breaks into small vesicles	spindle microtubules produced	centromere of each chromosome splits	nucleoli become visible
C	nucleoli become visible	nuclear envelope breaks into small vesicles	spindle microtubules produced	centromere of each chromosome splits
D	spindle microtubules produced	centromere of each chromosome splits	nucleoli become visible	nuclear envelope breaks into small vesicles

23 What is the maximum number of hydrogen bonds in a length of DNA containing 700 base pairs?

A 350 **B** 700 **C** 1400 **D** 2100

24 What is the common component of the three molecules RNA, DNA, and ATP?

A adenosine

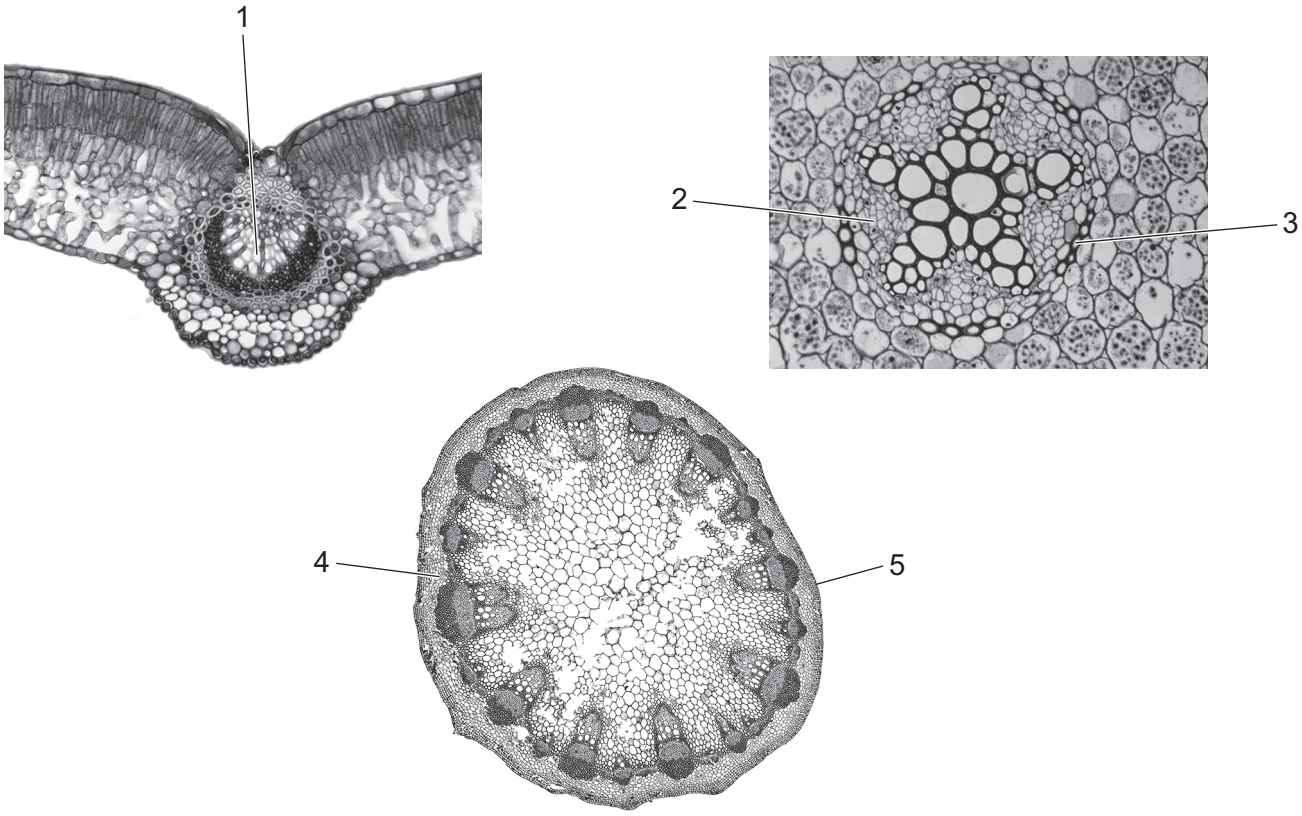
B hydrogen bonds

C phosphate

D ribose

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25 Photomicrographs of a dicotyledonous plant root, stem and leaf are shown.



Which row is correct for the labels 1 to 5 on the photomicrographs?

	1	2	3	4	5
A	cortex	phloem	epidermis	parenchyma	endodermis
B	phloem	parenchyma	xylem	epidermis	cortex
C	phloem	xylem	endodermis	cortex	epidermis
D	xylem	phloem	endodermis	cortex	epidermis

26 Which features apply to phloem sieve tube elements and to xylem vessel elements?

1 no cytoplasm

2 no end walls

3 no nucleus

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

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27 Which statement correctly describes an event in the process of mass flow in phloem sieve tube elements?

A Any part of a plant where sucrose is loaded into a sieve tube element is called a sink.

B Loading sucrose into a sieve tube element increases the water potential inside it.

C Mass flow in the phloem is a passive process occurring at the same rate as diffusion.

D Sucrose moves down a hydrostatic pressure gradient in the phloem from source to sink.

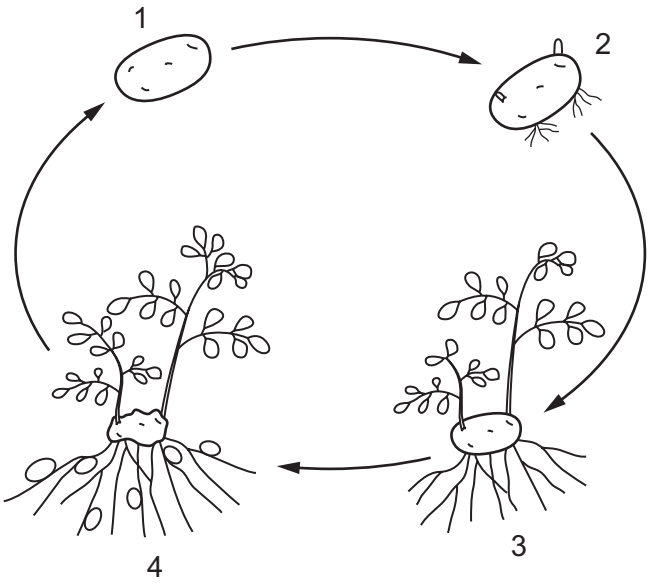
28 The diagram shows a potato tuber at different stages.

1 dormant tuber (not growing)

2 sprouting roots and shoots

3 growing roots and shoots

4 making new potato tubers



Which row identifies a stage where a potato tuber acts as a source and a stage where it acts as a sink?

	source	sink
A	1	3
B	2	4
C	3	2
D	4	1

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29 What describes the role of the atrio-ventricular node of the heart?

A It causes the muscles of the ventricles to contract from the apex upwards.

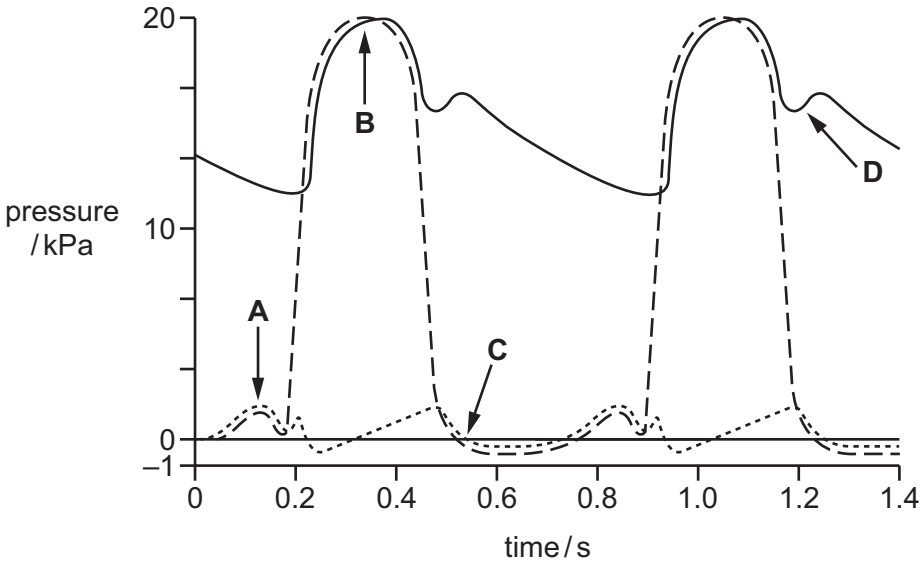
B It delays the transmission of a wave of electrical activity from the sinoatrial node.

C It initiates a new wave of electrical activity in the ventricles.

D It provides a non-conducting barrier between the atria and the ventricles.

30 The diagram shows pressure changes during the cardiac cycle.

Which arrow indicates ventricular systole?



31 Which process can be carried out by a mature red blood cell?

A active transport

B cell division

C phagocytosis

D protein synthesis

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

Which statement about the binding sites of haemoglobin is correct?

A Carbon dioxide and carbon monoxide bind to one site, oxygen binds to a different site.

B Carbon dioxide and oxygen bind to one site, carbon monoxide binds to a different site.

C Carbon monoxide and oxygen bind to one site, carbon dioxide binds to a different site.

D Carbon monoxide, oxygen and carbon dioxide all bind to different sites.

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33 Which tissues are present in a bronchus?

	cartilage	ciliated epithelium	smooth muscle
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

key
✓ = present
✗ = absent

34 Cigarette smoke contains tar.

Which statements describe the effect of tar on the respiratory system?

1 Tar causes goblet cells to increase the secretion of mucus.

2 Tar increases the risk of blood clots forming inside blood vessels.

3 Tar may cause changes to the DNA in epithelial cells.

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

35 Symptoms of chronic obstructive pulmonary disease (COPD) include a cough, breathlessness and chest infections.

Some of the changes in the lungs that result from smoking are listed.

1 Alveoli lose elastin and collapse.

2 Bacteria accumulate in the mucus.

3 Cilia are inactivated.

4 Goblet cells secrete more mucus.

Which changes cause the cough in COPD?

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

36 Which statements about infectious diseases are correct?

1 Cholera has a vaccine available and is caused by a bacterial pathogen of the *Vibrio* group.

2 Measles has a vaccine available and is caused by a pathogen called *Morbillivirus*.

3 Smallpox was eradicated by vaccination and was caused by a bacterial pathogen called *Variola*.

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

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37 The antibiotic tetracycline binds to the small subunit of bacterial ribosomes, stopping protein synthesis.

Bacteria have become resistant to tetracycline due to the effect of mutations.

Which effect could produce resistance to tetracycline?

A preventing tetracycline from binding to the bacterial cell wall

B preventing tetracycline from entering the bacterial cell

C preventing tetracycline from inhibiting transcription

D preventing the production of tetracycline by ribosomes

38 Where are antigens found?

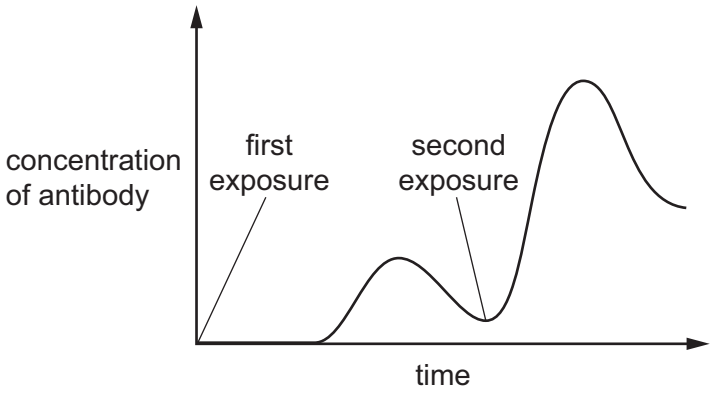
	on the surface of macrophages	in blood plasma
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = antigens found

✗ = antigens not found

39 The graph shows how the body reacts following exposure to an antigen for the first and second time.



What is the direct cause of the increase in antibody production after the second exposure to antigens?

A B-memory cells

B macrophages

C plasma cells

D T-memory cells

40 Why has it proved difficult to develop an effective vaccine against malaria?

A Mosquitoes have many stages in their life cycles.

B The human immune system does not recognise the antigens of the parasite.

C The parasites can only be attacked when outside the liver cells and red blood cells.

D Vaccines are rapidly broken down by proteases in the stomach.

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