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

BIOLOGY **9700/12**

Paper 1 Multiple Choice **May/June 2012**

1 hour

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

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 06_9700_12/4RP

1 Which range of sizes would include most eukaryotic cells?

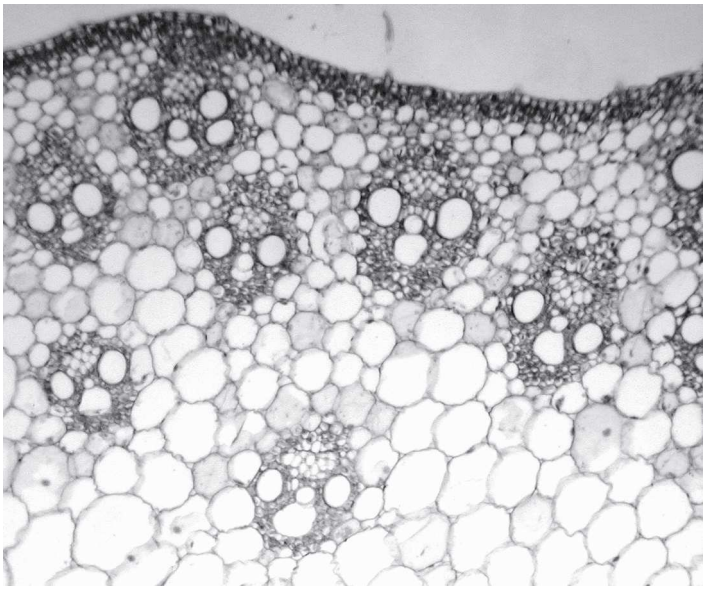
A 1×10^2 nm to 1 μm

B 1 μm to 1×10^1 μm

C 1×10^1 μm to 1×10^2 μm

D 1×10^2 μm to 1×10^3 μm

2 A student was asked to draw a plan diagram of the plant tissue shown in the photomicrograph and to annotate two observable features.



What are the correct annotations?

A epidermis darkly stained layer of cells, xylem hollow vessels

B epidermis formed of single layer of cells, xylem strengthened by lignin

C phloem small cells, xylem empty cells to transport water

D vascular bundles arranged in a regular pattern, xylem large dead cells

3 Which structure is present in **all** eukaryotic cells but **not** present in prokaryotic cells?

A 70S ribosome

B cell wall

C chromatin

D plasmid

4 What restricts the resolution of the light microscope?

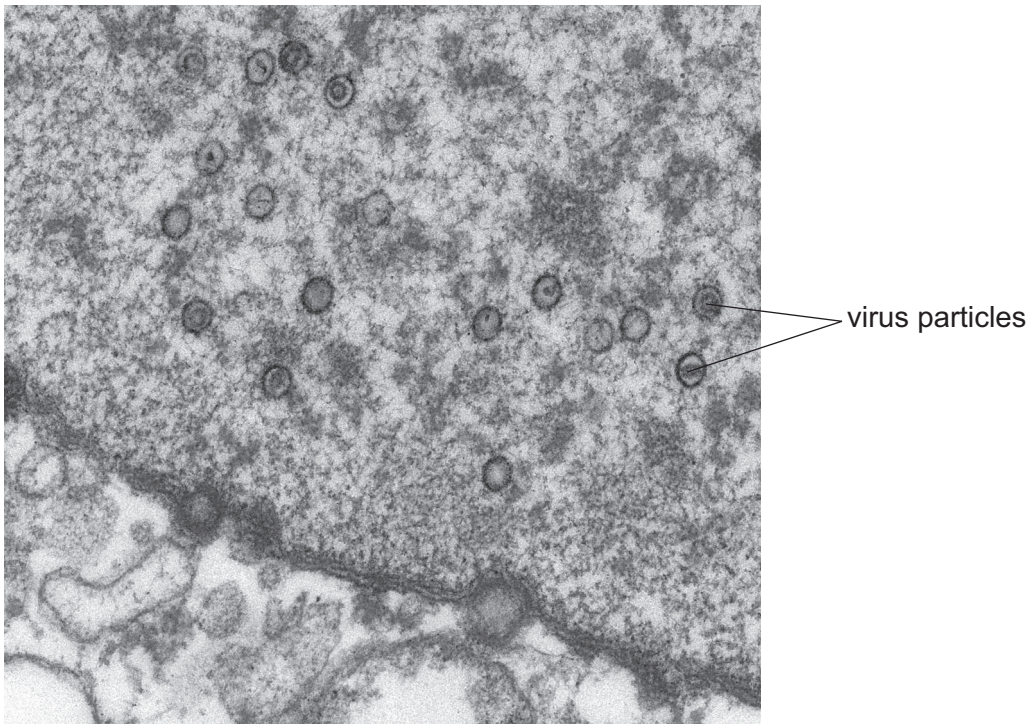
A the inability to cut very thin sections

B the low light intensity of microscope lamps

C the low magnification produced by glass

D the wavelengths of visible light

5 The diagram shows an electron micrograph of virus particles in a human nucleus.



×24 000

What is the diameter of the labelled virus particles?

A $1.5 \times 10^{0}\,\mu m$ **B** $1.5 \times 10^{-2}\,\mu m$ **C** $1.5 \times 10^{0}\,nm$ **D** $1.5 \times 10^{2}\,nm$

6 A student carried out a series of tests on an extract from a plant.

The table shows the results of the tests.

reagent	observation
ethanol and water	white emulsion
Benedict's solution	brick red precipitate
Biuret	blue colour

Which row shows the molecules found in the plant extract?

	protein	fatty acids	reducing sugar
A	✓	✓	✓
B	✗	✓	✓
C	✗	✓	✗
D	✗	✗	✓

key

✓ = present

✗ = absent

7 Glycogen is a polymer of glucose.

Which description summarises its structure?

A α-glucose joined by glycosidic bonds involving carbons 1 and 4

B α-alpha glucose joined by glycosidic bonds involving carbons 1, 4 and 6

C β-beta glucose joined by glycosidic bonds involving carbons 1 and 4

D β-beta glucose joined by glycosidic bonds involving carbons 1, 4 and 6

8 Which molecules contain C=O bonds?

1 amino acids

2 fatty acids

3 proteins

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

9 Which of the statements about polysaccharides can be used to describe both amylose and amylopectin?

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

10 Which carbohydrate gives a brick red colour when heated with Benedict's solution?

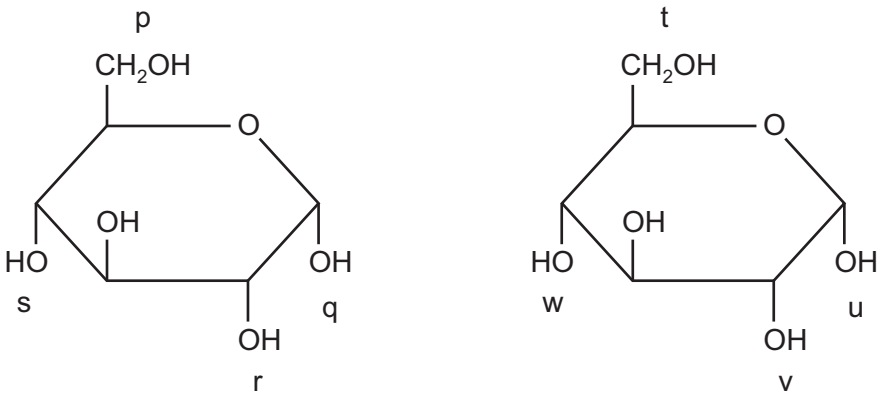
A cellulose

B fructose

C glycogen

D sucrose

11 The diagram shows two molecules of glucose. Four possible bonding positions are labelled p, q, r, and s, and t, u, v, w.



When these two molecules condense during the formation of a glycogen molecule, where could bonds form?

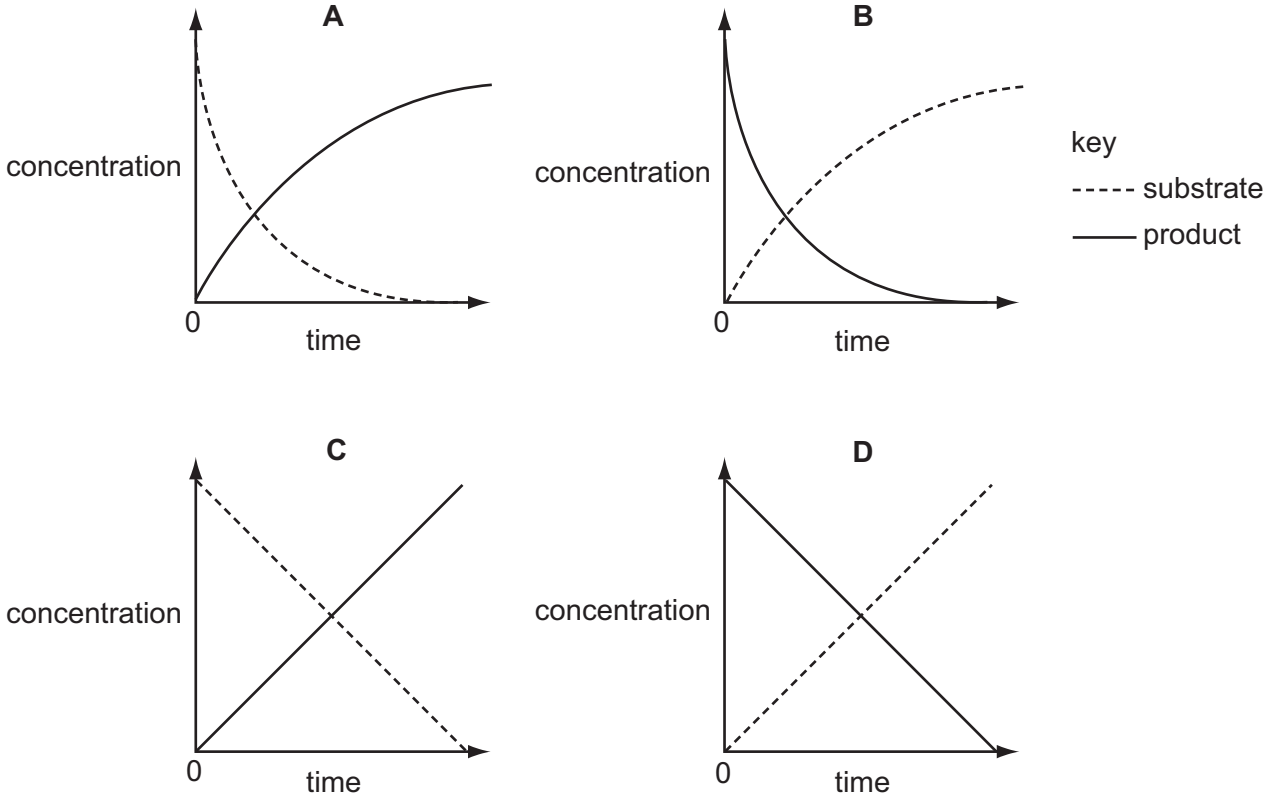
A p – u or q – w

B q – w or p – v

C r – t or q – u

D s – w or r – v

12 Which graph represents the changes in concentration of a substrate and its product in the same enzyme-catalysed reaction?



13 Glucose in urine can be detected using a biochemical test. When the end of a test strip, which is impregnated with the enzyme glucose oxidase, is dipped into urine, the development of a blue colour indicates that glucose is present.

This is a reliable test that people with diabetes can carry out at home.

Which feature of the enzyme makes this test so reliable?

A It is heat stable.

B It is specific.

C It lowers the activation energy of the reaction.

D It only works at low pH range.

14 What is the role of cholesterol in the cell surface membrane?

A to assist active transport

B to assist facilitated diffusion

C to provide hydrophilic channels

D to regulate fluidity of the membrane

15 The following are all processes by which substances can enter a cell.

1 endocytosis

2 facilitated diffusion

3 osmosis

Which processes are passive?

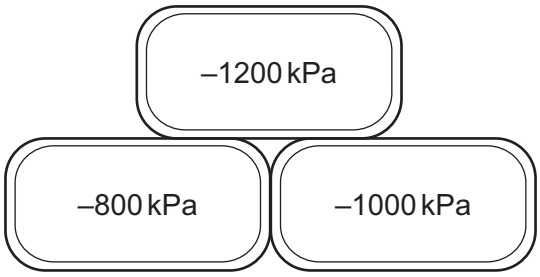
A 2 only

B 3 only

C 2 and 3 only

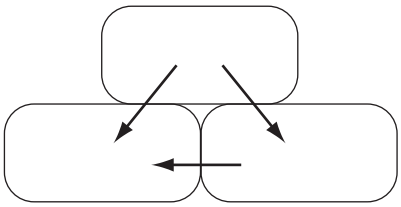
D 1, 2 and 3

16 The diagram shows the water potential of three adjacent plant cells.



In which directions will there be net movement of water by osmosis?

A



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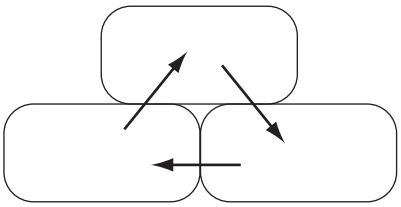

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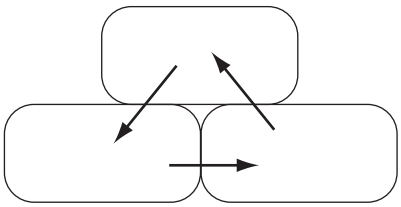

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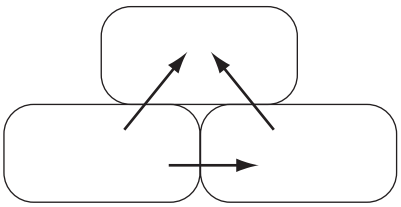


17 Each of the following events takes place during mitosis.

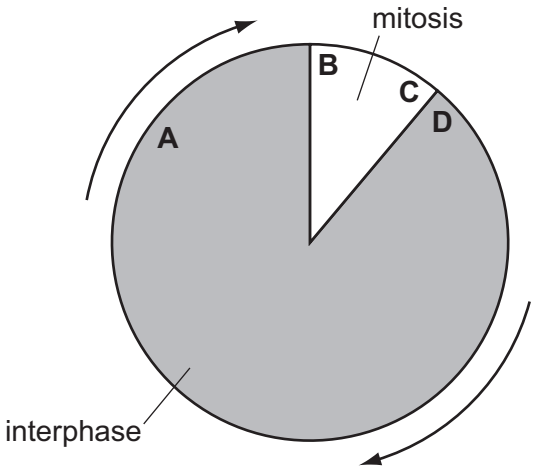
1 centromeres divide
2 chromatids move to opposite poles of the cell
3 chromosomes line up along the equator of the spindle
4 chromosomes uncoil
5 two chromatids are joined by a centromere

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

18 The diagram shows the cell cycle.

When radioactive nucleotides are supplied to dividing cells, at which point will they be incorporated into the chromosomes?



19 What does the process of transcription require?

A ATP, DNA and free nucleotide bases

B DNA, mRNA and RNA polymerase

C mRNA, ribosomes and RNA polymerase

D ribosomes, tRNA and ATP

20 A peptide consists of ten amino acids of four different kinds.

What is the theoretical minimum number of different tRNA molecules required to translate the mRNA for this peptide?

A 4 **B** 10 **C** 12 **D** 30

21 Which statements about tRNA structure are correct?

1 There is a binding site for the attachment of a specific amino acid, as well as a different binding site for the attachment to the ribosome, in order to allow translation to occur.

2 There is a ribose-phosphate backbone with strong covalent phosphodiester bonds and areas within the polynucleotide chain where base-pairing by hydrogen bonding occurs.

3 There is a section known as an anticodon that contains the same triplet of bases as the triplet of DNA bases that has been transcribed to produce the mRNA codon.

A 1 only

B 1 and 2 only

C 2 and 3 only

D 1, 2 and 3

22 Which statements describe why a large animal has had to evolve a transport system?

1 diffusion occurs slowly over long distances

2 it has a high rate of gas exchange

3 it has a large surface area to volume ratio

A 1 only

B 3 only

C 1 and 2 only

D 1, 2 and 3

23 Which row identifies the tissue that contains the Casparian strip and the molecule forming this strip?

	tissue	molecule
A	cortex	lignin
B	endodermis	suberin
C	epidermis	cellulose
D	xylem	lignin

24 Which of the following are included in the apoplast pathway?

1 living components

2 plant vacuoles

3 cell walls

4 xylem vessels

A 3 only

B 1 and 2 only

C 3 and 4 only

D 1, 2 and 4 only

25 Which statement explains why the circumference (girth) of a tree is less in the middle of the day than at night?

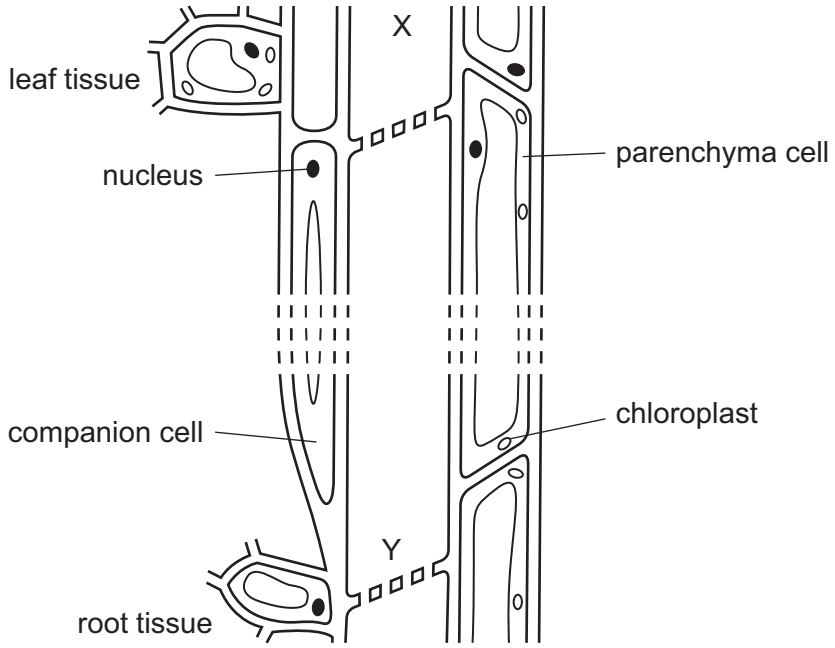
A Mineral uptake by the root hair cells decreases during the night because root pressure has decreased.

B Stomata close during the night and there is a build-up of water in the vascular tissue within the stem.

C The phloem sieve tubes fill with dissolved solutes because the translocation rate is reduced at night.

D There is less tension in the xylem vessels at night because the rate of transpiration is at a minimum.

26 Sucrose is transported in solution in the phloem of plants. Transport takes place from sources to sinks. The process depends on differences in hydrostatic pressure between the sources and the sinks.



Which tissues are either a source or a sink and what is the hydrostatic pressure at X and Y within the phloem?

	tissue		hydrostatic pressure	
	leaf	root	high	low
A	sink	source	X	Y
B	sink	source	Y	X
C	source	sink	X	Y
D	source	sink	Y	X

27 Which of the following are found in **all** blood vessels, lymph and tissue fluid?

1 carbon dioxide

2 glucose

3 white blood cells

4 antibodies

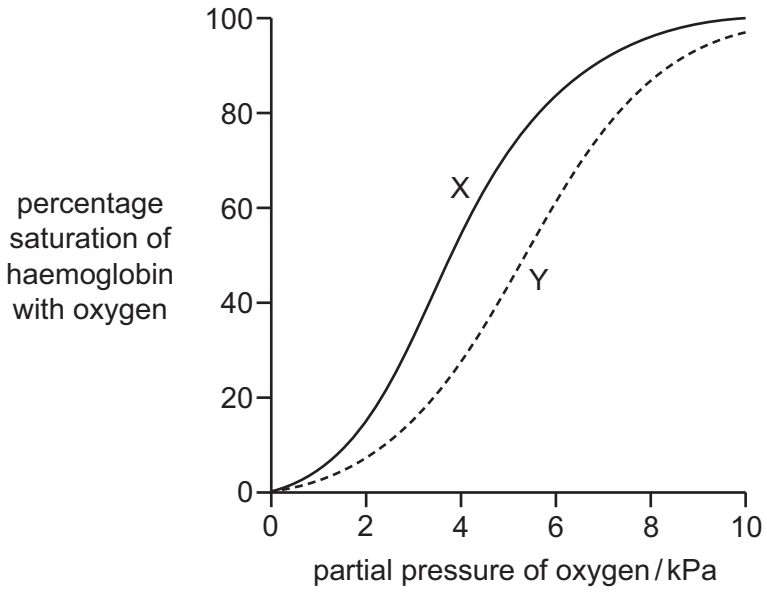
A 2 and 4 only

B 1, 2 and 3 only

C 1, 3 and 4 only

D 1, 2, 3 and 4

28 The diagram shows the Bohr effect.



What causes the shift from X to Y?

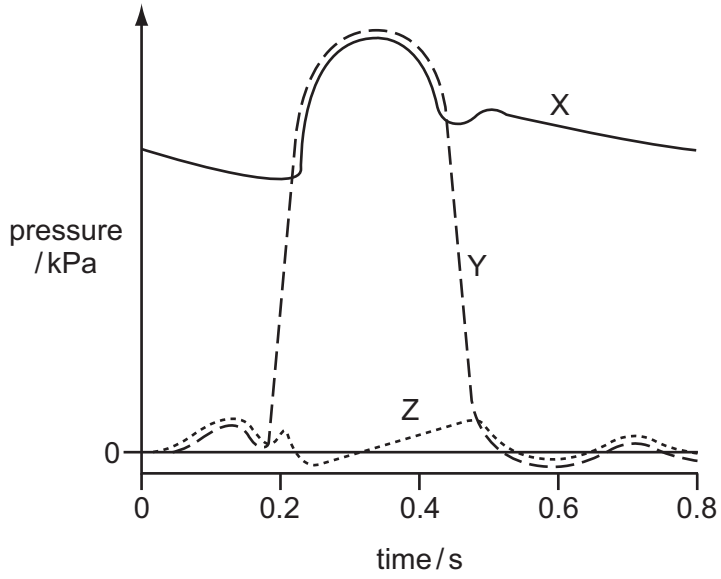
A decreased concentration of carbon dioxide and high pH

B decreased concentration of carbon dioxide and low pH

C increased concentration of carbon dioxide and high pH

D increased concentration of carbon dioxide and low pH

29 The graph shows the pressure changes in different areas of the left side of the heart during one cardiac cycle.



Which row shows the pressure changes in each part of the heart?

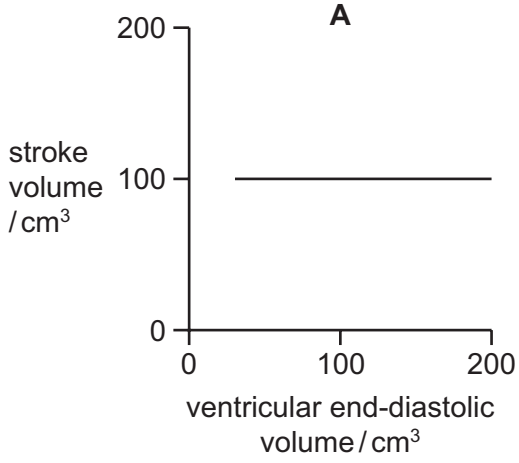
	left atrium	left ventricle	aorta
A	X	Y	Z
B	Y	Z	X
C	Z	X	Y
D	Z	Y	X

[Turn over

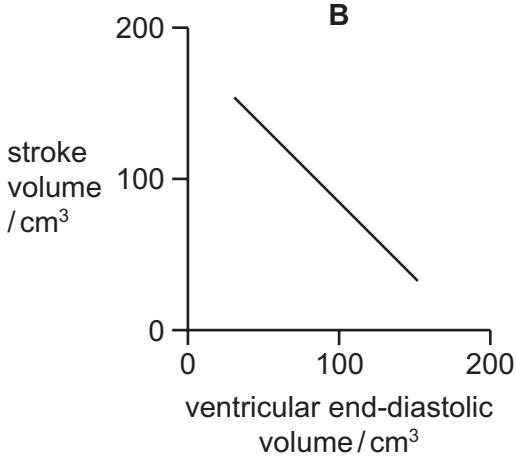
30 The stroke volume is the volume of blood pumped by each contraction of a ventricle. The ventricular end-diastolic volume is the volume of blood in the ventricle just before systole.

Which graph shows the relationship between the stroke volume and the ventricular end-diastolic volume?

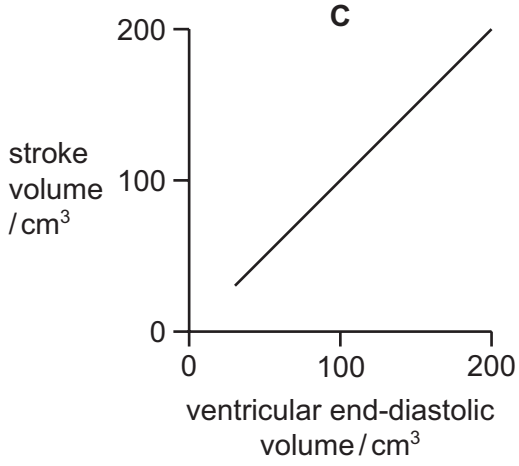
A



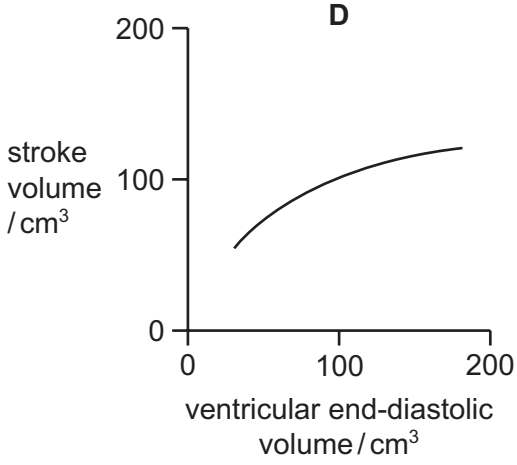
B



C



D



31 Which component of tobacco smoke causes an increase in blood pressure?

A carbon monoxide

B carcinogens

C nicotine

D tar

32 Which statements about chronic obstructive pulmonary disease (COPD) are correct?

1 The patient coughs a lot, bringing up mucus.

2 The patient's symptoms normally do not change.

3 The patient is normally over 30 years old.

4 The disease can often be reversed by treatment.

A 1, 2 and 3 only

B 1, 2 and 4 only

C 2, 3 and 4 only

D 1, 2, 3 and 4

33 What would be seen in a photomicrograph of the wall of the trachea?

	tissue		
	elastic fibres	epidermis	smooth muscle
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✗

key

✓ = present

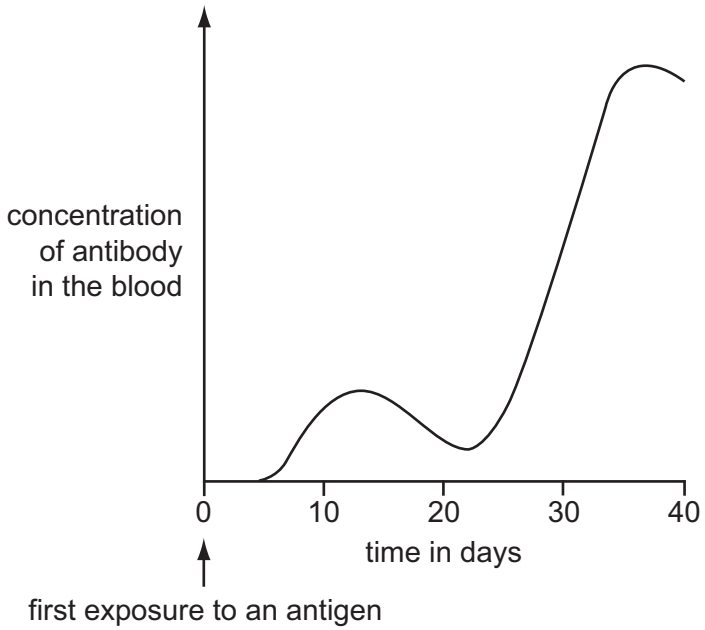
✗ = absent

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

What type of immune response is produced?

	passive	artificial
A	no	no
B	no	yes
C	yes	no
D	yes	yes

35 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 lymphocytes are activated on day 12.

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

36 Which of the following two diseases are caused by viruses?

A HIV and cholera

B malaria and cholera

C measles and smallpox

D TB and HIV

37 Cholera is no longer common in many countries. What is the reason for this?

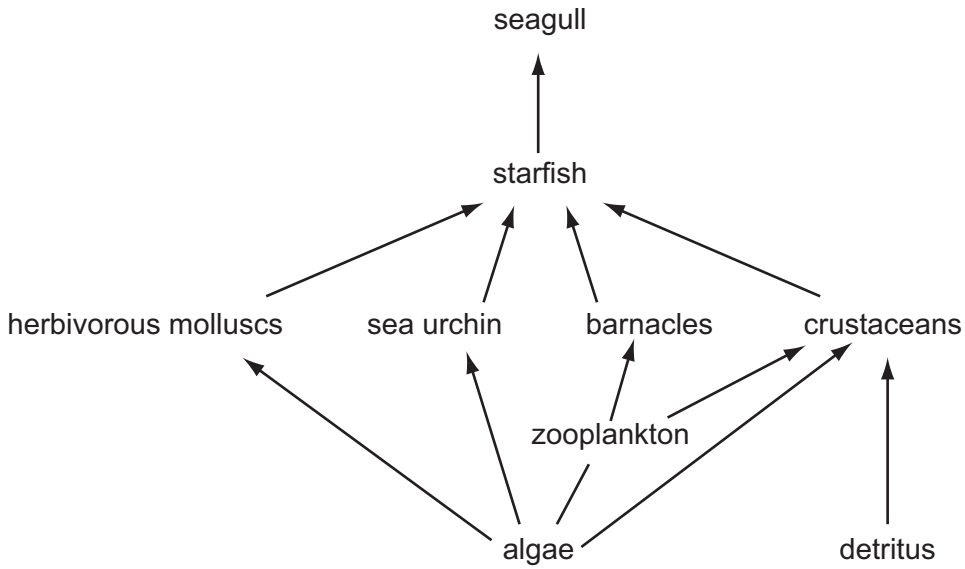
A education of the citizens about the spread of the disease

B routine vaccination by local health authorities

C treatment of water supplies and separate sewage treatment

D treatment of water to control mosquitoes

38 The diagram shows a food web.



How many trophic levels are represented in the food web?

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

39 What is the role of decomposers in the nitrogen cycle?

A They convert proteins to ammonium compounds.

B They fix atmospheric nitrogen.

C They oxidise ammonium compounds to nitrites.

D They oxidise nitrites to nitrates.

40 Why could only 4 % of the energy from sunlight be fixed by producers during photosynthesis?

A A lot of energy is lost as energy passes from one trophic level to the next in food chains.

B A lot of sunlight reflects off clouds, is absorbed by pond water or does not strike chloroplasts.

C Some energy passes from dead plants to decomposers such as bacteria and fungi.

D Some parts of plants are not eaten or cannot be digested by herbivores.

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