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

BIOLOGY **9700/11**

Paper 1 Multiple Choice **October/November 2013**

1 hour

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

9604054839

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

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1 Which cell structure can be seen **only** with an electron microscope?

A cell wall

B chromosome

C nucleolus

D ribosome

2 Which statement is **not** correct in its description of a light microscope or an electron microscope?

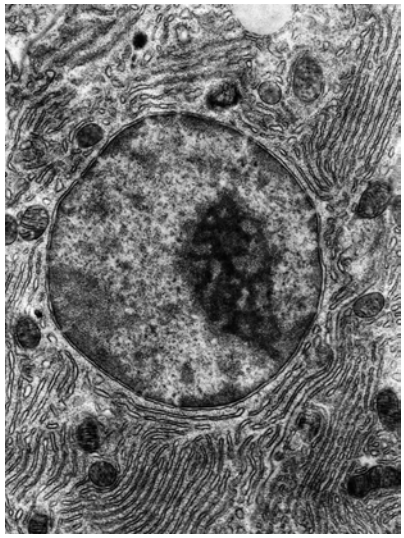
A A light microscope has a maximum resolution of 0.2 μm.

B An electron microscope has a maximum resolution of 0.05 nm.

C A light microscope can resolve specimens as small as 200 nm in diameter.

D An electron microscope can resolve specimens as small as 0.5 nm in diameter.

3 The electronmicrograph shows part of an animal cell.



What will be synthesised in large quantities in this cell?

1 ATP

2 glucose

3 RNA

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

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4 Which statements about a typical eukaryotic cell are correct?

1 It is smaller than 2 μm.

2 It has a nucleolus.

3 It has linear DNA.

4 It only has small (70S) ribosomes.

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

5 Which animal cells would have the most Golgi apparatus?

A ciliated epithelial cells

B goblet cells

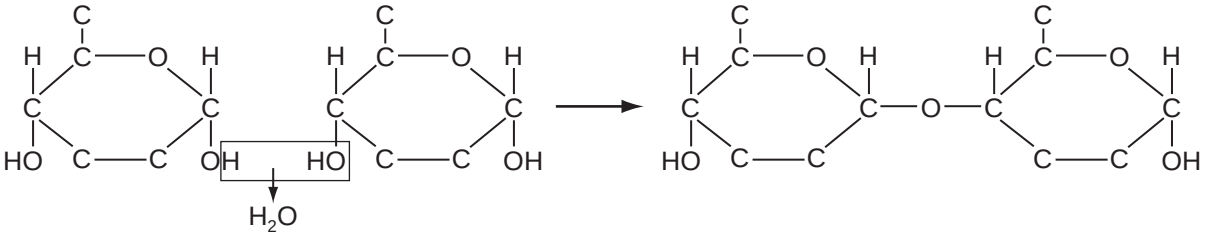
C red blood cells

D smooth muscle cells

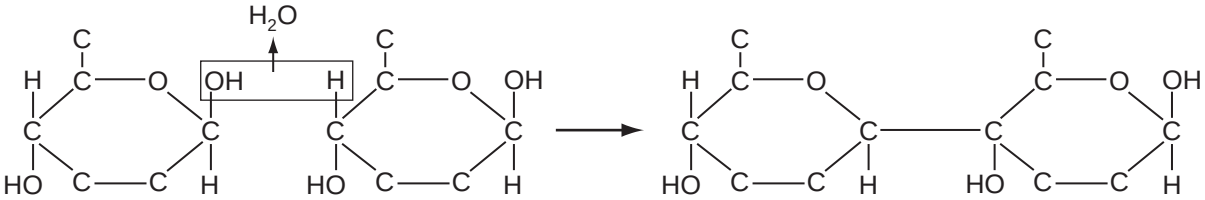
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6 Which diagram shows the reaction that occurs to link two monomers that form cellulose?

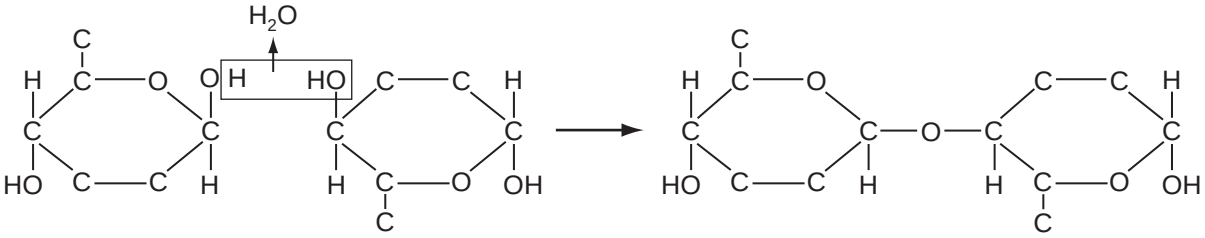
A



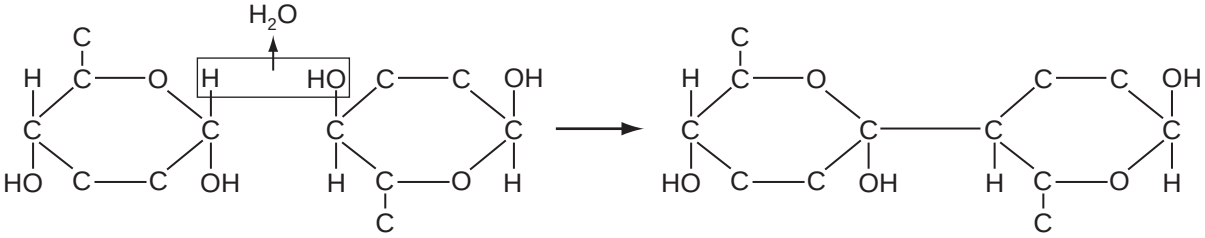
B



C



D



7 Which bonds will be broken when a molecule of glycogen is hydrolysed?

1 α-1, 4

2 β-1, 4

3 α-1, 6

4 β-1, 6

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

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8 Collagen is a macromolecule with three polypeptides lying closely side by side in the form of a triple helix.

Every third amino acid in each polypeptide has the shortest possible R-group or side chain (– H) to allow close packing of the polypeptides.

Which is the amino acid?

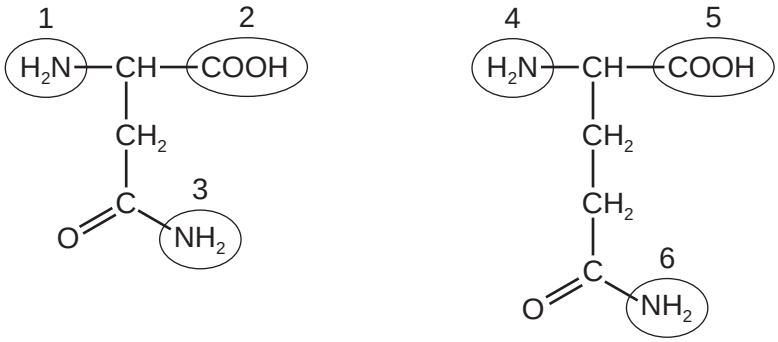
A glucose

B glycerol

C glycine

D guanine

9 The diagrams show the structures of two amino acids, each of which has two amine ($–NH_2$) groups.



A peptide bond is formed between the two amino acids.

Which groups form the peptide bond?

A 1 and 4 **B** 1 and 5 **C** 2 and 6 **D** 3 and 5

10 Each list, 1, 2 and 3, shows some substances found in animal tissues.

1 glucose, cholesterol, triglycerides, water.

2 glycogen, antibodies, adenine, phospholipids.

3 haemoglobin, carbon dioxide, mRNA, monosaccharides.

Which shows one or more substances that contain nitrogen atoms?

A 1, 2 and 3

B 1 and 2 only

C 1 and 3 only

D 2 and 3 only

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11 Which statements about competitive inhibitors of enzyme action are correct?

1 Increasing the concentration of the enzyme's substrate will reduce their effect.

2 They bind to an enzyme at its active site.

3 They reduce the activation energy required for a reaction to take place.

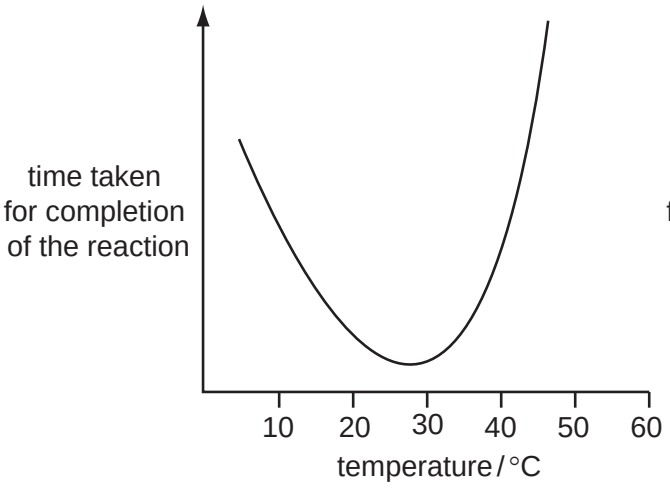
4 They reduce the maximum rate of reaction.

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

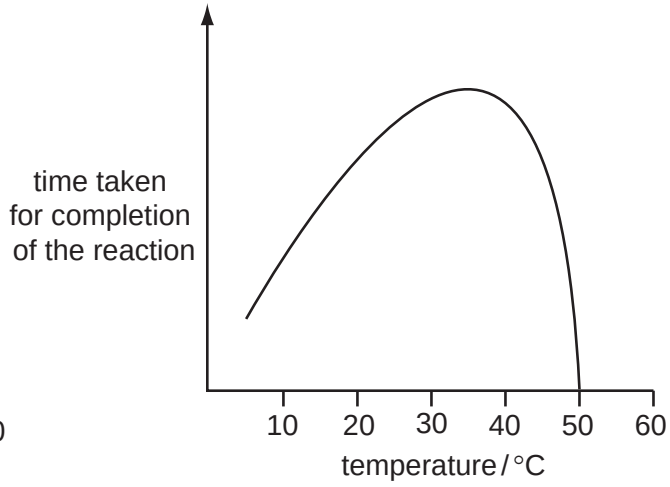
12 An enzyme is completely denatured at 50 °C. A fixed concentration of this enzyme is added to a fixed concentration of its substrate. The time taken for completion of the reaction is measured at different temperatures.

Which graph shows the results?

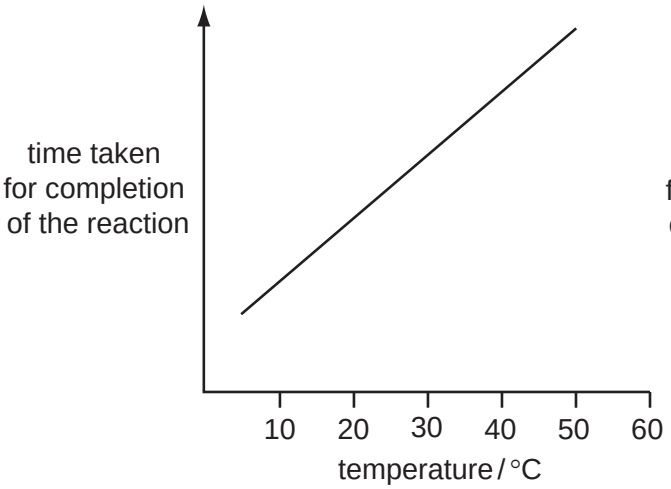
A



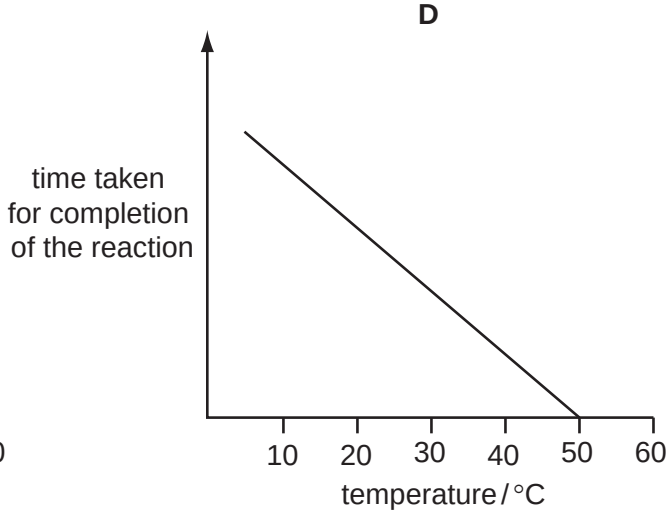
B



C



D



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13 Molecules 1, 2 and 3 are found in cell surface membranes.

1 glycolipids

2 glycoproteins

3 phospholipids

Which contribute to cell recognition?

A 2 only

B 1 and 2 only

C 1 and 3 only

D 2 and 3 only

14 What are the features of facilitated diffusion?

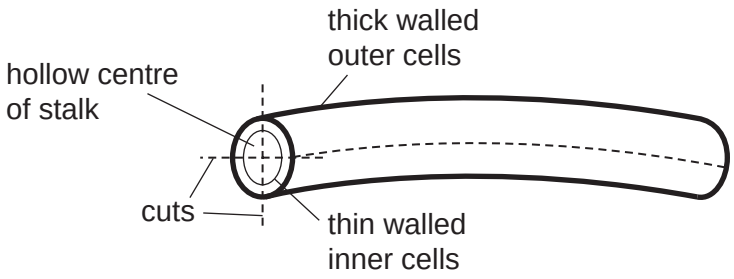
	uses proteins in membrane	uses ATP	molecules move down a concentration gradient
A	✓	✓	✓
B	✗	✓	✓
C	✓	✗	✓
D	✓	✓	✗

key:

✓ correct

✗ incorrect

15 The stalk of a dandelion flower is a hollow tube. Pieces of the stalk are cut as shown and placed in sucrose solutions of different water potentials.



Which diagram shows the piece that is placed in the sucrose solution with the highest water potential?

A



B



C



D



16 What happens to an animal cell when it is placed in a solution with a more negative water potential?

A It loses solutes to the solution and swells.

B It loses water by osmosis and shrinks.

C It takes in solutes and swells.

D It takes in water by osmosis and bursts.

17 Exposure to which of the following increases the risk of developing a cancerous growth?

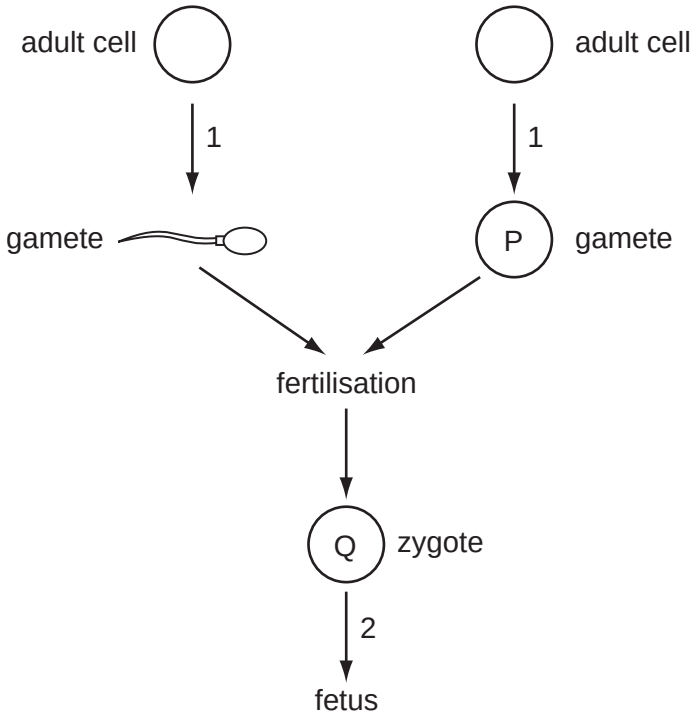
	ultraviolet light	viruses	carbon monoxide	X-rays
A	✓	✓	✗	✓
B	✓	✗	✓	✓
C	✗	✓	✓	✗
D	✓	✗	✓	✗

key

✓ increases risk

✗ does not increase risk

18 The diagram shows an outline of the process of sexual reproduction.



Which row identifies the type of cell division occurring during stages 1 and 2 and the number of chromosomes in cells P and Q?

	1	2	P	Q
A	meiosis	meiosis	diploid	haploid
B	meiosis	mitosis	haploid	diploid
C	mitosis	meiosis	haploid	diploid
D	mitosis	mitosis	diploid	haploid

19 A short piece of DNA 19 base pairs long was analysed to find the number of nucleotide bases in each of the polynucleotide strands. Some of the results are shown below.

	number of nucleotide bases			
	A	C	G	T
strand 1				4
strand 2		7		5

How many nucleotides containing C were present in strand 1?

A 2 **B** 3 **C** 5 **D** 7

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20 Which statements about complementary base pairing are correct?

1 Cytosine forms two hydrogen bonds with guanine.

2 Purines and pyrimidines are different sizes.

3 Adenine forms the same number of hydrogen bonds with thymine and uracil.

4 The base pairs are of equal length.

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

21 What does the enzyme DNA polymerase synthesise in a cell?

A a polypeptide using DNA as a template

B a strand of DNA using a polypeptide as a template

C a strand of DNA using DNA as a template

D a strand of mRNA using DNA as a template

22 The statements describe some of the properties of water.

1 requires a lot of heat energy to evaporate

2 retains a lot of heat energy

3 is able to form hydrogen bonds with other water molecules

4 is able to form hydrogen bonds with other polar and non-polar molecules

Which properties are important for transport in xylem?

A 1, 2 and 3 only

B 1, 2 and 4 only

C 1 and 3 only

D 3 and 4 only

23 Which row is correct?

	needs energy from ATP	transfers heat energy	carries assimilates
A	translocation	mass flow	xylem vessel element
B	translocation	transpiration	phloem sieve tube element
C	transpiration	mass flow	xylem vessel element
D	transpiration	translocation	phloem sieve tube element

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24 Which feature of xylem vessel elements allows them to have reduced resistance to water movement?

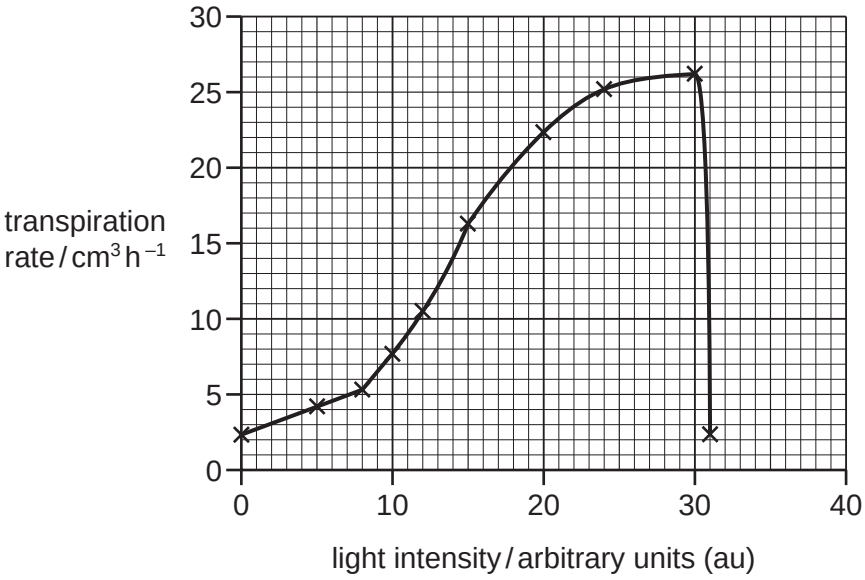
A lignin forms an incomplete secondary wall

B new vessels carry extra water as a plant grows

C there are no cross walls between vessel elements

D vessel elements join to form narrow tubes

25 An investigation was carried out into the effect of light intensity on the rate of transpiration. All other variables were standardised. A student was asked to explain the results shown in the graph below.



Which explanation is correct?

A At light intensities above 30 au the stomata close rapidly.

B The rate of transpiration increases as the light intensity increases.

C The rate of transpiration never falls to 0 cm^3 because some stomata are always open.

D Water uptake by the plant increases as the light intensity increases from 0 to 30 au.

26 Different substances, such as sucrose and amino acids, can move in different directions in the phloem sieve tubes.

Which statement explains this?

A Active transport occurs in some phloem sieve tubes and mass flow occurs in other phloem sieve tubes.

B Both active transport and mass flow occur in each individual phloem sieve tube.

C Mass flow occurs in both directions at the same time in each individual phloem sieve tube.

D Mass flow occurs in different directions in different phloem sieve tubes at the same time.

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27 Which reactions will be taking place in blood that is passing through active tissues?

1 $HbO_8 \rightarrow Hb + 4O_2$

2 $HbO_8 + H^+ \rightarrow HHb + 4O_2$

3 $HCO_3^- + H^+ \rightarrow H_2CO_3$

4 $H_2O + CO_2 \rightarrow H_2CO_3$

A 1, 2, 3, and 4

B 1, 2 and 4 only

C 1, 3 and 4 only

D 2 and 3 only

28 During a cardiac cycle, the pressure in the right ventricle is lower than that in the right atrium and lower than that in the pulmonary artery.

Which row is correct?

	atrioventricular valve	semilunar valve
A	closed	closed
B	closed	open
C	open	closed
D	open	open

29 What correctly describes an event in the cardiac cycle that follows atrial systole?

A A wave of excitation passes through the sinoatrial node (SAN), before spreading down to the base of the septum.

B Electrical impulses pass from the muscles of the atria to the muscles of the ventricles to cause ventricular systole.

C Electrical impulses pass through conducting fibres, which cause a delay before spreading to Purkyne tissue.

D The opening and closing of the semilunar valves occurs later than the opening and closing of the atrioventricular valves.

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30 'Heart block' is a disease which can result in a lower than normal heart rate. A doctor treating a patient suffering from heart block found that electrical impulses were initiated as normal but were not correctly conducted to the ventricles, so the rate of ventricular contraction was slowed.

Which may be functioning incorrectly in the patient?

1 atrioventricular node (AVN)

2 Purkyne tissue

3 sinoatrial node (SAN)

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

31 What correctly describes the 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 and mucus accumulates in the lungs, causing DNA to change and a tumour to develop.

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

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

32 A disease damages alveoli walls.

What effect does this have on the gas exchange surface area and on the volume of the lungs?

	surface area	volume
A	decreased	decreased
B	decreased	increased
C	decreased	no change
D	no change	no change

33 Which is a correct description of part of the gas exchange system?

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

key

✓ present

✗ absent

34 Which is correct for TB, measles and malaria?

	TB		measles		malaria	
	causative agent	transmission	causative agent	transmission	causative agent	transmission
A	bacteria	air-borne	virus	air-borne	protoctist	insect vector
B	bacteria	water-borne	protoctist	air-borne	virus	insect vector
C	virus	air-borne	bacteria	water-borne	protoctist	insect vector
D	virus	insect vector	protoctist	insect vector	bacteria	water-borne

35 What do the causative agents of HIV / AIDS, malaria and TB have in common?

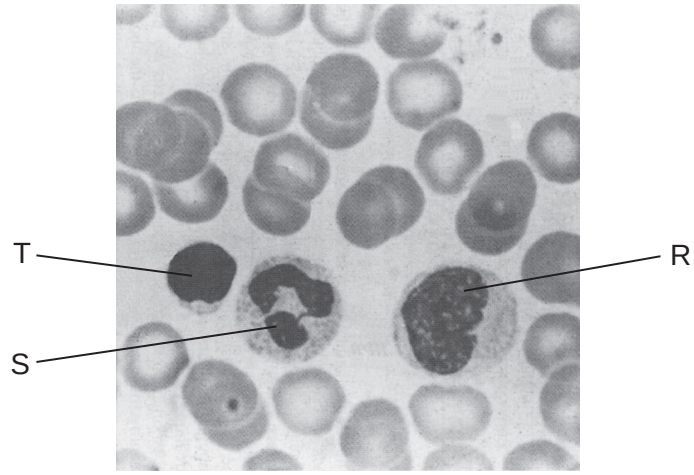
	they have a cell surface membrane	they have genes	they have ribosomes	they respire
A	✓	✓	✓	✓
B	✓	✗	✗	✓
C	✗	✓	✗	✓
D	✗	✓	✗	✗

key

✓ present in each causative agent

✗ not present in each causative agent

36 The photomicrograph shows human blood, with three types of white cell labelled.



Which row correctly identifies these white cells?

	cell R	cell S	cell T
A	lymphocyte	lymphocyte	lymphocyte
B	lymphocyte	phagocyte	phagocyte
C	phagocyte	lymphocyte	phagocyte
D	phagocyte	phagocyte	lymphocyte

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37 What are the function(s) of T-lymphocytes during an immune response?

1 destroy infected body cells

2 differentiate into memory cells

3 secrete antibodies

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

38 A student wrote down three statements about antibodies.

1 Their structure depends on peptide, hydrogen and disulfide bonds.

2 They are protein molecules with both tertiary and quaternary structure.

3 Four polypeptides provide four antigen binding sites.

Which statements are true?

A 1, 2 and 3

B 1 and 2 only

C 1 and 3 only

D 2 and 3 only

39 An insect consumes 180 J of plant material. Of this, 95 J of energy is passed out in the insect's faeces and 58 J is used for respiration.

Which percentage of the energy, in the original plant material taken in by the insect, is converted into biomass?

A 10 % **B** 15 % **C** 32 % **D** 47 %

40 Decomposition of organic matter can cause the concentration of ammonia to rise in a fish tank. High concentrations of ammonia in the tank are toxic to fish. Bacteria may be added to remove the ammonia.

Which type of bacteria should be added?

A ammonifying

B denitrifying

C nitrifying

D nitrogen-fixing

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