Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

0815827811

BIOLOGY **9700/23**

Paper 2 AS Level Structured Questions **May/June 2017**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **12** printed pages.

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Answer **all** the questions.

1 Mammals have a closed double circulation system.

(a) Explain what is meant by a *closed double circulation*.

.....

.....

.....

.....

.....[2]

(b) Table 1.1 shows some structures in the mammalian circulatory system.

Complete Table 1.1 to show the sequence of structures through which blood flows, starting with the pulmonary vein.

Use the numbers 2 to 5 to indicate the correct sequence.

Table 1.1

structure	sequence of blood flow
left ventricle	
vena cava	
pulmonary vein	**1**
aorta	
right atrium	

[2]

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(c) (i) Explain why arteries have thicker walls than veins.

.....

.....

.....

.....

.....[2]

(ii) Smoking causes carbon monoxide and nicotine to enter the blood.

Describe the short-term effects of each of these substances on the cardiovascular system.

carbon monoxide

.....

.....

.....

nicotine

.....

.....

.....[4]

[Total: 10]

2 Fig. 2.1 is a transmission electron micrograph of a cell from a leaf.



Fig. 2.1

(a) Use the scale bar to calculate the magnification of the image in Fig. 2.1.

Write down the formula that you will use and show your working.

formula

magnification × .....[3]

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(b) Name structure **X** and state **one** function of this structure.

name .....

function .....

.....[2]

(c) Name two structures, **visible** in the cell in Fig. 2.1, that contain DNA.

1 .....

2 .....[2]

(d) Plant cells can be infected with viruses.

Fig. 2.2 shows the key features of a plant virus.

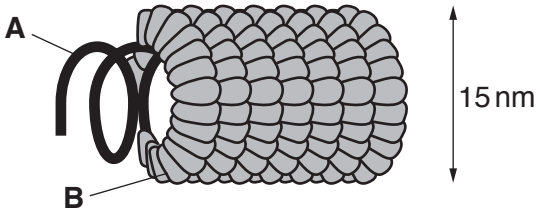


Fig. 2.2

Identify the structures labelled **A** and **B** in Fig. 2.2.

A .....

B .....[2]

(e) Some plant cells produce a polypeptide called systemin.

(i) Describe the role of DNA in the production of systemin.

.....

.....

.....

.....

.....[2]

(ii) Systemin stimulates plant cells to produce enzyme inhibitors known as serpins.

One of these serpins is a competitive inhibitor of some protease enzymes. It inhibits the protease enzymes found in herbivores, but does **not** inhibit the proteases in plants.

Suggest how this serpin inhibits **only** the protease enzymes in herbivores but **not** those in plants.

.....

.....

.....

.....

.....

.....

.....[3]

(iii) The presence of competitive inhibitors, such as serpins, increases the Michaelis-Menten constant (K_m) for the enzymes they inhibit.

Explain why the K_m value increases.

.....

.....[1]

[Total: 15]

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3 **(a)** Name the causative organism of tuberculosis (TB).

.....[1]

(b) Fig. 3.1 shows the number of deaths from TB and the number of new cases of TB from 1925 to 2010 in Canada.

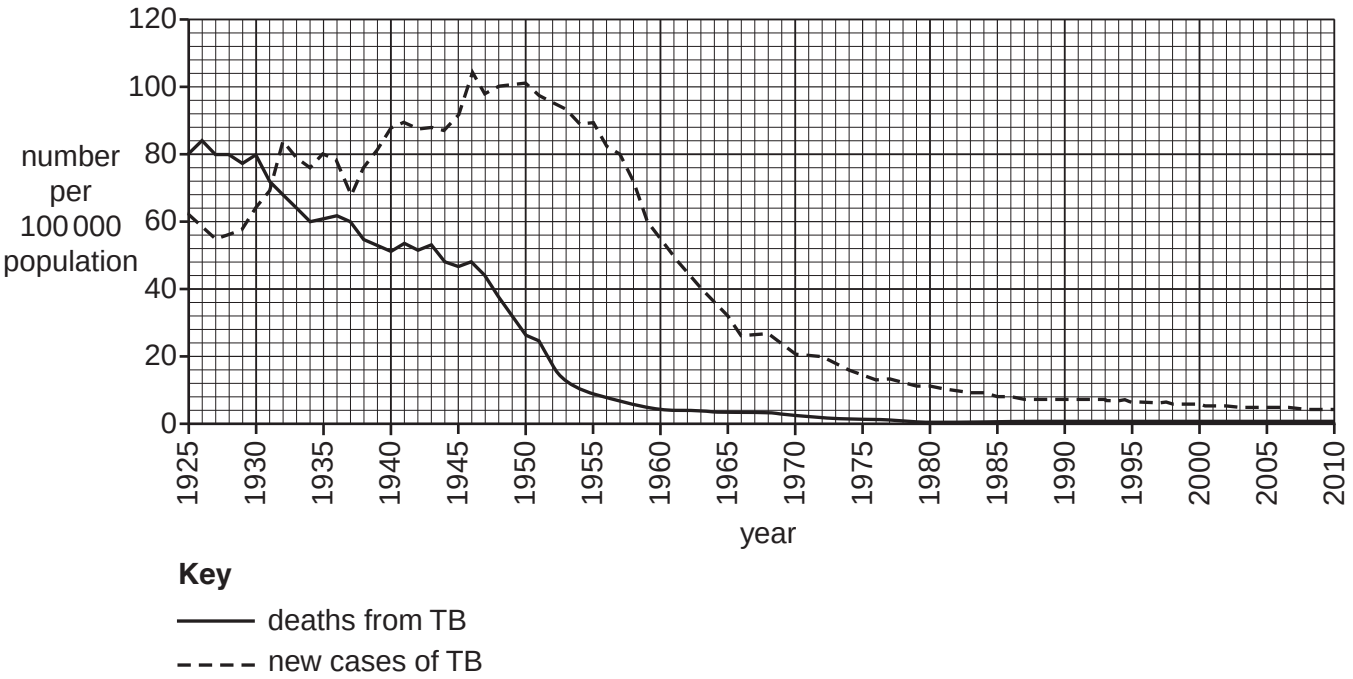


Fig. 3.1

The vaccine for TB was introduced in Canada for widespread use from 1948.

Antibiotics, such as streptomycin, were introduced in Canada from 1940.

Use the information in Fig. 3.1 to comment on the effect of the introduction of the vaccine and antibiotics on the number of new cases and deaths from TB.

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.....[5]

(c) In 2010, Swaziland had one of the highest death rates from TB in the world.

Swaziland also had a high number of new cases of HIV infection in its population in 2010.

People who are infected with HIV are described as HIV+ and people who are **not** infected with HIV are described as HIV–.

Table 3.1 shows the number of deaths from TB in Swaziland in 2010.

Table 3.1

HIV status	**number of deaths from TB per 100 000 population**
HIV+	400
HIV–	91

Using the information in Table 3.1, suggest why the number of deaths per 100 000 population of people who are HIV+ is much higher than that in people who are HIV–.

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.....

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.....[3]

[Total: 9]

4 **(a)** Complete Table 4.1 by using a tick (✓) to indicate which statements apply to each of the molecules. Use a cross (✗) for statements that do **not** apply.

Some of the boxes have been completed for you.

Table 4.1

statement	ATP	cellulose	haemoglobin	phospholipid
contains phosphorus	✓		✗	
found in plants				
contains iron				✗
has a structural role				

[4]

(b) Fig. 4.1 shows two amino acids.

Complete Fig. 4.1 to show how a peptide bond forms between these two amino acids.



Fig. 4.1

[3]

(c) Some glycoproteins in cell surface membranes function as transport proteins.

State two **other** functions of glycoproteins in cell surface membranes.

1 .....

.....

2 .....

.....[2]

[Total: 9]

5 **(a)** Describe the process of DNA replication.

.....

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.....

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.....

.....

.....

.....

.....

.....

.....

.....

.....[5]

(b) State the name of the part of the chromosome that prevents the loss of genes during DNA replication.

.....[1]

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(c) During DNA replication, the use of an incorrect base in the newly synthesised strand can lead to a mutation.

(i) A transversion event is where a pyrimidine is used in the newly synthesised strand instead of a purine, or the other way round.

Name the **two** possible bases that could be used instead of cytosine in a transversion event.

.....[1]

(ii) A transition event is where an incorrect purine is used or an incorrect pyrimidine is used.

Suggest why transversion events are **less** likely to occur than transition events.

.....

.....

.....[2]

(d) Outline how mutations can cause healthy cells to become tumour cells.

.....

.....

.....

.....

.....

.....[3]

[Total: 12]

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[Turn over

6 **(a)** In the space below, draw a diagram to show a hydrogen bond between two water molecules.

[3]

(b) **(i)** Movement of water in xylem depends on the force of attraction between water molecules as a result of hydrogen bonding.

State the name given to this force of attraction.

.....[1]

(ii) State the property of water that results in a cooling effect as water evaporates from the surface of organisms.

.....

.....[1]

[Total: 5]

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