



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

CANDIDATE  
NAME

CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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**BIOLOGY**

**9700/23**

Paper 2 Structured Questions AS

**May/June 2013**

**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 in the spaces provided at the top of this page.

Write in dark blue or black ink.

You may use a soft pencil for any diagrams, graphs or rough working.

Do not use red ink, staples, paper clips, highlighters, glue or correction fluid.

**DO NOT WRITE IN ANY BARCODES.**

Answer **all** questions.

Electronic calculators may be used.

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.

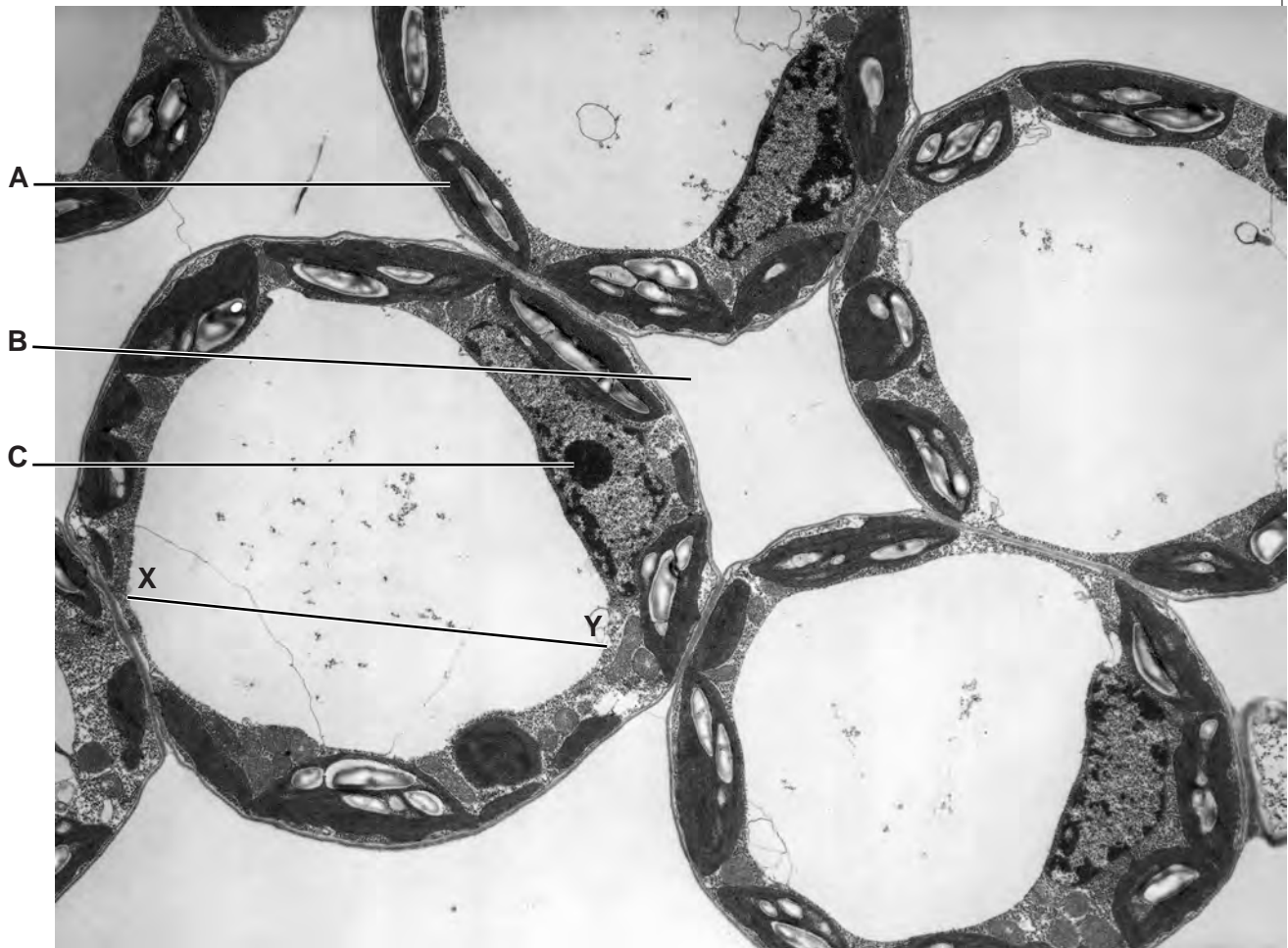
This document consists of **12** printed pages.



Answer **all** the questions.

For  
Examiner's  
Use

- 1 Fig. 1.1 is an electron micrograph of a transverse section of palisade mesophyll tissue in the leaf of the flowering plant, *Zinnia elegans*.



magnification  $\times 7000$

**Fig. 1.1**

- (a) Name the features labelled **A**, **B** and **C**.

**A** .....

**B** .....

**C** .....

[3]

- (b) Calculate the width of the vacuole across the line **X-Y**.

Show your working and give your answer to the nearest micrometre ( $\mu\text{m}$ ).

answer .....  $\mu\text{m}$  [2]



2 Read the following passage.

For  
Examiner's  
Use

A method called *in vitro* translation is often used by scientists to produce proteins in the laboratory. The method uses extracts from animal cells, plant cells or bacteria. These are chosen because they have high levels of protein synthesis. The cells are treated so that the cell walls, if present, and cell membranes are broken down and then treated so that any of the cell's own DNA and mRNA are destroyed. When mRNA from any source is added to these extracts, it will be translated into the corresponding protein.

(a) Explain why:

(i) the cells are chosen on the basis of their high level of protein synthesis

.....

.....

.....

..... [2]

(ii) the cell walls (if present) and cell membranes need to be broken down

.....

.....

..... [1]

(iii) the cell's own mRNA needs to be destroyed

.....

.....

..... [1]

(iv) mRNA from any source can be translated in any type of extract.

.....

.....

.....

..... [2]

5

(b) State **two** differences between the cell structures used in translation in prokaryotes and eukaryotes.

For  
Examiner's  
Use

.....  
.....  
.....  
..... [2]

(c) Scientists usually find that the method of *in vitro* translation is less efficient than *in vivo* translation, which occurs in cells.

Suggest a reason for this.

.....  
.....  
..... [1]

[Total: 9]



(b) Other inorganic substances, such as phosphate, are cycled entirely within the soil.

(i) State **one** use for phosphate and **one** use for nitrate in organisms.

phosphate .....

nitrate .....

[2]

(ii) Nitrogen and phosphate are both cycled more rapidly in ecosystems where there are high rates of growth within trophic levels and high rates of energy flow between trophic levels.

With reference to the use of **both** nitrogen and phosphate in organisms, explain this statement.

.....  
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.....  
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.....  
.....  
.....

[3]

[Total: 11]

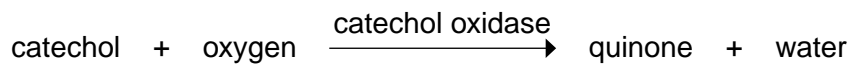
For  
Examiner's  
Use

8

- 4 The enzyme, catechol oxidase, causes a brown colour to develop when slices of many fruits, such as apples, are exposed to air.

For  
Examiner's  
Use

The enzyme catalyses the following reaction:



Quinone is then immediately further oxidized in air to a brown-coloured substance. Catechol and quinone are colourless.

A student investigated the rate of this reaction under different conditions.

- (a) State how the student could follow the progress of this reaction.

.....  
..... [1]

In the first investigation, the student measured the initial rate of the reaction in varying concentrations of catechol. The results are shown in Fig. 4.1.

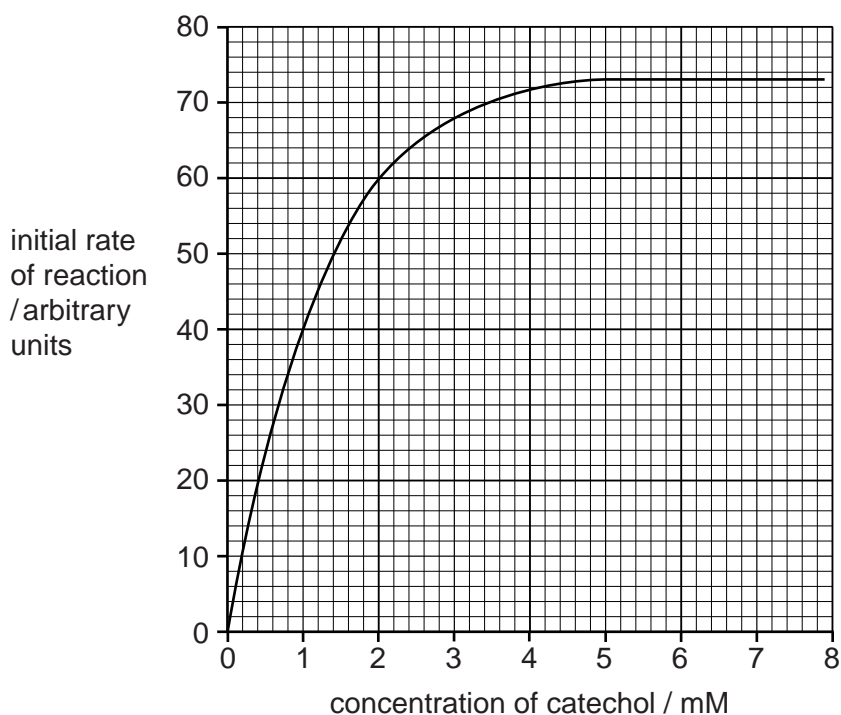


Fig. 4.1





10

5 (a) Explain the importance of mitosis in multicellular organisms.

For  
Examiner's  
Use

.....  
.....  
.....  
.....  
.....  
..... [3]

A protein, mitosis-promoting factor (MPF), has been identified in cells. MPF is a globular protein made from two polypeptide chains.

(b) Place a tick (✓) in the box next to the type, or types, of protein structure shown by MPF.

primary	<input type="checkbox"/>
secondary	<input type="checkbox"/>
tertiary	<input type="checkbox"/>
quaternary	<input type="checkbox"/>

[1]

The presence of MPF is known to cause prophase to start.

(c) Describe the changes that occur during prophase in an animal cell.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
..... [4]

11

(d) MPF normally begins to break down and stops functioning during anaphase.

Suggest the possible consequences of MPF **not** breaking down.

*For  
Examiner's  
Use*

.....

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 11]

6 Measles is an infectious disease, while lung cancer is not.

For  
Examiner's  
Use

(a) Explain why lung cancer is sometimes referred to as a 'lifestyle disease'.

.....

.....

.....

..... [2]

(b) State the type of pathogen that causes measles and state its mode of transmission.

*pathogen* .....

*transmission* .....

..... [2]

(c) Between January and April 2011, 118 measles cases were reported in the USA, where measles was previously thought to be virtually eradicated.

Suggest a reason for this rise in measles cases.

.....

.....

.....

..... [1]

[Total: 5]

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