

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced Subsidiary GCE

BIOLOGY

2801

Biology Foundation

Monday

10 JANUARY 2005

Morning

1 hour

Candidates answer on the question paper.

Additional materials:

Electronic calculator

Ruler (cm/mm)

Candidate Name	Centre Number	Candidate Number											
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TIME 1 hour

INSTRUCTIONS TO CANDIDATES

- Write your name in the space above.
- Write your Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, in the spaces provided on the question paper.
- Read the questions carefully before starting your answer.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	8	
2	10	
3	8	
4	7	
5	17	
6	10	
TOTAL	60	

This question paper consists of 14 printed pages and 2 blank pages.

Answer **all** the questions.

- 1 Fig. 1.1 is a drawing of an animal cell as seen under an electron microscope.

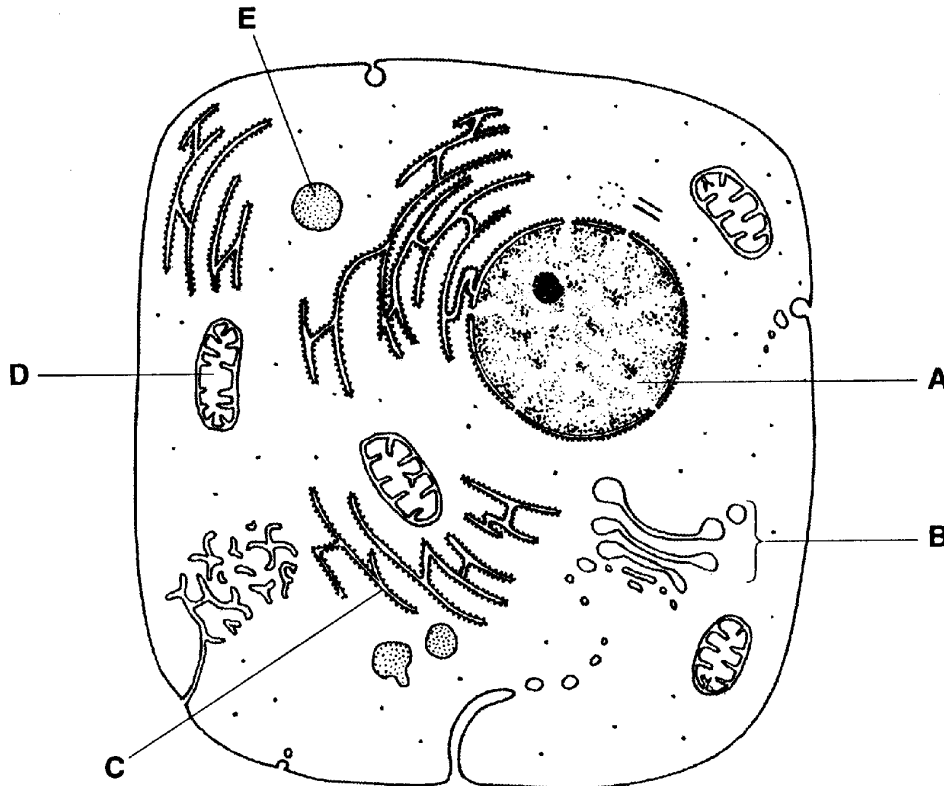


Fig. 1.1

Complete the following table by:

- identifying the parts of the cell **A** to **E**
- naming the part of the cell responsible for the function stated.

The first one has been done for you.

function	part of cell	label
controls activities of the cell	nucleus	A
carries out aerobic respiration		
attaches to mRNA in protein synthesis		
produces secretory vesicles		
contains digestive enzymes		

[Total: 8]

2 (a) Fig. 2.1 represents part of a collagen molecule.

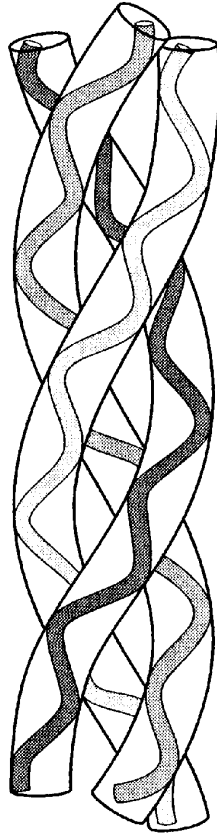


Fig. 2.1

(i) Collagen is a protein made of three chains of amino acids, twisted together like a rope.
State the name given to a chain of amino acids.

.....[1]

(ii) Name the amino acid that forms a high proportion of the collagen molecule.

.....[1]

(iii) Collagen has tremendous strength, having about one quarter of the tensile strength of mild steel.
Using information given in Fig. 2.1 to help you, explain how the structure of collagen contributes to its strength.

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

- (b) Complete the following passage by inserting the most appropriate terms in the spaces provided.

Cellulose and collagen are both fibrous molecules. Cellulose, a carbohydrate, is the main component of the in plants.

Cellulose is made of chains of many glucose molecules which are joined by 1,4 bonds. Each glucose molecule is rotated° relative to its neighbour, resulting in a chain. Adjacent chains are held to one another by bonds.

[6]

[Total: 10]

3 (a) Fig. 3.1 is a scanning electron micrograph of root hairs on the roots of cress seedlings.

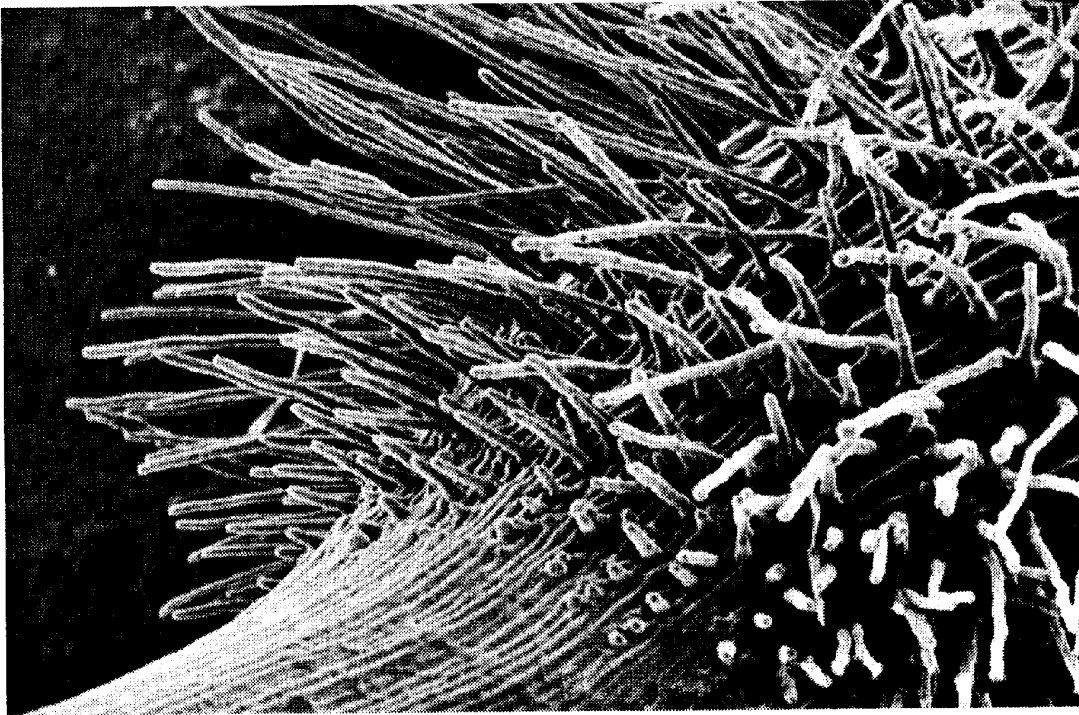


Fig. 3.1

Plants take up nitrate ions and water from the soil into the roots.

(i) State **one** way in which root hairs are adapted to increase uptake.

.....[1]

(ii) State **one** method used by root hairs to take up nitrate ions.

.....[1]

(iii) Outline the process by which water enters the cells of the root from the soil.

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

(b) Statements about the nitrogen cycle are written below.

1	a genus of bacterium associated with leguminous plants	T
2	conversion of nitrate ions to nitrogen	
3	swelling on the root of a leguminous plant	
4	conversion of ammonium ions to nitrate ions	
5	an animal that eats plants	

Select from the following terms the appropriate letter to match each statement. Write the letter in the box.

The first one has been done for you.

Q	secondary consumer
---	--------------------

R	nitrogen fixation
---	-------------------

S	primary consumer
---	------------------

T	<i>Rhizobium</i>
---	------------------

U	denitrification
---	-----------------

V	nodule
---	--------

W	niche
---	-------

X	lightning
---	-----------

Y	decay
---	-------

Z	nitrification
---	---------------

[4]

[Total: 8]

4 (a) Deoxyribonucleic acid (DNA) is a polynucleotide.

(i) State how many different types of nucleotide are found in DNA.

.....[1]

(ii) Name the components of **one** of these nucleotides.

.....

.....[3]

(b) DNA replication is described as semi-conservative. Fig. 4.1 is a diagram showing the replication of a DNA molecule.

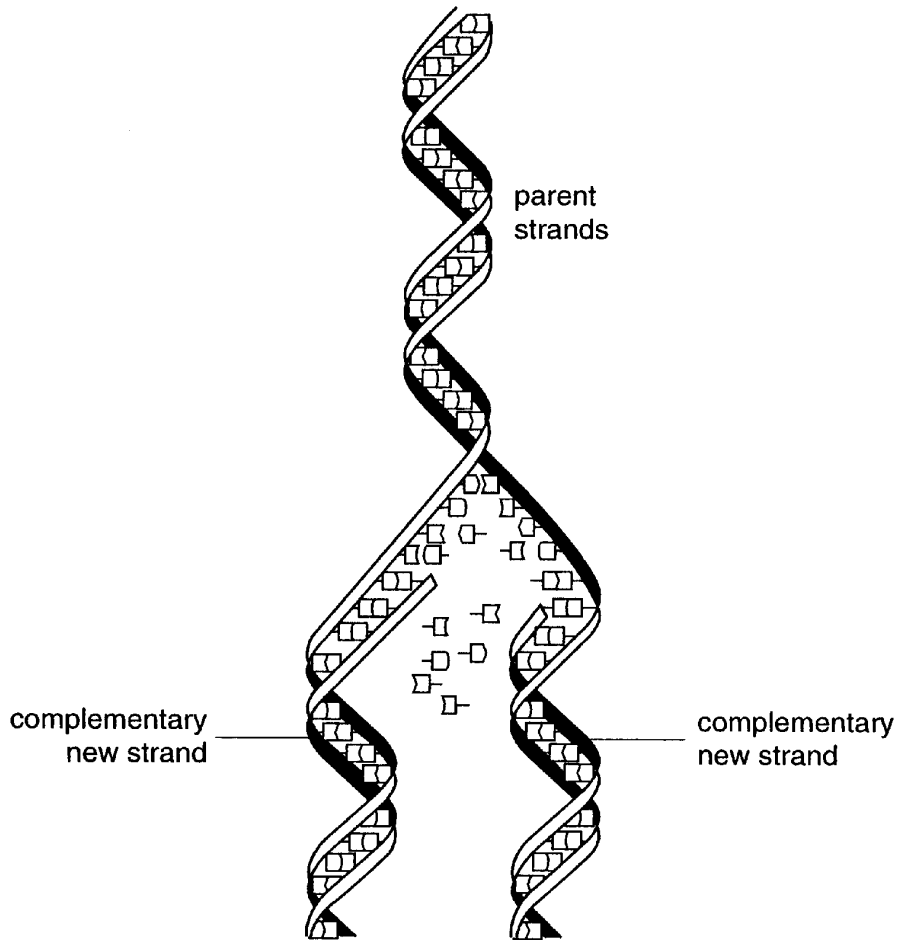


Fig. 4.1

Explain what is meant by the term *semi-conservative replication*.

.....

.....

.....

.....[3]

[Total: 7]

5 (a) State what is meant by the term *cancer*.

.....

[2]

Radiation is one factor that can increase the chance of developing lung cancer. Radon, a naturally occurring radioactive gas, is found in all rocks and soils. On average, radon contributes about 50% of the total radiation dose received by people. Different areas of the UK have different levels of radon because of their rock and soil types. Radon seeps out of soils and rocks into the air and may build up in enclosed spaces such as buildings. Air containing an average concentration of 20 units of radon is considered to be a typical figure. Air containing an average concentration of 200 units has been defined as a Threshold Level at which radon is considered to be a significant risk. Research has linked exposure to radon with an increased risk of lung cancer. Smoking also increases the risk of lung cancer. Some typical figures are shown in Table 5.1.

Table 5.1

radon level / arbitrary units	estimated risk of developing lung cancer / %	
	no exposure to cigarette smoke	smoker (15 cigarettes per day)
0	0.1	1.0
20	0.1	1.0
200	1.0	10.0

(b) Using the data in Table 5.1,

(i) calculate by how much smoking increases the risk of developing lung cancer;

.....
[1]

(ii) comment on the risks of radon and smoking on the development of lung cancer.

.....

[2]

(c) The UK Government publishes maps that show areas where radon concentrations are above the Threshold Level.

Suggest **one** advantage and **one** disadvantage of publishing maps such as these.

advantage

.....
.....

disadvantage

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

(d) Four light micrographs of onion cells undergoing mitosis are shown in Fig. 5.1.

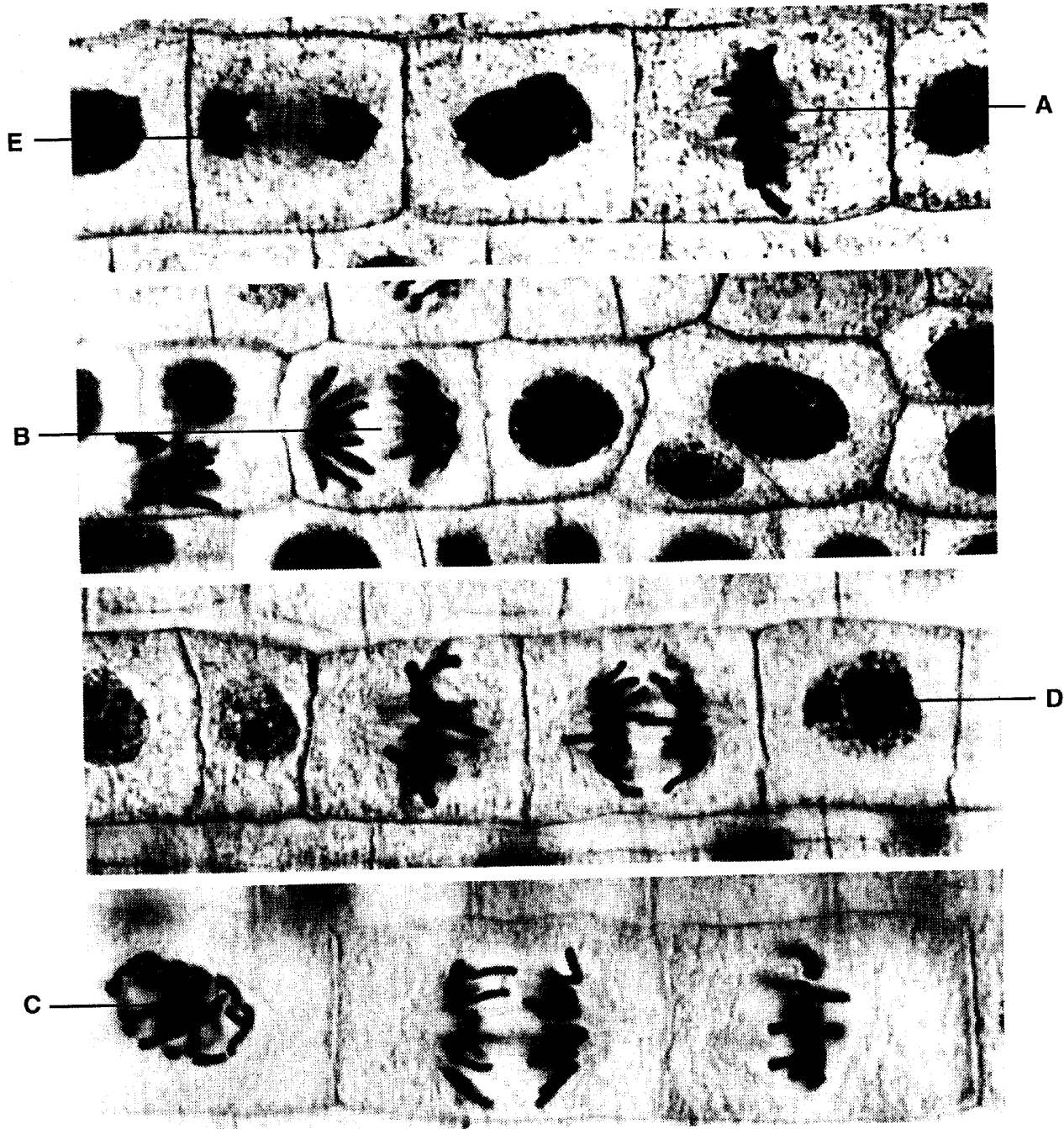


Fig. 5.1

In this question, one mark is available for the quality of the use and organisation of scientific terms.

Outline what happens to chromosomes during the mitotic cell cycle.

You will gain credit if you refer to the labelled cells in Fig. 5.1.

.....

.....

.....

[Dotted lines for writing]

Quality of Written Communication [1]

[Total: 17]

- 6 Cyclo-oxidase (COX) is one of the enzymes needed in the formation of prostaglandins, compounds that are involved in causing fever, pain and inflammation. COX catalyses the conversion of arachidonate to prostaglandinH₂, as shown in Fig. 6.1.

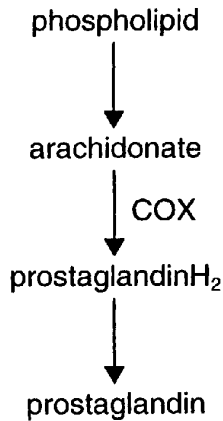


Fig. 6.1

The COX enzyme is found attached to the inner surface of the endoplasmic reticulum membrane. This is shown in Fig. 6.2.

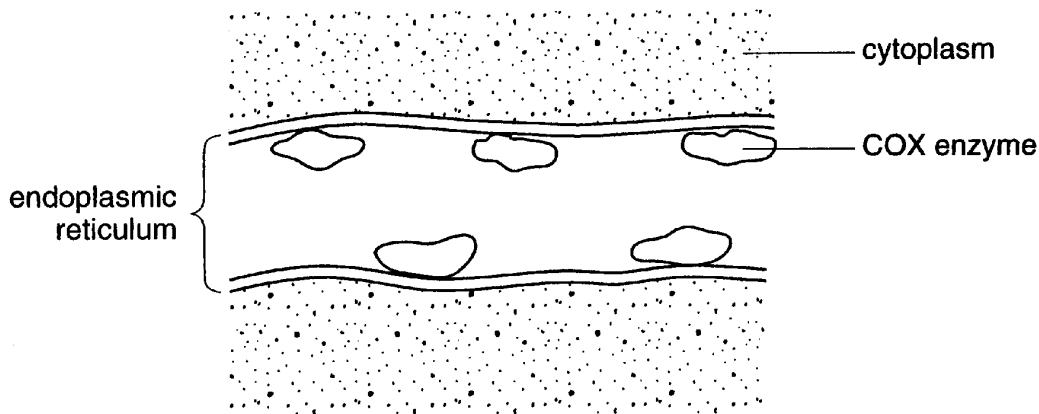


Fig. 6.2

- (a) Using the information given above, suggest why the COX enzyme is found attached to the inner surface of the endoplasmic reticulum.

.....

.....

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.....

.....

.....[2]

