

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**  
**Advanced Subsidiary GCE**

**BIOLOGY**

**2801**

Biology Foundation

Thursday **10 JANUARY 2002** Afternoon 1 hour 30 minutes

Candidates answer on the question paper.

Additional materials:  
Electronic Calculator

Candidate Name	Centre Number	Candidate Number											
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**TIME** 1 hour 30 minutes

**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 on the question paper.
- Read each question carefully and make sure you know what you have to do 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 calculations.

<b>FOR EXAMINER'S USE</b>		
Qu.	Max.	Mark
1	11	
2	20	
3	13	
4	8	
5	15	
6	10	
7	13	
<b>TOTAL</b>	<b>90</b>	

**This question paper consists of 18 printed pages and 2 blank pages.**

Answer **all** questions.

- 1 (a) Describe a test which will indicate the presence of protein.

Method .....

.....

Observation if protein is present.

.....[2]

Fig. 1.1 shows a number of bonds or links, identified with the letters **A** to **E**, which are involved in the formation of proteins and polysaccharides. **C**, **D** and **E** are all covalent bonds or links.

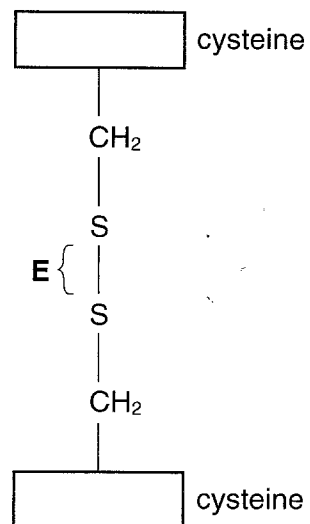
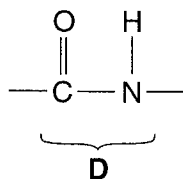
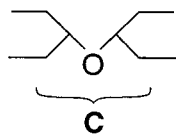
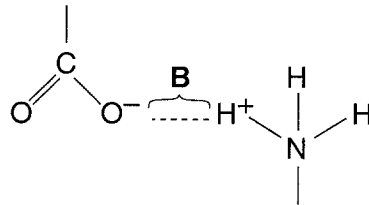
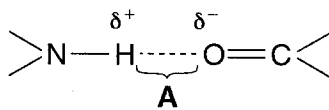


Fig. 1.1

(b) (i) Name the bonds **A** and **B**.

**A** .....

**B** .....[2]

(ii) State the *specific* names given to bonds or links **C** to **E**.

**C** .....

**D** .....

**E** .....[3]

(c) With reference to Fig. 1.1, use **one** of the **letters A** to **E** to indicate the bond or link that is used

(i) to join glucose molecules in the formation of a polysaccharide;

.....

(ii) to join adjacent amino acids in the primary structure of a protein;

.....

(iii) in the secondary structure of a protein;

.....

(iv) **only** in the tertiary structure of a protein.

.....

[4]

[Total : 11]

2 Fig. 2.1 represents the structure of the plasma (cell surface) membrane.

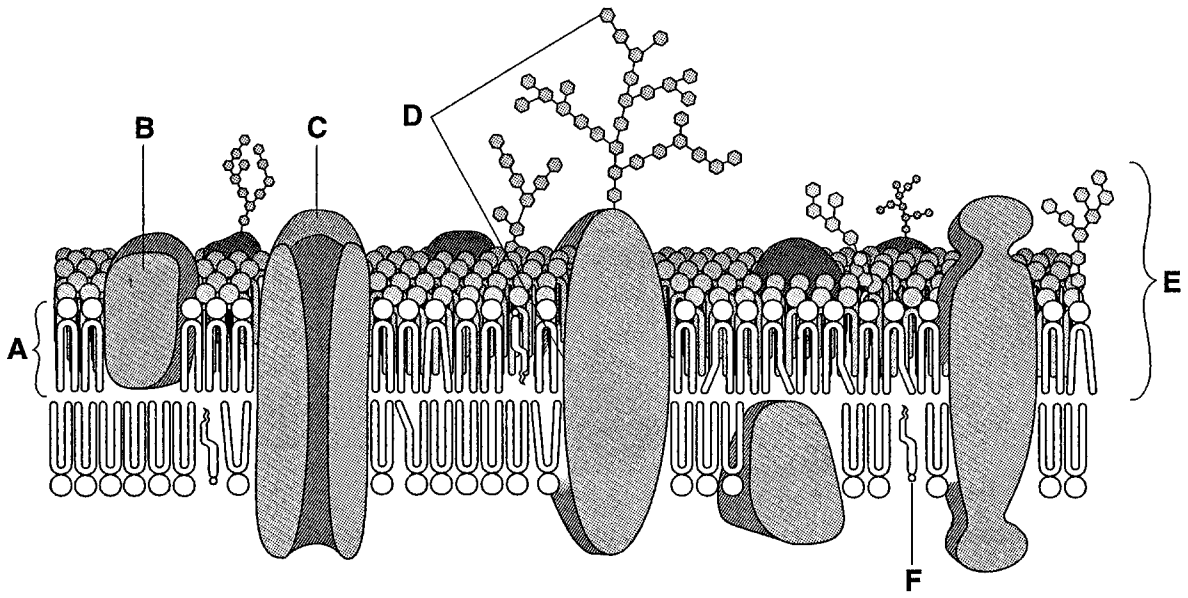


Fig. 2.1

(a) Name molecules A to F.

A .....

B .....

C .....

D .....

E .....

F .....

[6]

(b) State the approximate width of the membrane.

.....[1]

Water moves across the plasma (cell surface) membrane by osmosis.

(c) Complete the table below to

- (i) show the direction in which water will move across the plasma (cell surface) membranes of cells in different conditions;
- (ii) indicate whether or not the cell will burst.

Place a (✓) or a cross (✗) in each box of the table as appropriate.

	initial net movement of water		cell bursts
	in	out	
leaf mesophyll cell immersed in distilled water			
red blood cell immersed in concentrated salt solution			
red blood cell immersed in distilled water			

[6]





- (c) Complete the following passage by inserting the appropriate term in each space. The first one has been inserted for you.

The grey squirrel lives in *deciduous woodland* (its ..... **HABITAT** .....). It feeds on nuts, acorns and toadstools and is, therefore, a primary ..... As it can also eat animal material, such as eggs or young birds, it occupies more than one ..... (position in the food chain). Surveys have been carried out to establish the *number of squirrels* (the ..... of squirrels) in oak woodland on the island of Anglesey, North Wales. It has been discovered that the number of grey squirrels has been increasing dramatically. The grey squirrel was introduced into Britain from North America and has outcompeted the native red squirrel so effectively that the numbers of red squirrels are now very low. As a result of their interaction with *the organisms of the other species in the habitat* (the ..... ), the stability of the ..... (the environment in which they live and with which they interact) has been affected. [5]

[Total : 13]





5 Some plant cells divide by mitotic cell division.

(a) Explain the role of mitotic cell division in the life of plants.

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

Cancer in humans results from uncontrolled mitotic cell division.

(b) Explain why

(i) it is advisable to apply high factor sun screen when going out into the sun in the summer;

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

(ii) it may be less harmful to smoke low tar cigarettes than those with high tar;

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

(iii) radiographers stand behind a lead screen while taking X-rays.

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



6 Enzymes are proteins with a tertiary structure.

(a) Explain the importance of the tertiary structure to the functioning of an enzyme.

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

Food spoilage is often caused by the enzyme action of microorganisms.

(b) Explain why

(i) some foods are preserved in vinegar;

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

(ii) foods are heated to very high temperatures before being canned.

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

During cheese production, rennet is used to solidify the protein in the milk. Rennet is a commercially prepared form of rennin, an enzyme found naturally in the stomachs of young mammals.

- (c) Explain why the temperature of the milk needs to be kept between 30 °C and 40 °C during this stage of cheese production.

.....

.....

.....

.....[2]

[Total : 10]

7 Fig. 7.1 represents a nucleotide which forms part of a DNA molecule.

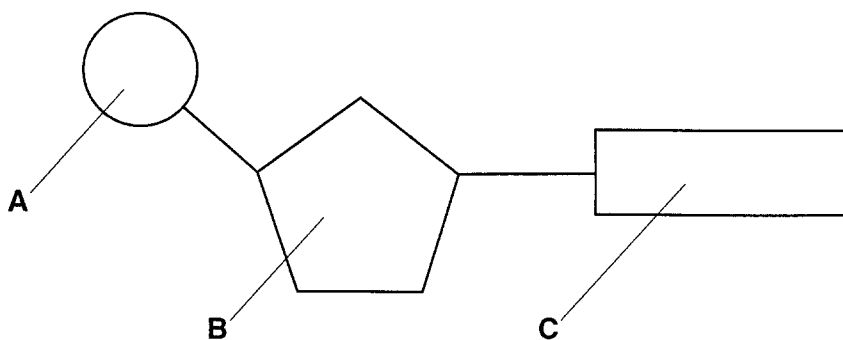


Fig. 7.1

(a) (i) Name A to C.

- A .....
- B .....
- C .....[3]

(ii) State which part of the nucleotide contains nitrogen.

.....[1]

During research into the mechanism of DNA replication, bacteria were grown for many generations in a medium containing only the 'heavy' isotope of nitrogen,  $^{15}\text{N}$ . This resulted in all the DNA molecules containing only  $^{15}\text{N}$ . This is illustrated in Fig. 7.2.

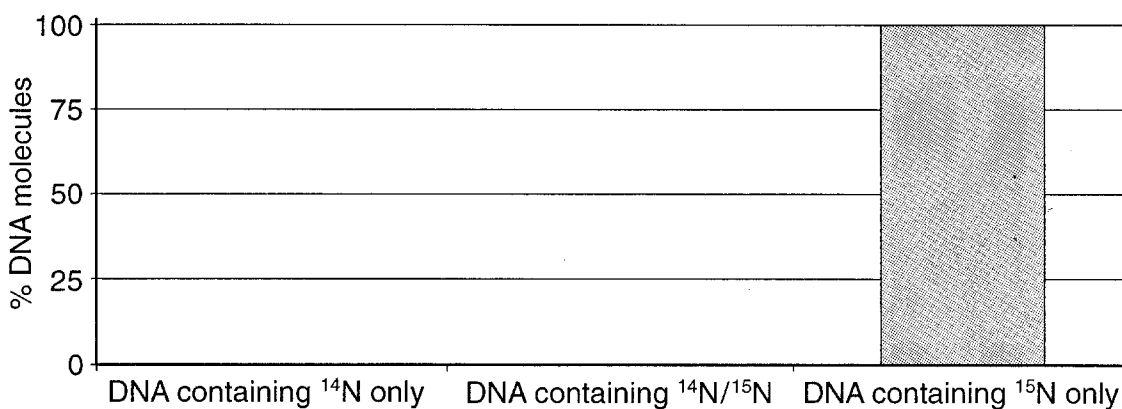
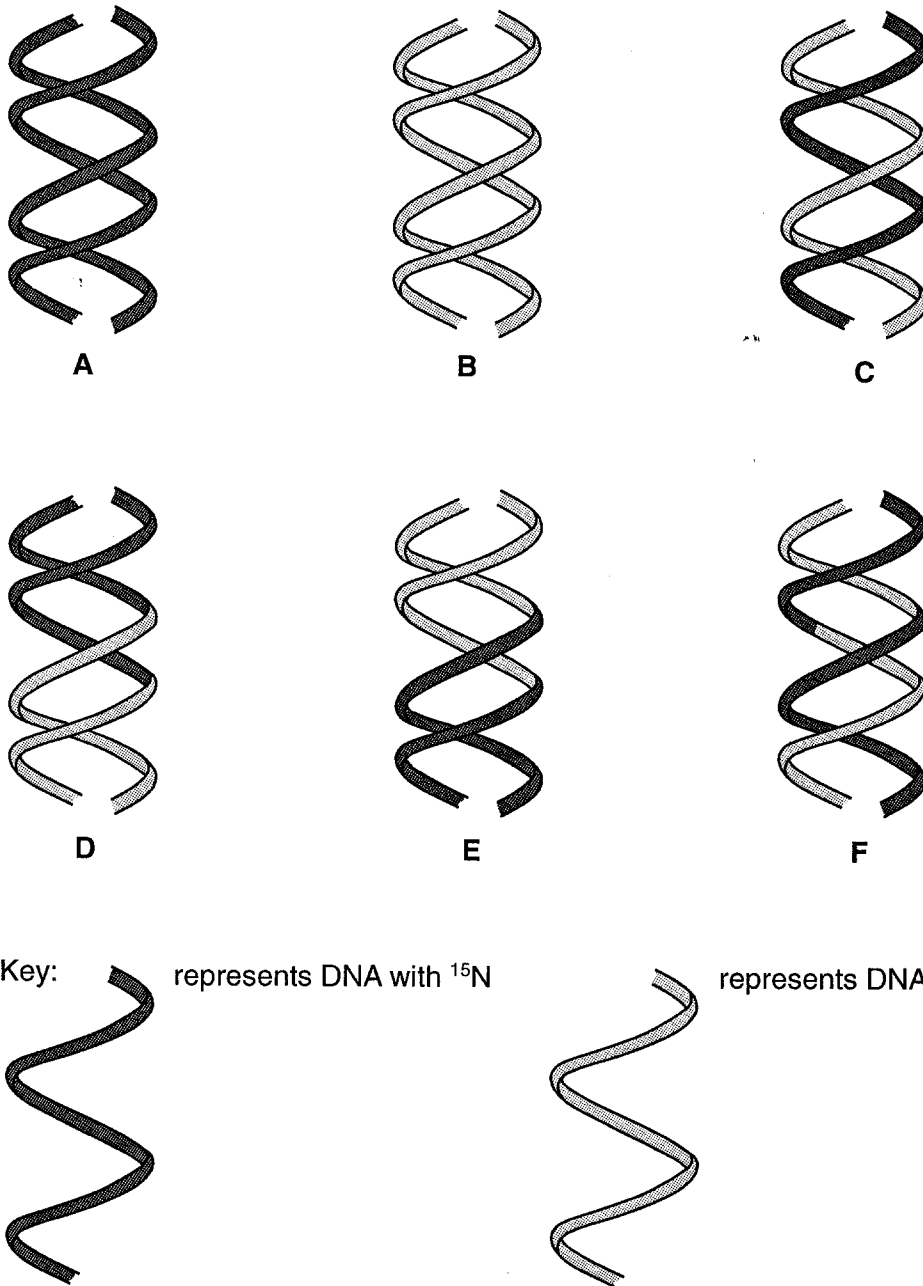


Fig. 7.2



Fig. 7.5 shows simple diagrams of DNA molecules, indicating the nitrogen content of each.



**Fig. 7.5**

(c) With reference to Fig. 7.5, select the letter or letters which best represent the bacterial DNA in Fig. 7.2, Fig. 7.3 and Fig. 7.4.

Fig. 7.2 .....

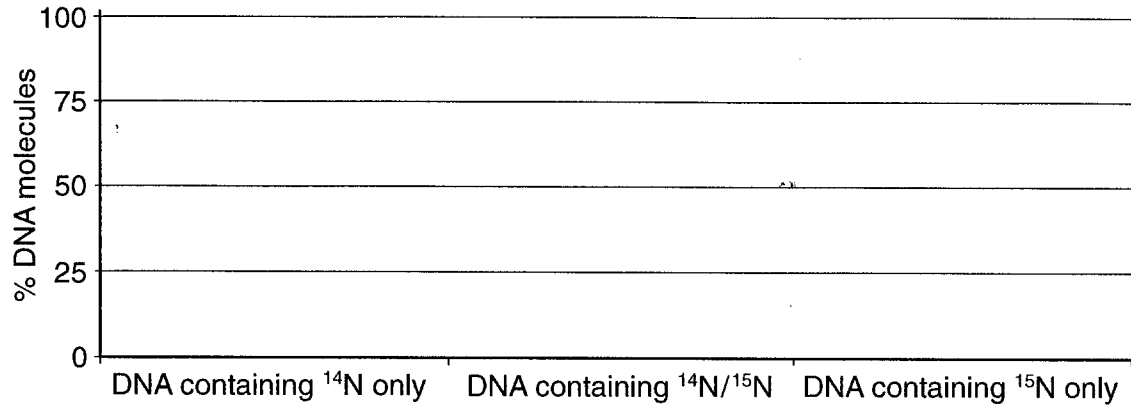
Fig. 7.3 .....

Fig. 7.4 .....[3]



The bacteria continued to grow in the 'light' nitrogen,  $^{14}\text{N}$ , medium until the DNA had replicated once more. The DNA molecules were analysed.

- (d) Complete the bar chart below to indicate the expected results of the composition of these DNA molecules.



[3]

[Total : 13]

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