Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						6	1	0	1	/	0	1	Signature	

Paper Reference(s)

6101/01

Examiner's use only

Team Leader's use only

Edexcel GCE

Biology

Biology (Human)

Advanced Subsidiary

Unit Test 1

Monday 6 June 2005 – Morning

Time: 1 hour

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
Total	

Materials required for examination
Ruler

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and your signature. The paper reference is shown above. Check that you have the booklet for the correct unit.
Answer ALL EIGHT questions in the spaces provided in this booklet.
Show all the steps in any calculations and state the units. Calculators may be used.
Include diagrams in your answers where these are helpful.

Information for Candidates

The marks for individual questions and parts of questions are shown in round brackets: e.g. (**2**).
The total mark for this question paper is 60.

Advice to Candidates

You will be assessed on your ability to organise and present information, ideas, descriptions and arguments clearly and logically, taking account of your use of grammar, punctuation and spelling.

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Answer ALL questions in the spaces provided.

1. (a) The table below refers to the composition of the disaccharides sucrose, maltose and lactose. Place a tick (✓) in the appropriate box or boxes to indicate clearly the monosaccharide or monosaccharides that make up each disaccharide.

Disaccharide	Monosaccharides		
	Galactose	Glucose	Fructose
Sucrose			
Maltose			
Lactose			

(3)

(b) Name the bond that joins two monosaccharides in a disaccharide.

.....

(1)

(Total 4 marks)

Q1

2. Read through the following passage about protein structure, then write on the dotted lines the most appropriate word or words to complete the passage.

All amino acids contain the elements carbon, hydrogen, oxygen and

..... The primary structure of a protein is formed when amino acids are joined together by ..... bonds. Chains of amino acids may then form a secondary structure such as a spiral shape called the

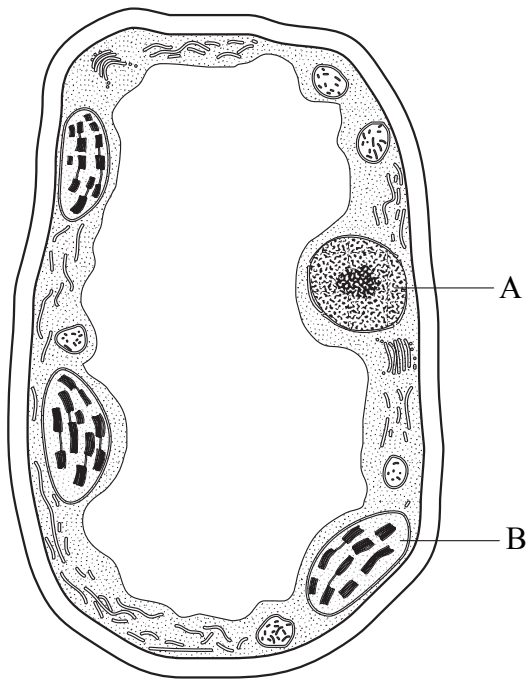
....., which is maintained by ..... bonding. The tertiary structure of a protein is maintained by bonding between the ..... of amino acids.

(Total 5 marks)

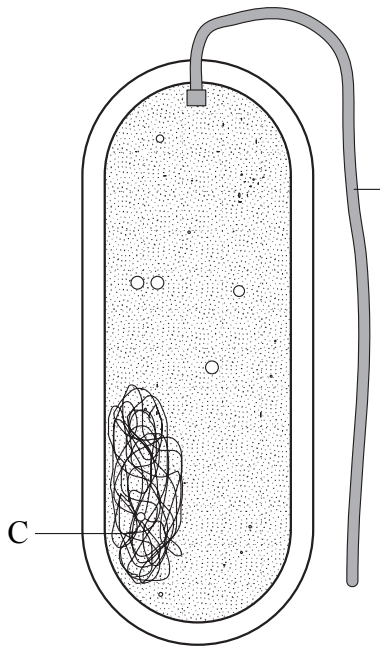
Q2

Leave blank

3. The diagrams below show the structures of a leaf palisade cell and a bacterial cell, as seen using an electron microscope.



Leaf palisade cell
(Magnification ×10000)



Bacterial cell
(Magnification ×18000)

(a) Name the parts labelled A, B and C.

A .....

B .....

C .....

(3)

(b) Give **one** difference between the cell wall of a leaf palisade cell and the cell wall of a bacterial cell.

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(1)

(c) Describe the function of part D.

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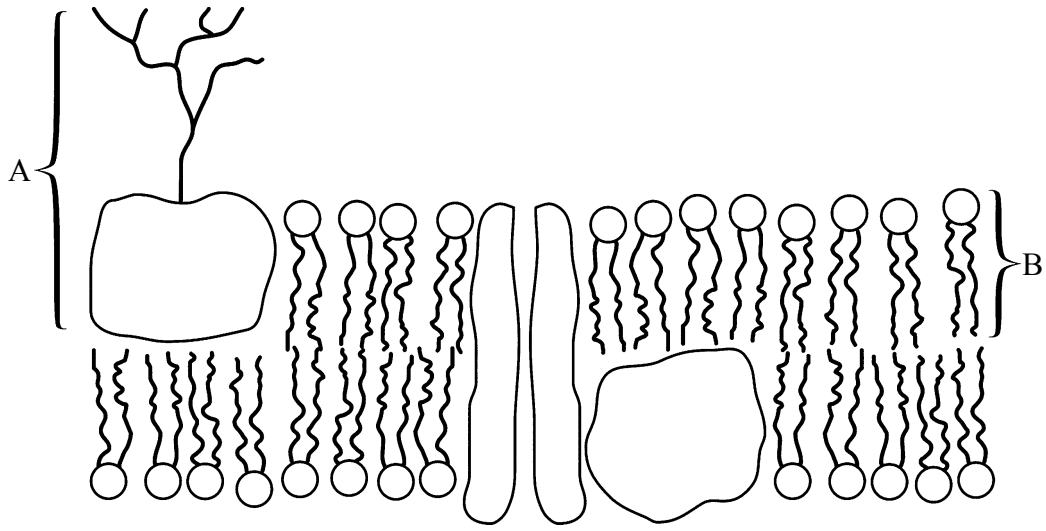
(2)

Q3

(Total 6 marks)

Leave blank

4. The diagram below shows the structure of the cell surface membrane.



(a) (i) Name the molecules A and B.

A .....

B .....

(2)

(ii) Give **one** function of the molecule labelled A.

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(1)

(iii) Explain why the molecules labelled B form a bilayer.

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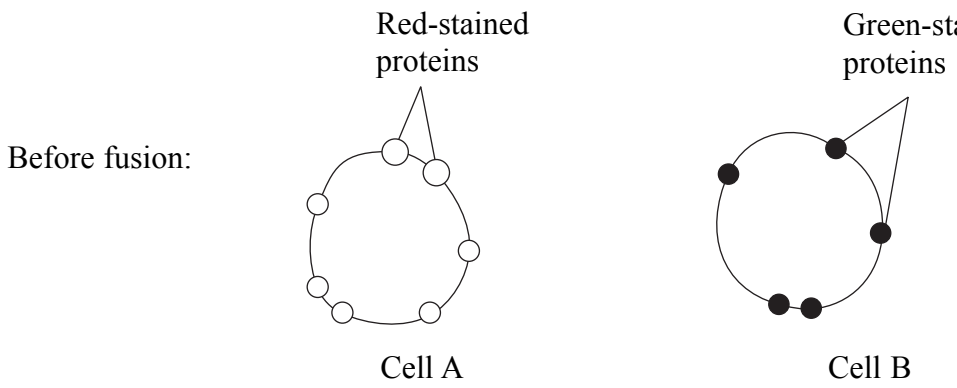
(3)

Leave blank

(b) The proteins in the cell surface membranes of two cells (A and B) were stained using different coloured dyes. One cell's membrane proteins were stained with a green dye and the other cell's membrane proteins with a red dye. The cells were then fused (merged together) to form one cell.

The diagram below shows the distribution of the proteins in the cells before and after fusion.



Use your knowledge of the properties of cell surface membranes to explain these results.

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(2)

(Total 8 marks)

Q4

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5. An investigation was performed to determine the length of time that a cell in an onion root tip spends in each stage of mitosis.

A growing root from an onion was selected and a root tip squash was made. This was examined under a light microscope and the percentage of cells in each stage of mitosis was determined.

The results are shown in the table below.

Stage of mitosis	Percentage of cells in this stage
Prophase	2.43
Metaphase	1.40
Anaphase	0.70
Telophase	2.78

(a) Describe how you would prepare a root tip squash so that mitosis could be studied.

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(4)

Leave blank

(b) The percentage of cells in a stage of mitosis is proportional to the duration of that stage. Use this information to compare the duration of each stage of mitosis in these root tip cells.

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(3)

(c) The duration of each stage of mitosis can be calculated using the equation below.

$$\text{Duration of a stage} = \frac{\text{Percentage of cells in that stage} \times \text{cell cycle time}}{100}$$

The cell cycle time for these cells is 1200 minutes.

Describe how you would use this data to determine the total duration of mitosis.

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(2)

Q5

(Total 9 marks)

Leave blank

6. (a) The medium power lens on a light microscope gave a magnification of ×100 and a resolution (resolving power) of 1.5 µm. Explain the meaning of these terms.

Magnification

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Resolution

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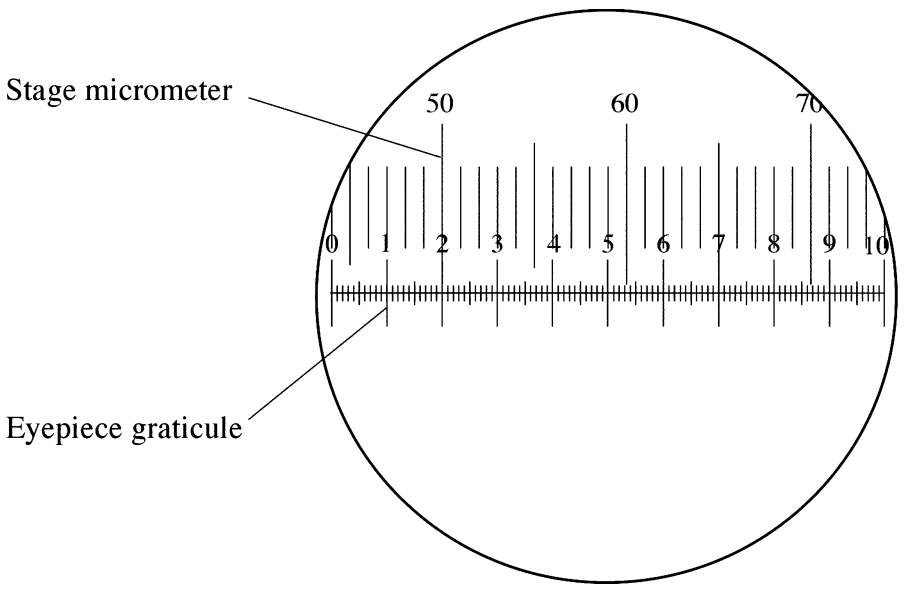
(2)

(b) A student used a light microscope to view some cells. She calibrated an eyepiece graticule scale in order to measure the size of one of the cells.

To do this she placed a glass disc with a scale etched on it (an eyepiece graticule scale) into the eyepiece of her microscope. She placed another scale (a stage micrometer) on the stage of her microscope.

On looking through the microscope she could see both scales. The diagram below shows what she saw when the medium power objective lens was used.



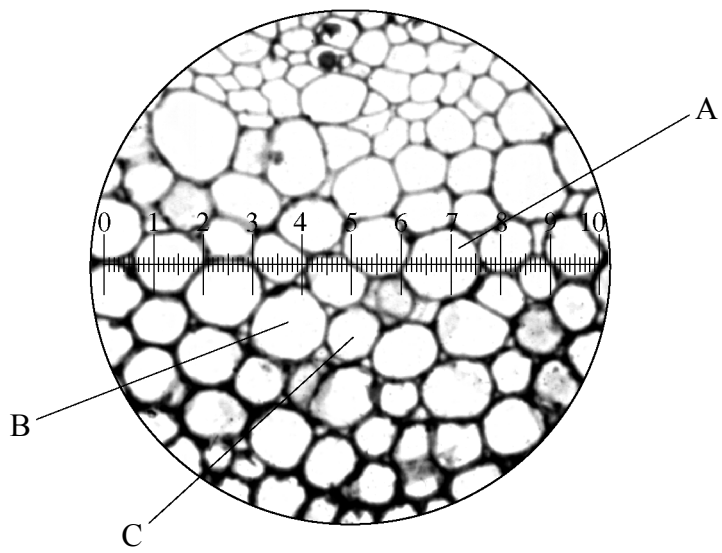
Each small division of the stage micrometer is 100 µm. Calculate the size of one small division of the eyepiece scale, expressing your answer in µm (micrometres). Show your working.

Answer .....µm

(2)

Leave blank

(c) Another student used the medium power objective lens to view some plant cells through a different microscope. He used an eyepiece graticule to measure the width of a cell. The photograph below shows the cells that he saw.



(i) He had calculated that one small division on his eyepiece graticule measured 20 μm.

Use this information to calculate the width of cell A.

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(1)

(ii) In the space below make a drawing, enlarged ×2, of the cells labelled B and C. Do **not** label your drawing.

(3)

(Total 8 marks)

Q6

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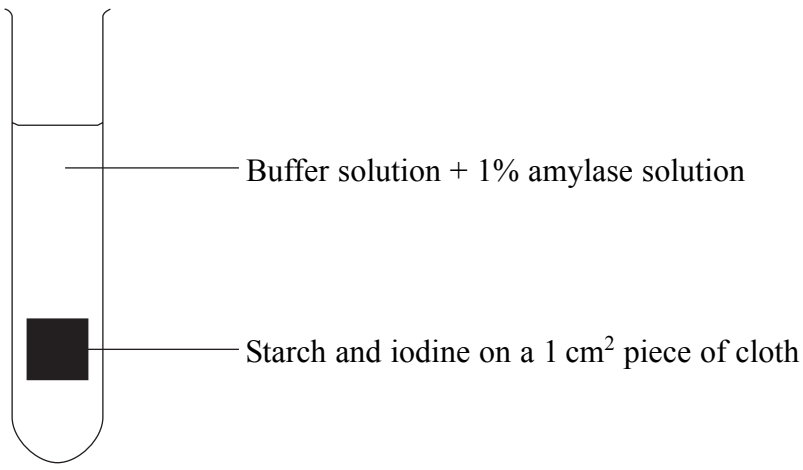
7. (a) Amylase is an enzyme which catalyses the hydrolysis of starch into maltose.

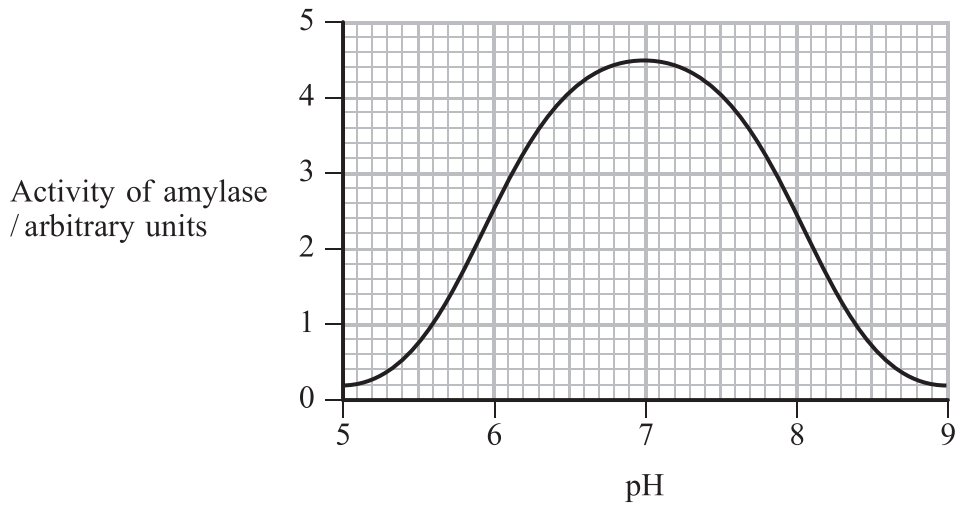
An experiment was carried out to investigate the effect of pH on the activity of amylase.

A piece of white cloth was sprayed with 'spray-on' starch and cut up into small squares each measuring 1 cm^2. Each square was covered with iodine solution so that the cloth was stained a blue-black colour.

One of the squares was placed in a test tube containing 5 cm^3 of a buffer solution and 5 cm^3 of a 1% amylase solution. The apparatus is shown in the diagram below.



The activity of the amylase was measured by timing how long it took for the enzyme to remove all of the starch on the cloth, and was measured at a range of pH values. The results are shown in the graph below.



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(i) Describe how each of the following factors was controlled in each test tube.

pH

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Volume of substrate

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(2)

(ii) Another test tube was set up as a control. Describe what should have been added to this tube.

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(2)

(b) Explain why changes in pH affect enzyme activity.

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(3)

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(c) Describe the structure of starch.

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(5)

Q7

(Total 12 marks)

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8. (a) Draw and label a diagram to show the structure of the Golgi apparatus as seen using an electron microscope.

(3)

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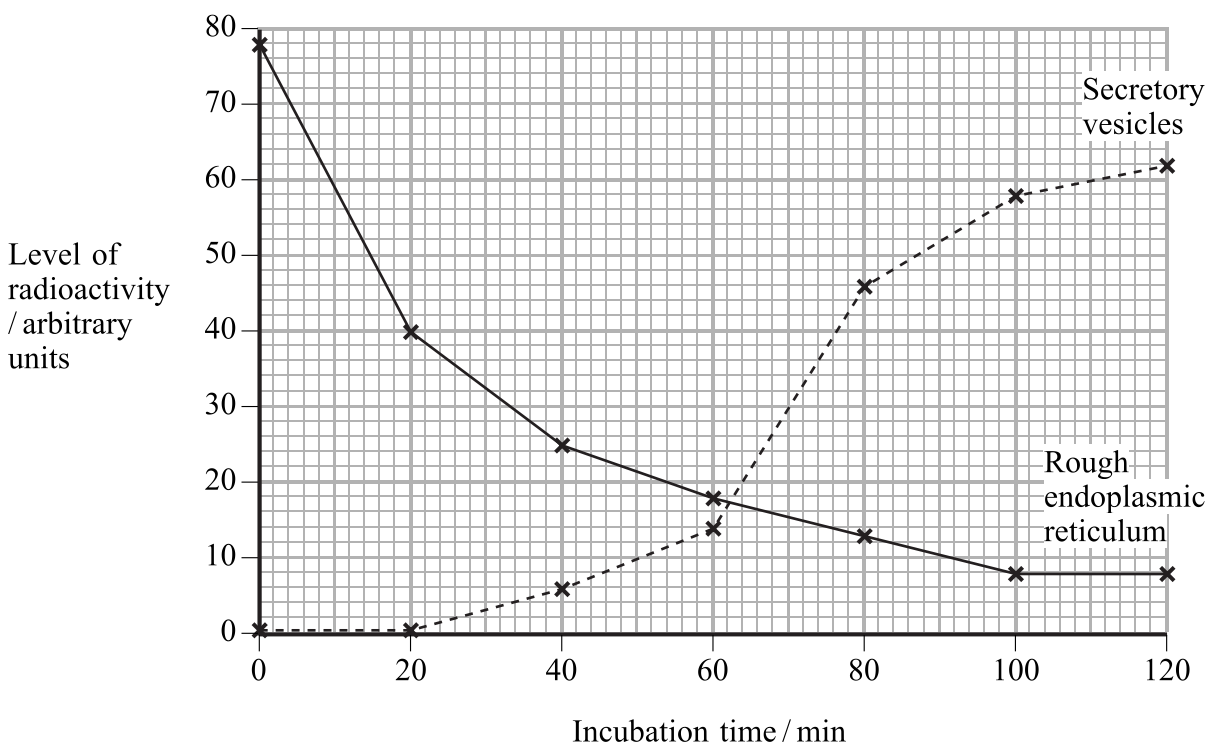
(b) The process of protein synthesis in cells and the secretion of proteins from the cells was investigated using radioactively labelled amino acids.

The cells were incubated with radioactive amino acids for 30 minutes. The cells were then removed and washed thoroughly to remove any radioactive amino acids on the cell surfaces.

The washed cells were then incubated with non-radioactive amino acids for 120 minutes. Every 20 minutes a sample of cells was removed and the level of radioactivity in the rough endoplasmic reticulum and in the secretory vesicles was determined.

The graph below shows the levels of radioactivity in the rough endoplasmic reticulum and the secretory vesicles.



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(i) Describe and explain the changes in the level of radioactivity in the rough endoplasmic reticulum during the first 40 minutes of the incubation period.

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(2)

(ii) Explain the shape of the curve for the secretory vesicles between 0 and 40 minutes.

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(3)

Q8

(Total 8 marks)

TOTAL FOR PAPER: 60 MARKS

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