Centre No.						Paper Reference (complete below)									Surname	Initial(s)
Candidate No.											/				Signature	

Paper Reference(s)

6101/01

Edexcel GCE

Biology

Biology (Human)

Advanced Subsidiary

Unit Test 1

Tuesday 8 June 2004 – Morning

Time: 1 hour

Examiner's use only

Team Leader's use only

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 and initials, the paper reference and your signature. The paper reference is shown above.
Check that you have the correct question paper.
Answer ALL EIGHT questions in the spaces provided in this booklet.
If you need to use additional answer sheets, attach them loosely but securely inside 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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Edexcel
Success through qualifications

Leave blank

Answer ALL questions in the spaces provided.

1. The following table refers to organelles found in eukaryotic cells. Complete the table by writing the name of the organelle, **two** features of its structure or **one** function of the organelle in each of the four empty boxes as appropriate.

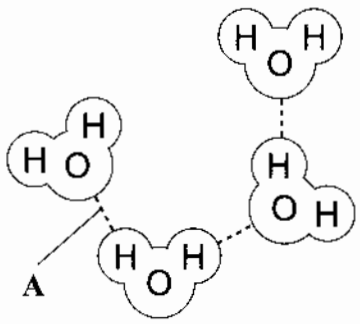
Name of organelle	**Two** features of structure	**One** function
	1. Stack of curved cisternae 2. Surrounded by many vesicles	Modification of proteins
Rough endoplasmic reticulum	1. 2.	
Chloroplast	1. 2.	Site of photosynthesis

Q1

(Total 6 marks)

Leave blank

2. The diagram below shows four molecules of water.



(a) Name the type of bond labelled **A** on the diagram.

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(1)

(b) Explain why water molecules are described as **dipolar**.

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(2)

(c) One of the properties of water is that it has a high specific heat capacity. Explain why this property is important for organisms that live in water.

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(2)

Q2

(Total 5 marks)

Leave blank

3. (a) The table below describes three carbohydrates.

Complete the table by writing the name of each carbohydrate next to its description.

Description of carbohydrate	Name of carbohydrate
A pentose found in transfer RNA	
A disaccharide consisting of glucose and galactose	
The carbohydrate transported in the phloem of plants	

(3)

(b) Describe the structure of cellulose.

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(3)

Q3

(Total 6 marks)

Leave blank

4. The photograph below shows a section through a typical mesophytic leaf, as seen using a light microscope.

(a) In the space below, draw a **plan** to show the tissues of this leaf. The scale of your drawing should be ×1. You should **not** draw individual cells.

(3)

(b) (i) Name **two** tissues that are found in a typical mesophytic leaf.

1. .....

2. .....

(2)

(ii) Explain why a leaf is described as an organ.

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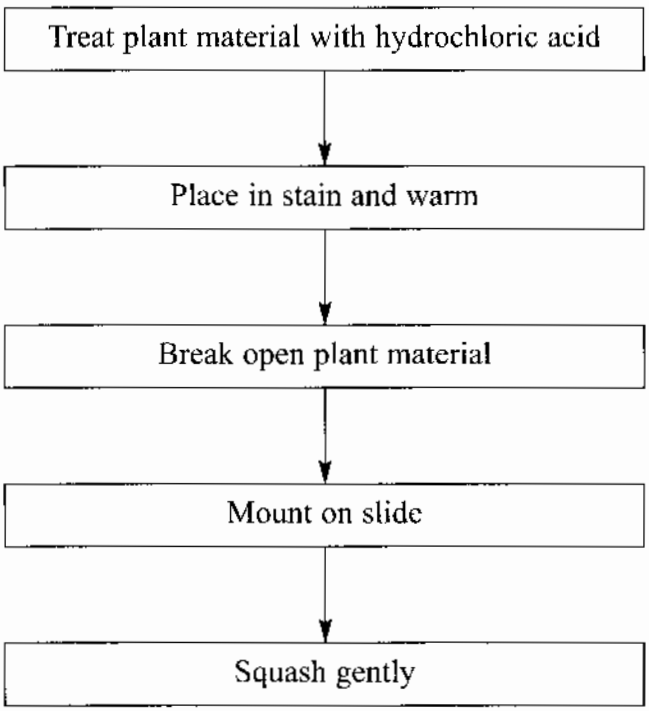
(1)

(Total 6 marks)

Q4

Leave blank

5. The flow diagram below shows a method for preparing and staining cells in order to study stages of mitosis.



(a) Name a suitable part of a plant to use, giving a reason for your choice.

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(2)

(b) (i) Explain why staining is necessary in this preparation.

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(1)

(ii) Name a suitable stain for this technique.

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(1)

Leave blank

(c) Explain why it is necessary to squash the preparation.

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(1)

(Total 5 marks)

Q5

Leave blank

6. Protein synthesis involves transcription and translation.

(a) (i) Where does transcription take place in a eukaryotic cell?

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(1)

(ii) Name the type of chemical reaction that occurs when a strand of messenger RNA is formed from individual nucleotides.

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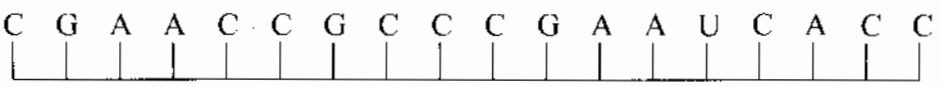
(1)

(b) The diagram below shows part of a messenger RNA (mRNA) molecule.



(i) What is the maximum number of amino acids coded for by this strand of mRNA?

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(1)

(ii) Complete the diagram below to show the sequence of bases on the strand of DNA that coded for this mRNA.

(2)

(c) A strand of mRNA was found to have **53** codons but the protein produced from it contained only **51** amino acids. Suggest **two** reasons for this difference.

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(2)

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(d) Describe the process of translation.

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(5)

(Total 12 marks)

Q6

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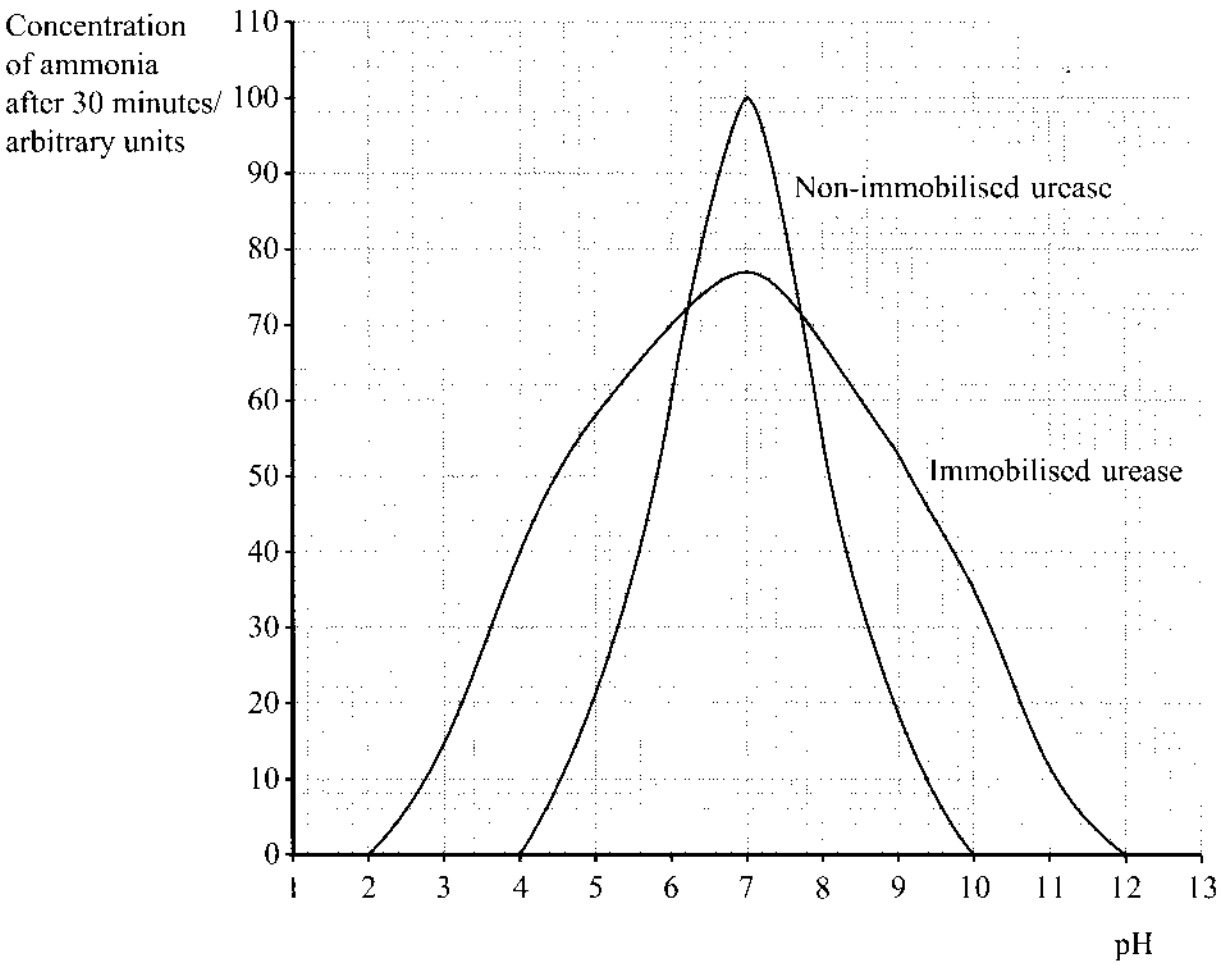
7. Urease is an enzyme which catalyses the breakdown of urea to ammonia and carbon dioxide.

An experiment was carried out into the effect of pH on the activity of immobilised and non-immobilised urease. 10 cm^3 of pH 9 buffer solution was mixed with 10 cm^3 of urea solution. This was mixed with urease and the concentration of ammonia in the mixture was measured after 30 minutes.

The procedure was repeated at different pH values for both immobilised and non-immobilised urease, at the same concentrations of enzyme. The results are shown in the graph below.



(a) Describe how the immobilised urease could be prepared for this experiment.

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(2)

Leave blank

(b) The rate of ammonia production for immobilised urease at pH 7 was 2.6 arbitrary units per minute.

(i) Calculate the rate of ammonia production for non-immobilised urease at pH7. Show your working.

Answer = ...

(2)

(ii) Compare the effect of pH on the activity of immobilised and non-immobilised urease.

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(3)

(iii) Suggest why immobilisation has this effect on the activity of urease.

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(2)

Q7

(Total 9 marks)

Leave blank

8. (a) DNA is replicated by a process called semi-conservative replication. Explain what is meant by the term **semi-conservative replication**.

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(4)

(b) When bacteria grow and reproduce they need a nitrogen source. The nitrogen becomes part of their DNA.

Bacteria were placed in a culture medium containing a heavy form of nitrogen. The bacteria were grown and allowed to reproduce for several generations until all the nitrogen in their DNA was heavy nitrogen.

The bacteria were removed, washed thoroughly and then divided into five batches labelled A, B, C, D and E. They were then placed in fresh culture medium and allowed to grow for different periods of time.

Batch A was placed into fresh culture medium containing heavy nitrogen, and left for four generations. The other four batches were placed into fresh culture medium containing light nitrogen and left for different periods of time.

The treatments are shown in the table below.

Batch	First treatment	Second treatment
A	All grown in heavy nitrogen	Grown in heavy nitrogen for four generations
B		Grown in light nitrogen for one generation
C		Grown in light nitrogen for two generations
D		Grown in light nitrogen for three generations
E		Grown in light nitrogen for four generations

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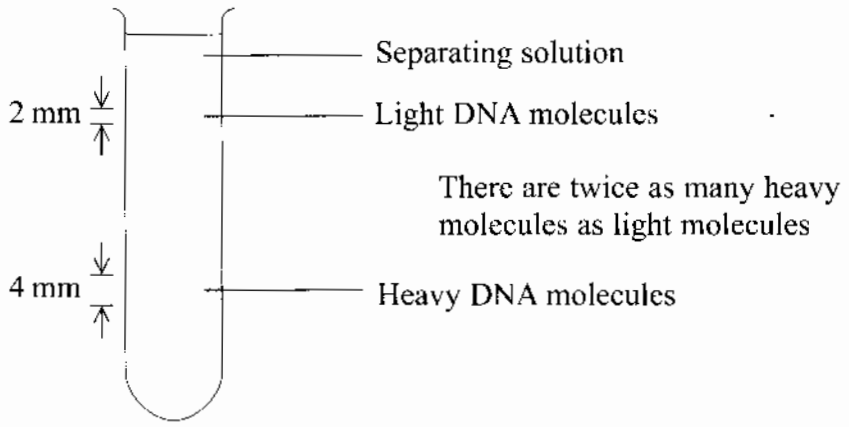
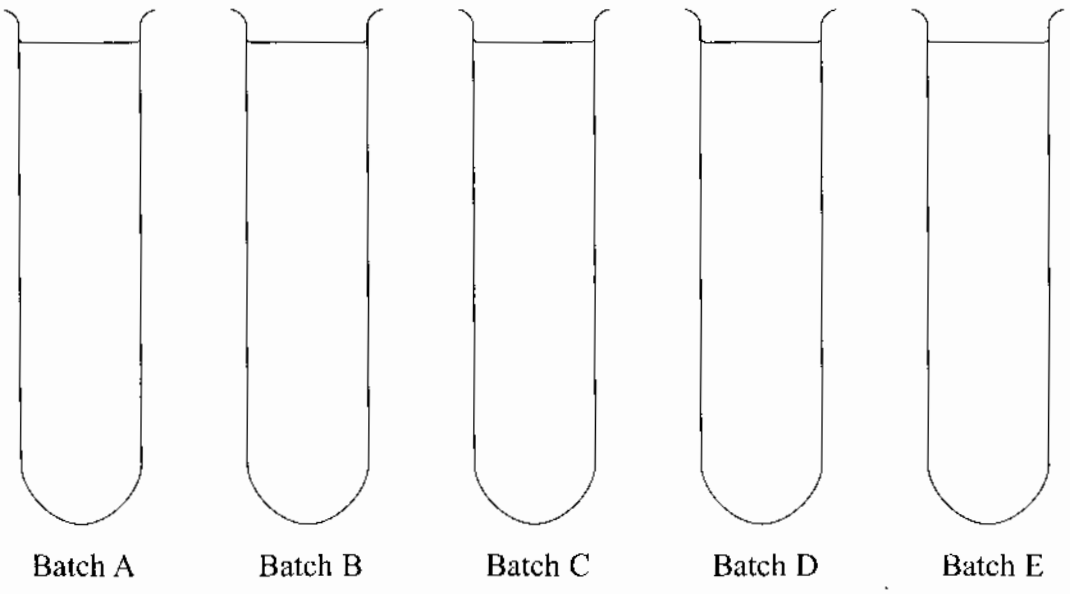
The DNA from the five batches of bacteria was then removed, placed on separating solutions and centrifuged (spun). The mass of DNA added to each separating solution was the same.

DNA containing different proportions of heavy and light nitrogen can be seen as separate bands after centrifugation. The heavier molecules are lower down in the separating solution than the lighter molecules. The wide bands contain more molecules than the narrow bands.

The diagram below shows an example of the results of centrifuging a mixture of heavy and light DNA.



The diagram below shows the results for the batches A, B, C and D.



This question continues on page 15

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(i) Explain why the DNA from batch B is higher up in the separating solution than the DNA from batch A.

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(2)

(ii) Explain the results for batch C.

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(3)

(iii) On the diagram on page 13, draw in the bands you would expect to see for the DNA separated from the bacteria grown in batch E.

(2)

Q8

(Total 11 marks)

TOTAL FOR PAPER: 60 MARKS

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