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

Paper Reference(s)

6101/01

Edexcel GCE

Biology

Biology (Human)

Advanced Subsidiary/Advanced

Unit Test 1

Monday 5 June 2006 – 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, initial(s) and 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.
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 the 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. The table below refers to the structure of DNA and RNA. If the statement is correct, place a tick (✓) in the appropriate box and if the statement is incorrect, place a cross (✗) in the appropriate box.

Statement	DNA	mRNA
Is double stranded		
Contains the bases adenine and uracil		
Contains a pentose sugar		
Contains phosphodiester bonds		

Q1

(Total 4 marks)

2. Read through the following account of the roles of lipids in living organisms, then write on the dotted lines the most appropriate word or words to complete the account.

Lipids have many important roles in living organisms. They are found as small droplets of oil in many cells where they act as an .....

Fats are found deposited beneath the skin of animals where they provide ..... and .....

In plants, waxes are found on the upper surface of leaves where they act as a ..... layer.

Q2

(Total 4 marks)

Leave blank

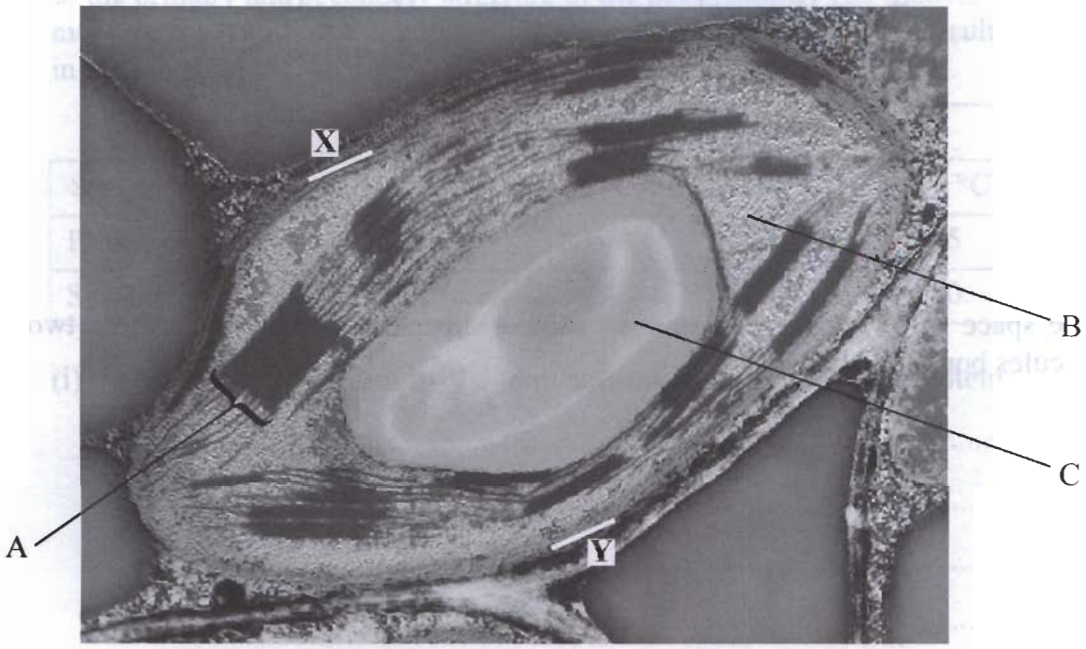
3. In the space below, draw a diagram to show the structure of the bacterium *Escherichia coli*. On your diagram label **three** structures **not** found in a liver cell.

Q3

(Total 4 marks)

Leave blank

4. The photograph below shows a chloroplast as seen using an electron microscope. It has been magnified 5000 times.



Magnification ×5000

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

A .....

B .....

C .....

(3)

(b) The magnification of this chloroplast is ×5000. Measure the width of the chloroplast between points X and Y on the photograph.

Calculate the actual width of the chloroplast, expressing the answer in μm (micrometres). Show your working.

Answer ..... μm

(3)

(c) Name **two** types of cells which contain chloroplasts and are found in a leaf.

1 .....

2 .....

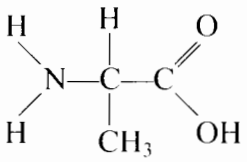
(2)

Q4

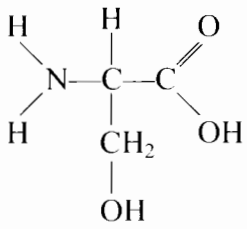
(Total 8 marks)

Leave blank

5. (a) The diagram below shows the structures of two amino acids, alanine and serine.



Alanine



Serine

In the space below, draw a diagram to show a dipeptide formed when these two molecules bond together.

(2)

Leave blank

(b) Computer-generated models were used to measure the length in nanometres (nm) of a polypeptide containing a large number of amino acids. Measurements were made of the primary and secondary structure of the polypeptide. The models were used to measure the length of the polypeptide at 25 °C and at 55 °C. The results are shown in the table below.

	Length of polypeptide/nm	
Structure of polypeptide	at 25 °C	at 55 °C
Primary	505	505
Secondary	48	70

(i) Explain what is meant by the term **secondary structure** of a protein.

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(2)

(ii) Compare the results obtained at 25 °C with those obtained at 55 °C.

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(2)

(iii) Suggest why the increase in temperature has this effect on the length of the secondary structure of the polypeptide.

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(2)

Q5

(Total 8 marks)

Leave blank

6. (a) Explain the meaning of the term **water potential**.

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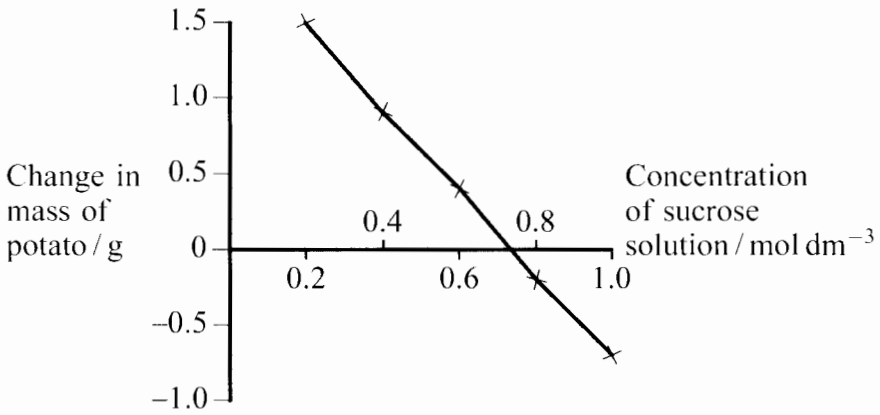
(2)

(b) In an investigation, a student prepared five pieces of raw potato of equal mass and a range of sucrose solutions of different concentrations.

One piece of potato was placed in each sucrose solution. After two hours the potato pieces were blotted dry and the change in mass was calculated.

The results are shown in the graph below.



From these results the student concluded that the water potential of the potato tissue was equivalent to the water potential of the sucrose solution at a concentration between 0.6 mol dm ^{3} and 0.8 mol dm^{-3}.

(i) Explain why the piece of potato placed in 0.2 mol dm ^{3} sucrose solution increased in mass.

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(2)

Leave blank

(ii) From the graph, find the concentration of sucrose solution in which there was no change in mass of potato.

..... mol dm^{-3}

(1)

(iii) Suggest why there was no change in mass of the potato at this concentration of sucrose solution.

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(2)

(c) The cell wall prevents the potato cells from bursting at low concentrations of sucrose solution. Describe the structure of a plant cell wall.

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(3)

Q6

(Total 10 marks)

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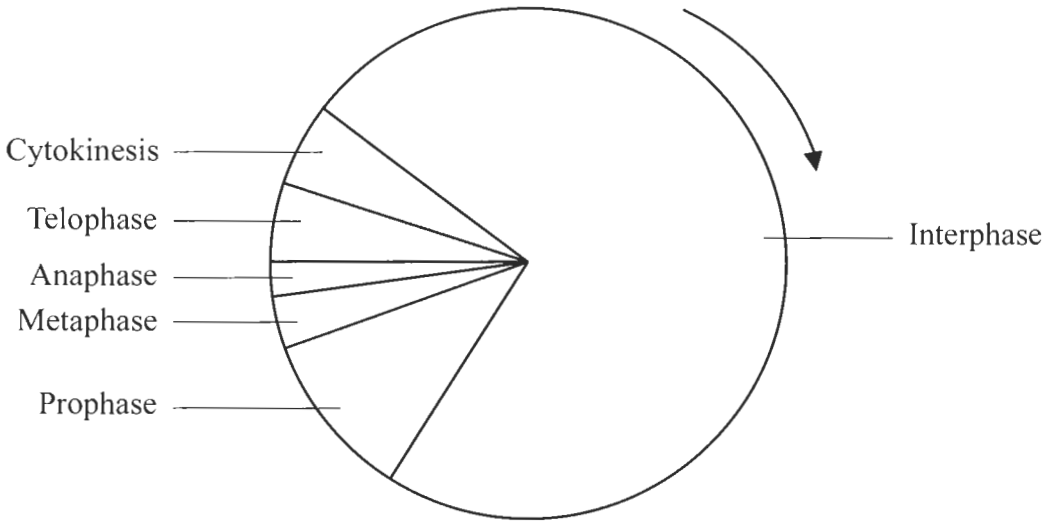
7. The diagram below shows the stages in the cell cycle of a plant root cell.



(a) The cell had 2 arbitrary units of DNA at the start of interphase. State the number of arbitrary units of DNA in this cell in each of the following stages.

(i) at the end of prophase

.....

(1)

(ii) during anaphase

.....

(1)

(b) Describe how you would prepare a root tip squash to observe the stages of mitosis.

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(5)

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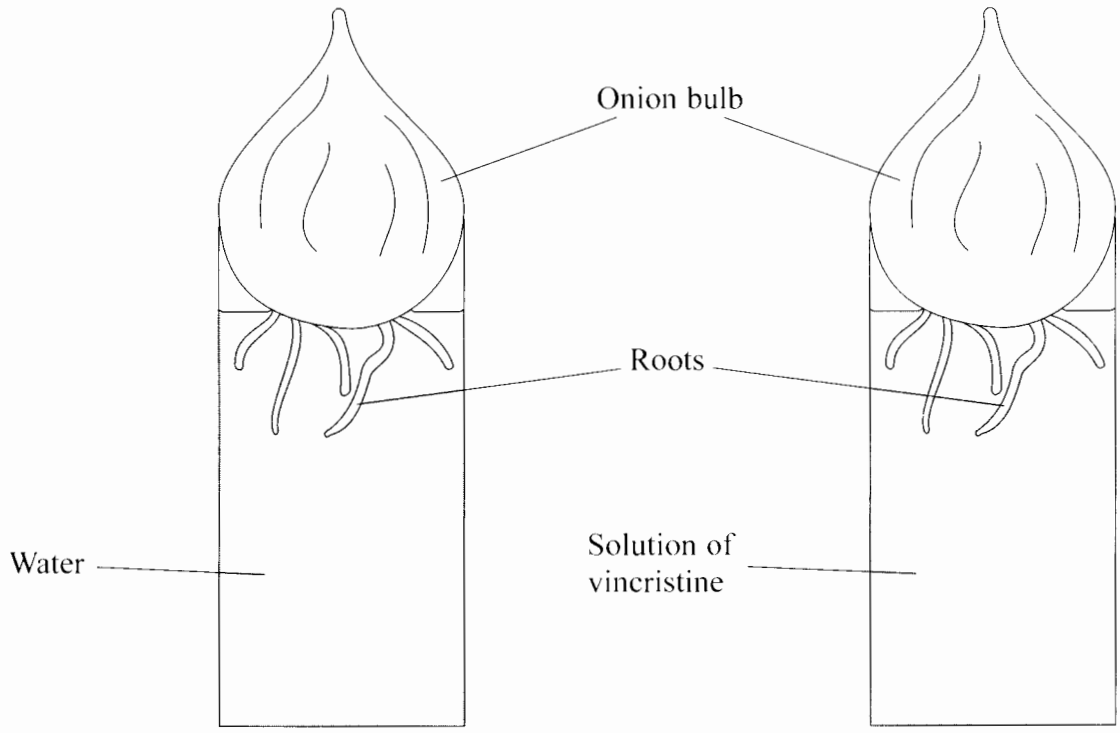
(c) Two onion bulbs were grown to obtain some roots. One onion bulb was grown in water, the other in a solution of a drug called vincristine, as shown below.



Vincristine is a drug used in the treatment of cancer. It prevents spindle formation during mitosis. The result of a root tip squash on the roots grown in a solution of vincristine showed an increase in the percentage of cells found in one of the phases compared with roots grown in water.

(i) Suggest in which phase of mitosis this increase occurs.

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(1)

(ii) Give an explanation for your answer.

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(2)

Q7

(Total 10 marks)

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8. (a) Enzyme activity can be affected by active site-directed inhibitors and non-active site-directed inhibitors.

(i) Explain what is meant by the term **active site-directed inhibition** of enzymes.

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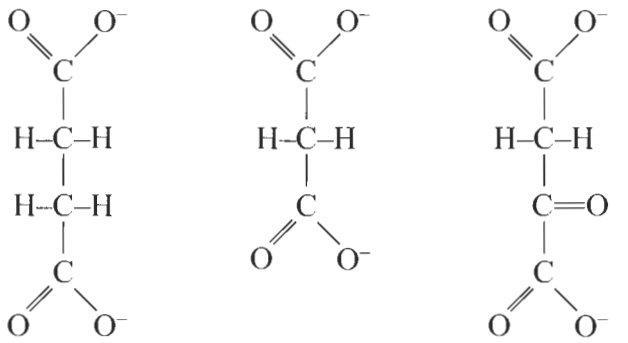
(3)

(ii) Succinate is the substrate for the enzyme succinate dehydrogenase. The activity of this enzyme is inhibited by malonate and oxaloacetate. The diagram below shows the structures of the substrate and the inhibitors.



Succinate (substrate) | Malonate (inhibitor) | Oxaloacetate (inhibitor)

Suggest how the structures of malonate and oxaloacetate indicate that they act as **active site-directed** inhibitors of succinate dehydrogenase.

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(1)

Leave blank

(iii) State **two** ways in which non-active site-directed inhibition differs from active site-directed inhibition.

1 .....

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2 .....

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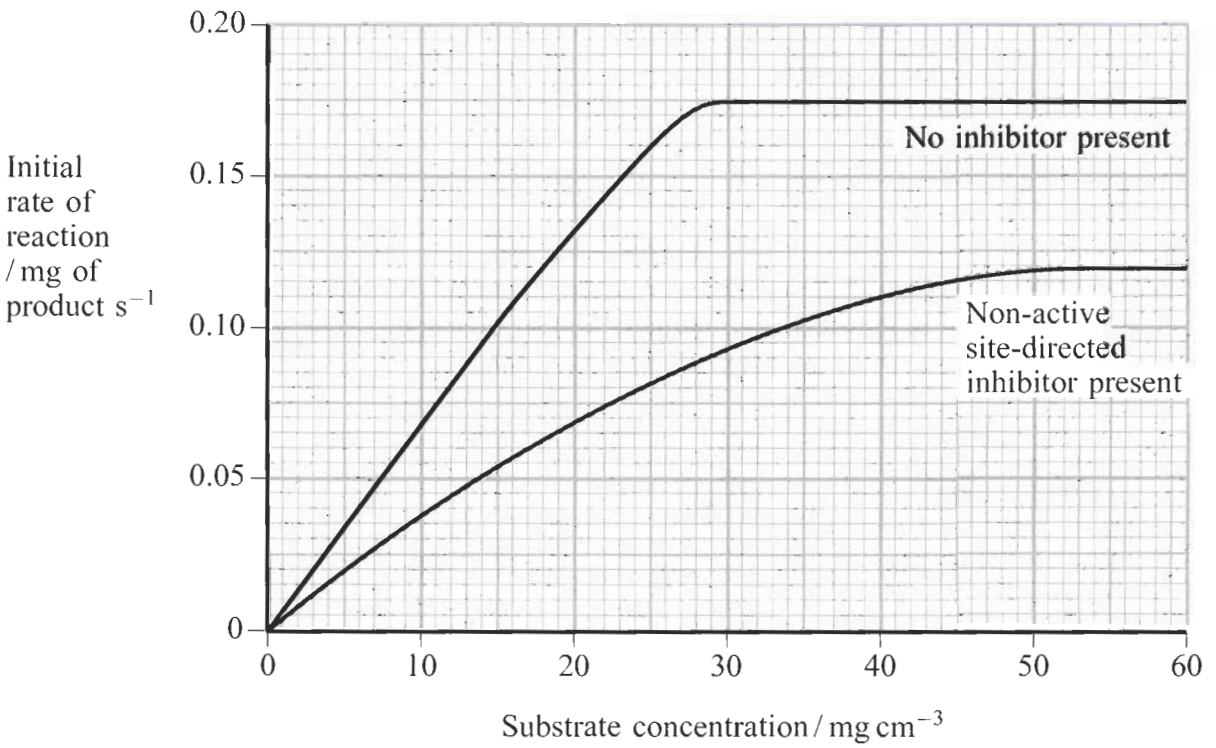
(2)

(b) The graph below shows the results of an investigation into the effects of substrate concentration on the initial rate of an enzyme-controlled reaction, with and without a non-active site-directed inhibitor present.



(i) Describe the relationship between the initial rate of reaction and substrate concentration when no inhibitor is present.

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(2)

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(ii) Explain why the initial rate of reaction of an enzyme levels off at high substrate concentrations when there is no inhibitor present.

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(2)

(iii) Describe the effect of the non-active site-directed inhibitor on the initial rate of the reaction.

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(2) **Q8**

(Total 12 marks)

TOTAL FOR PAPER: 60 MARKS

END