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 10 January 2005 – 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, initials 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 some important biological molecules, the smaller molecules from which they are made and the bonds joining these smaller molecules together. Complete the table by writing the most appropriate word or words in the empty boxes.

Name of biological molecule	Smaller molecules from which it is made	Name of bond joining the smaller molecules
Triglyceride		
	β Glucose	
Polypeptide	Amino acids	

Q1

(Total 5 marks)

2. Read through the following account of mitosis in an animal cell, then write on the dotted lines the most appropriate word or words to complete the account.

During prophase, the ..... breaks down and the

..... migrate to opposite poles of the cell.

During ....., the chromosomes are visible as pairs of chromatids, lined up along the equator of the cell. Spindle fibres extend from the poles of the cell and attach to the ..... .

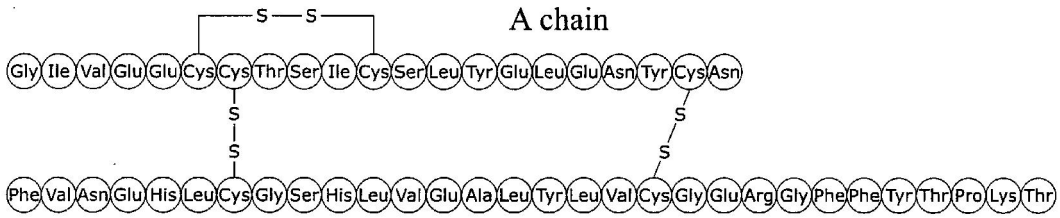
In ....., the spindle fibres contract, pulling the chromatids apart.

Q2

(Total 5 marks)

Leave blank

3. The diagram below shows the structure of a human insulin molecule. Each circle represents one amino acid.



Insulin is a protein that has a tertiary structure and a quaternary structure.

(a) (i) Name **two** types of bond that help to maintain the tertiary structure.

1. .....

2. .....

(2)

(ii) What evidence is there in the diagram that insulin has a quaternary structure?

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(1)

(b) (i) All human insulin molecules have the same primary structure. Explain what is meant by **primary structure**.

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(1)

(ii) When insulin molecules are formed they fold into a specific shape. Explain why all human insulin molecules fold into the same shape.

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(2)

(Total 6 marks)

Q3

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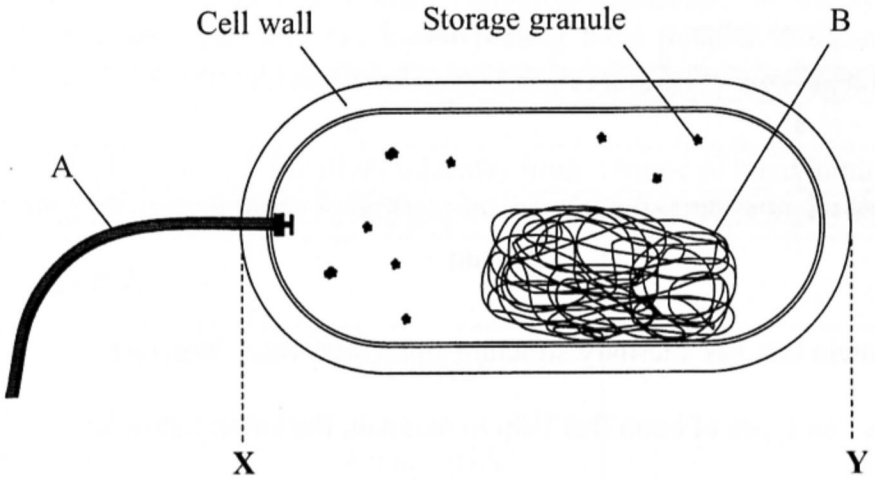
4. The diagram below shows the structure of a bacterial cell as seen using an electron microscope.



(a) (i) Name the parts labelled A and B.

A .....

B .....

(2)

(ii) Name the carbohydrate present in the storage granules.

.....

(1)

(iii) Describe how the cell wall in this bacterial cell differs from that in a plant cell.

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.....

(1)

(b) The diagram has been magnified 6000 times. Calculate the actual length of the bacterial cell between X and Y. Show your working, and give your answer in micrometres.

Answer ..... µm

(3)

(Total 7 marks)

Q4

Leave blank

5. Eukaryotic cells contain organelles, many of which are bound by a membrane. Some organelles have a double membrane, often called an envelope.

(a) (i) Describe **two** structural differences between the double membrane surrounding a mitochondrion and the double membrane surrounding a nucleus.

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(2)

(ii) Name **one** other organelle that has a double membrane.

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(1)

(b) Centrioles are an example of organelles that are **not** membrane-bound. Describe the structure and function of centrioles.

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(3)

(Total 6 marks)

Q5

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6. Beetroots are root vegetables. They appear red because their cells contain a water soluble red pigment in their vacuoles, which cannot pass through membranes.

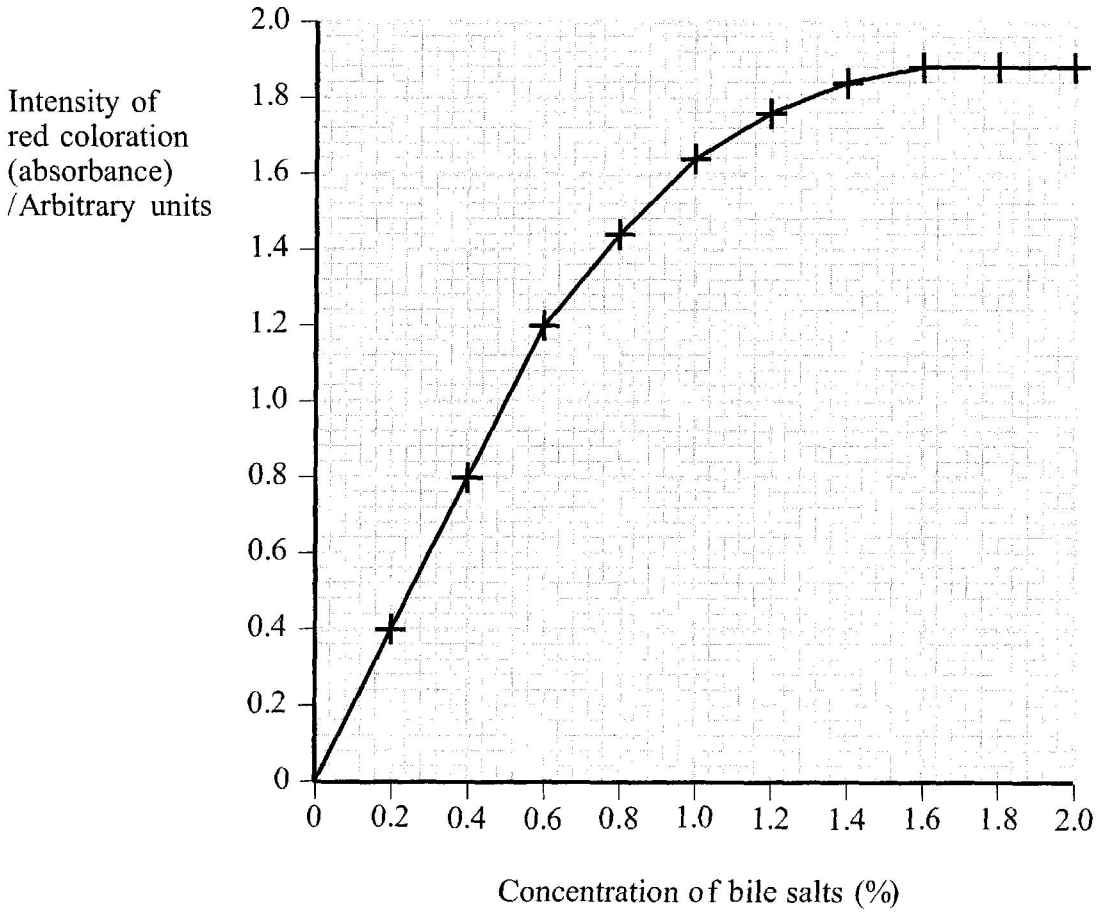
An experiment was carried out to investigate the effect of bile salts on the permeability of beetroot membranes. Bile salts disrupt the structure of the membranes. Several beetroot discs were cut of equal dimensions. Each disc was rinsed in distilled water and dried using absorbent tissue.

Five beetroot discs were then placed in a tube containing 25 cm^3 of 2% bile salt solution and left for 30 minutes at 20 °C. The procedure was repeated for different concentrations of bile salts and one set of discs was left in distilled water.

After 30 minutes, each set of beetroot discs was removed from the solutions and from the water. Each bile salt solution had become red and the discs were slightly pink. There was no change in the colour of the discs in the water and the water remained colourless.

Each bile salt solution was stirred and a sample removed and placed in a colorimeter. The intensity of red coloration (absorbance) was determined by the colorimeter.

The results of the investigation are shown in the graph below.



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(a) Explain why the cell membrane is described as having a fluid mosaic structure.

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(2)

(b) Suggest why it was necessary to rinse the beetroot discs before they were added to the bile salt solution.

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(1)

(c) Describe the effect of increasing bile salt concentration on the intensity of the red colour (absorbance) of the solution.

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(3)

Leave blank

(d) Suggest an explanation for these results.

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(4)

(e) The experiment was repeated using a second beetroot. Suggest why the readings obtained might be slightly different from those for the first beetroot.

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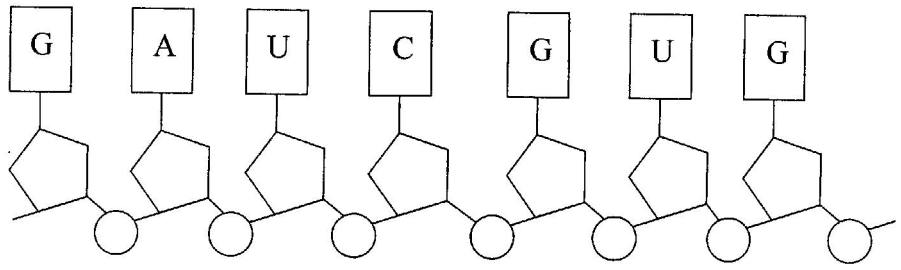
(1)

Q6

(Total 11 marks)

Leave blank

7. The diagram below shows part of a molecule of messenger RNA.



(a) On the diagram, draw a ring around a mononucleotide and label it with the letter **M**.

(1)

(b) Messenger RNA is formed during protein synthesis by a process called transcription. Describe the events which occur during transcription.

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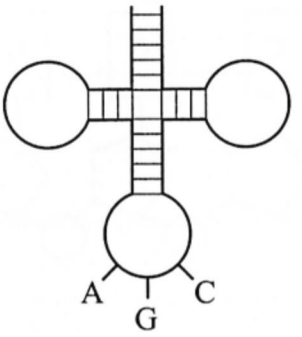
(5)

Leave blank

(c) During translation, transfer RNA molecules line up against the messenger RNA molecule. The diagram below shows the structure of one transfer RNA molecule.



(i) State precisely where in the cell translation takes place.

.....

(1)

(ii) On the diagram of the messenger RNA molecule on the opposite page, draw a ring around the codon that this transfer RNA molecule would bind to. Label it with the letter **C**.

(1)

Q7

(Total 8 marks)

Leave blank

8. The enzyme pectinase can be used to extract juice from fruit such as apples.

(a) Give **one** other use of pectinase in food modification.

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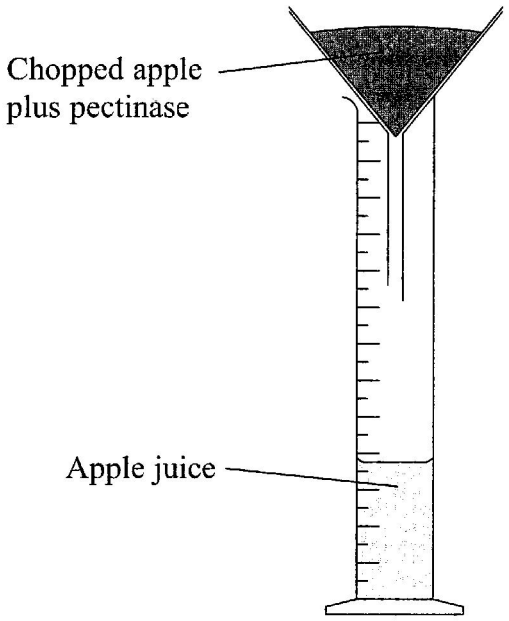
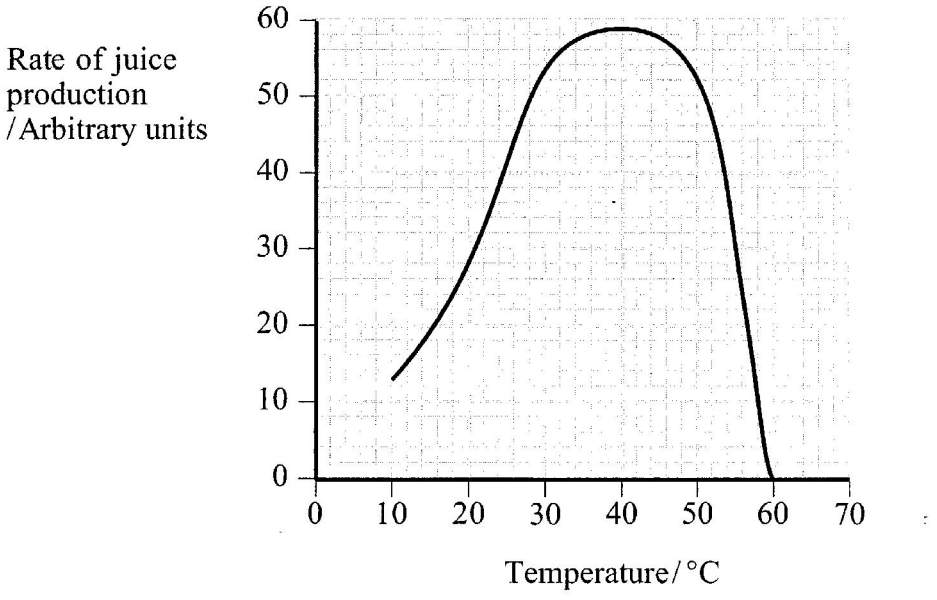
(1)

(b) An experiment was carried out to investigate the effect of temperature on the rate at which pectinase extracted fruit juice from apples. An apple was chopped up and 2 cm^3 of pectinase solution was added to a 50 g sample of this chopped apple. This mixture was incubated at 20 °C for 10 minutes. The volume of apple juice produced was measured by filtering into a measuring cylinder. The experiment was repeated at different temperatures.



The results are shown in the graph below.



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(i) State **two** variables, other than the mass of apple and volume of enzyme solution, that should be kept constant during the experiment.

1. .....

2. .....

(2)

(ii) Describe and explain the shape of the graph between 20 °C and 40 °C.

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(2)

(iii) Describe and explain the shape of the graph between 40 °C and 60 °C.

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(3)

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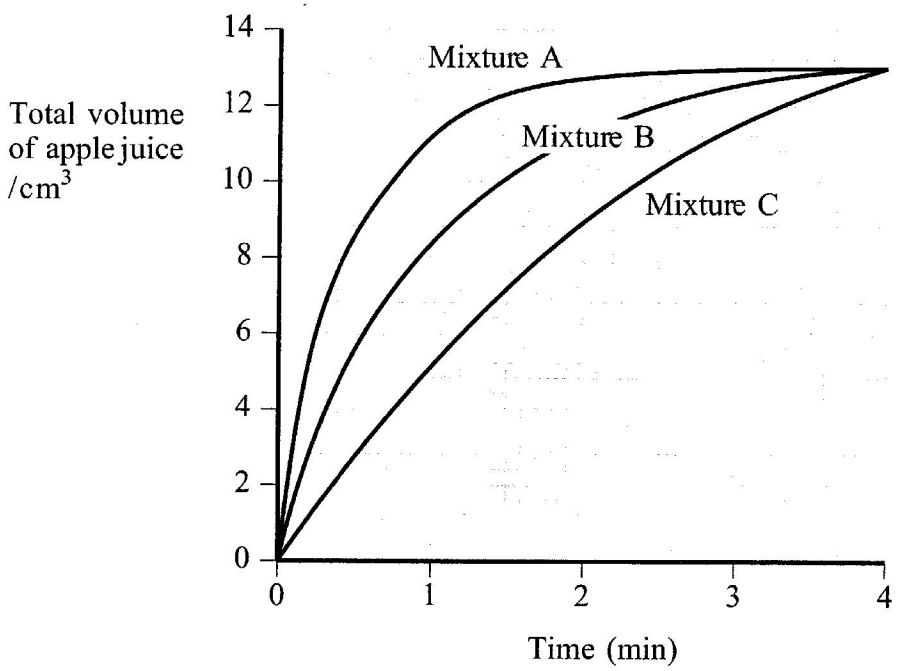
(c) In another experiment a student investigated the effect of an inhibitor on the activity of pectinase. The student made apple pulp by placing several apples together in a blender. She used this apple pulp as the substrate. She then made mixtures of the apple pulp with an inhibitor as shown in the following table.

Mixture	Volume of apple pulp/cm^3	Volume of water/cm^3	Volume of inhibitor solution/cm^3	Concentration of inhibitor solution (%)
A	20	20	0	—
B	20	0	20	10
C	20	0	20	20
D	20	0	20	5

She added 2 cm^3 of the pectinase solution to each mixture and then measured the total volume of apple juice obtained every 30 seconds for several minutes. The results for mixtures A, B and C are shown on the graph below.



(i) Draw and label on the graph above the expected results for mixture **D**.

(2)

(ii) The student concluded that this is an example of active site-directed inhibition because the rate of reaction depends on the relative concentrations of inhibitor and substrate. Explain how the results support her conclusion.

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(2)

Leave blank

Q8

(Total 12 marks)

TOTAL FOR PAPER: 60 MARKS

END