Surname	Centre Number	Candidate Number
Other Names		2

WJEC CBAC

GCE A level

1074/01

BIOLOGY – BY4

A.M. WEDNESDAY, 25 January 2012

1¾ hours

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**14**	
2	**13**	
3	**14**	
4	**14**	
5	**7**	
6	**8**	
7	**10**	
Total	**80**	

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INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

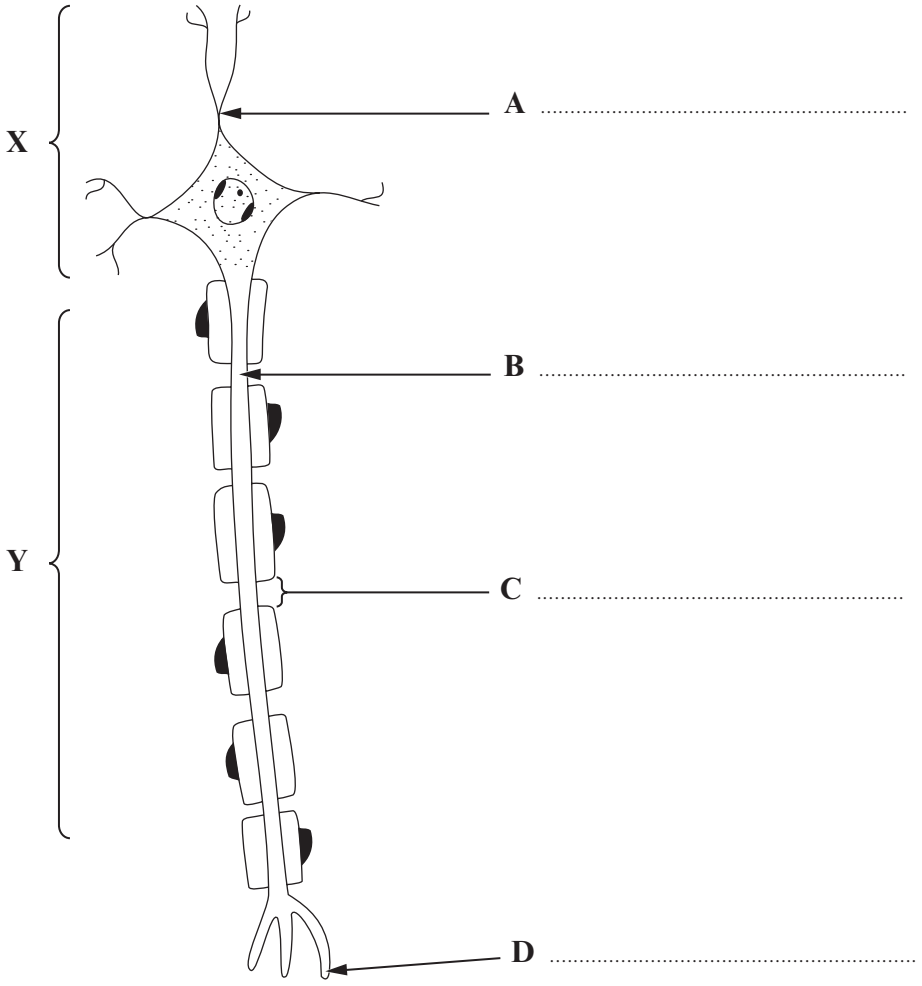
The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The quality of written communication will affect the awarding of marks.

Examiner only

1. *(a)* (i) Label structures **A-D** on the diagram of the motor neurone below. [4]



(ii) Give the names of **two different types** of effectors. [2]

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(iii) Where in the spinal cord would you find structure **X**? [1]

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(iv) In which spinal cord root would you find structure **Y**? [1]

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(b) (i) Complete the following which describes how the myelin sheath is formed. [3]

During embryonic development ..... cells become associated with axons and dendrons. These cells ..... around the axon forming a layer called the myelin sheath. This layer is formed of many layers of ..... .

(ii) What are the functions of the myelin sheath? [3]

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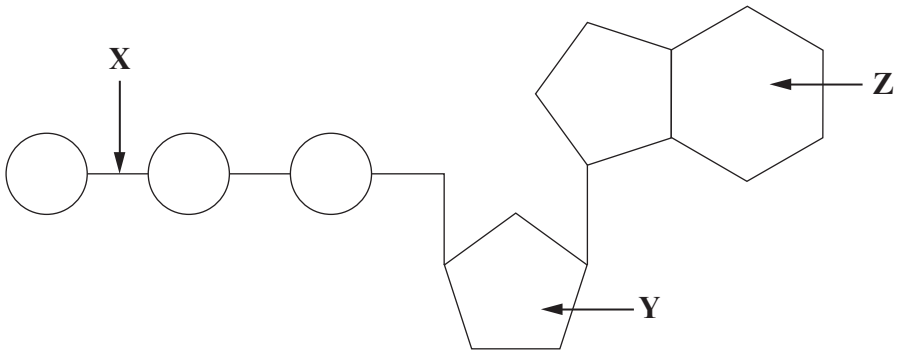
(Total 14 marks)

Examiner only

2. *(a)* The diagram represents a molecule of ATP.



(i) Give the name of the reaction which has resulted in the bond **X**. [1]

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(ii) Name the pentose sugar **Y**. [1]

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(iii) Name the organic base **Z**. [1]

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(b) Describe how energy is released from ATP. [3]

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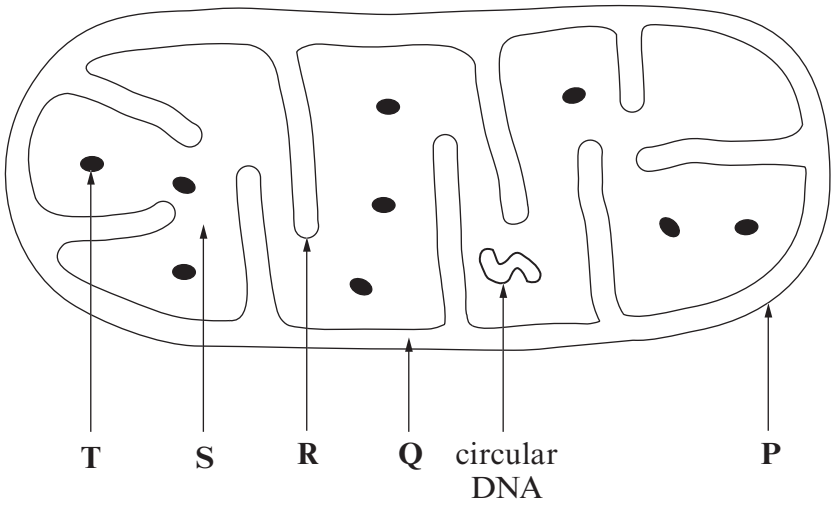
(c) (i) The diagram shows the structure of a mitochondrion as seen using an electron microscope.



Using the letters on the diagram identify the site of each of the following: [3]

I. Krebs cycle; .....

II. oxidative phosphorylation; .....

III. decarboxylation. .....

(ii) What is the function of the circular DNA? [1]

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(iii) Explain how the pH in region **Q** becomes acidic. [3]

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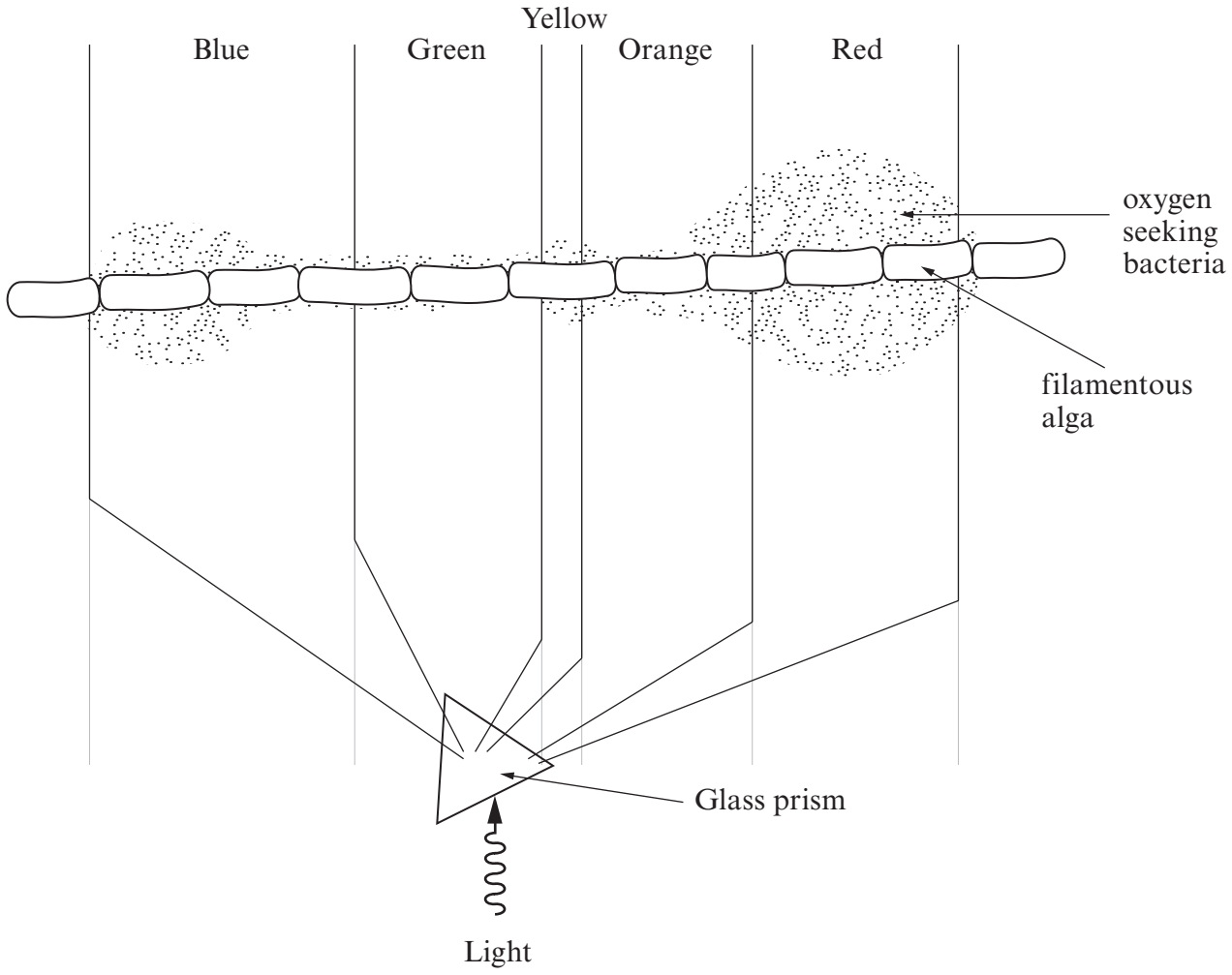
(Total 13 marks)

Examiner only

3. A scientist called Engelmann set up an experiment using a filamentous alga (a single strand of photosynthetic cells joined end to end). The filamentous alga received light which had been passed through a glass prism which split the light into the different wavelengths. He used motile oxygen seeking bacteria to show which regions of the filamentous alga produced most oxygen.



(a) (i) Describe and explain the distribution of the bacteria. [3]

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Examiner only

(ii) Describe the process by which the alga produces oxygen. [5]

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(b) A suitable control would be to repeat the experiment without the prism. Suggest how the bacteria would then be distributed. [1]

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(c) (i) Give the name of the pigment found at the reaction centre. [1]

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(ii) Give the names of **two** *other* light absorbing pigments found in chloroplasts. [2]

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(iii) What is the advantage to a plant of having several different light absorbing pigments? [2]

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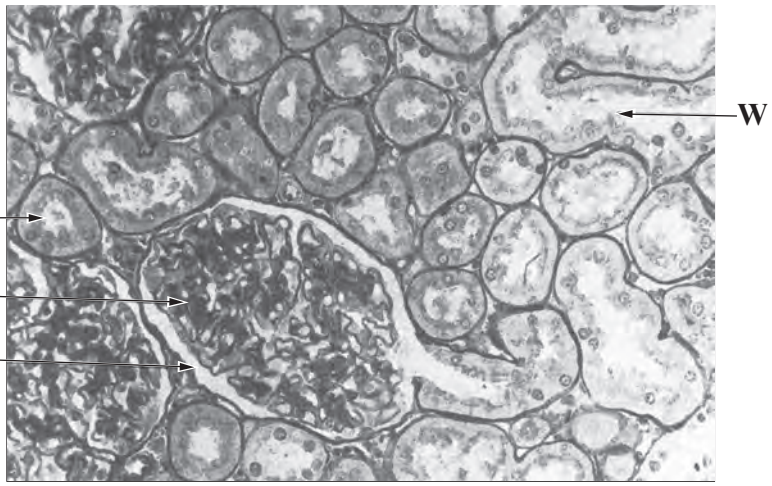
(Total 14 marks)

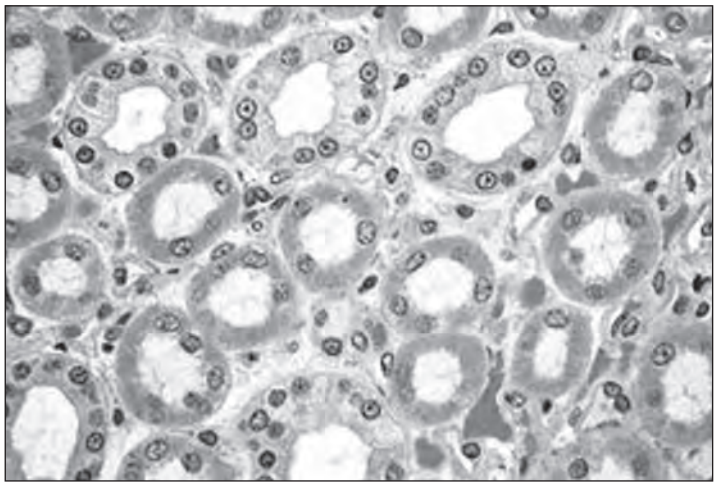
Examiner only

4. The micrographs are of kidney as seen using a light microscope.

Micrograph **A**



Micrograph **B**



(a) (i) Name the area of the kidney from which micrograph **A** is taken. [1]

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(ii) In micrograph **A** identify structures **X**, **Y** and **Z**. [3]

X .....

Y .....

Z .....

(iii) **X** and **W** are the same structure. How do you account for their different appearance under the microscope? [1]

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Examiner only

(iv) Micrograph **B** shows structures in the medulla. Which parts of the nephron can be seen? [3]

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(b) Describe the process of ultrafiltration. [6]

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(Total 14 marks)

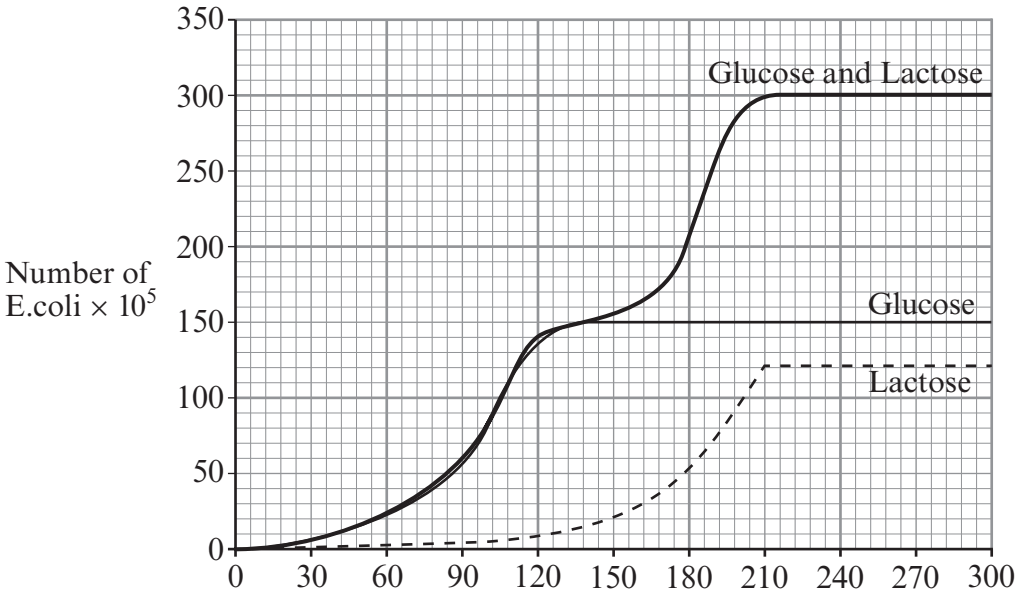
5. Fill in the missing blanks with appropriate scientific terms. [7]

Proteins in dead organisms are decayed by ..... into ..... . The bacterium called ..... converts these into ..... and finally the bacterium ..... converts the waste products of these bacteria into nitrate ions. Bacteria called ..... which live in the root nodules of legumes can fix atmospheric nitrogen.

The bacterium ..... is a free living bacterium in the soil which can also fix nitrogen. It does this by adding atmospheric nitrogen to a carbon source from sugars.

(Total 7 marks)

6. Three fermenters were set up in order to study the population growth of *E. Coli* in different sugar solutions, 0.001 M glucose, 0.001 M lactose and a mixture of glucose and lactose both at 0.001 M. Samples were removed from the fermenter at timed intervals. The population size in each fermenter was estimated. The results are shown in the graph below.



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(a) Explain why there is a difference in population growth between the glucose and lactose. [3]

(b) Describe and explain the shape of the curve when the bacteria are grown in lactose and glucose together. [5]

(Total 8 marks)

Examiner only

7. Answer **one** of the following questions.

Any diagrams included in your answers must be fully annotated.

Either, *(a)* Describe the function of enzymes and coenzymes (carriers) in the process of respiration. [10]

Or *(b)* Describe the role of the **cell membrane** in

(i) the generation of a nerve impulse; [7]

(ii) the passage of a nerve impulse between two neurones. [3]

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(Total 10 marks)