

Candidate Name	Centre Number	Candidate Number
		2



GCE AS/A level

1071/01

BIOLOGY/HUMAN BIOLOGY – BY1

A.M. TUESDAY, 25 May 2010

1½ hours

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	3	
2	9	
3	10	
4	12	
5	8	
6	11	
7	7	
8	10	
Total	70	

1071 01

INSTRUCTIONS TO CANDIDATES

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.

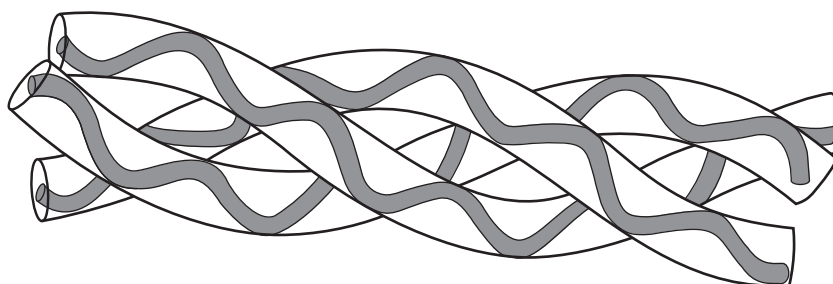
The quality of written communication will affect the awarding of marks.

1. The table shows three features that may be found in bacteria and viruses. If the feature is present put a tick (✓) in the box, if it is not present put a cross (✗) in the box. [3]

<i>Feature</i>	<i>Bacterium</i>	<i>Virus</i>
Possess nucleic acid		
Surrounded by a protein coat		
Ribosomes in cytoplasm		

(Total 3 marks)

2. (a) The diagram represents a section of a collagen molecule.



- (i) Name the group of proteins to which collagen belongs. [1]

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- (ii) Describe the structure of a collagen molecule. [3]

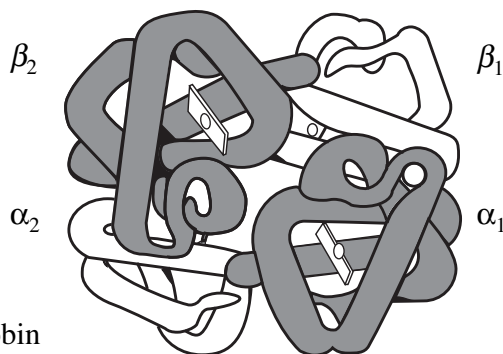
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- (iii) State **one** function of collagen. [1]

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- (b) Haemoglobin belongs to another group of proteins called globular proteins. The diagram shows a molecule of haemoglobin.



Structure of haemoglobin

- (i) Describe **three** differences between collagen and haemoglobin that you can see in the diagrams. [3]

1.

 2.

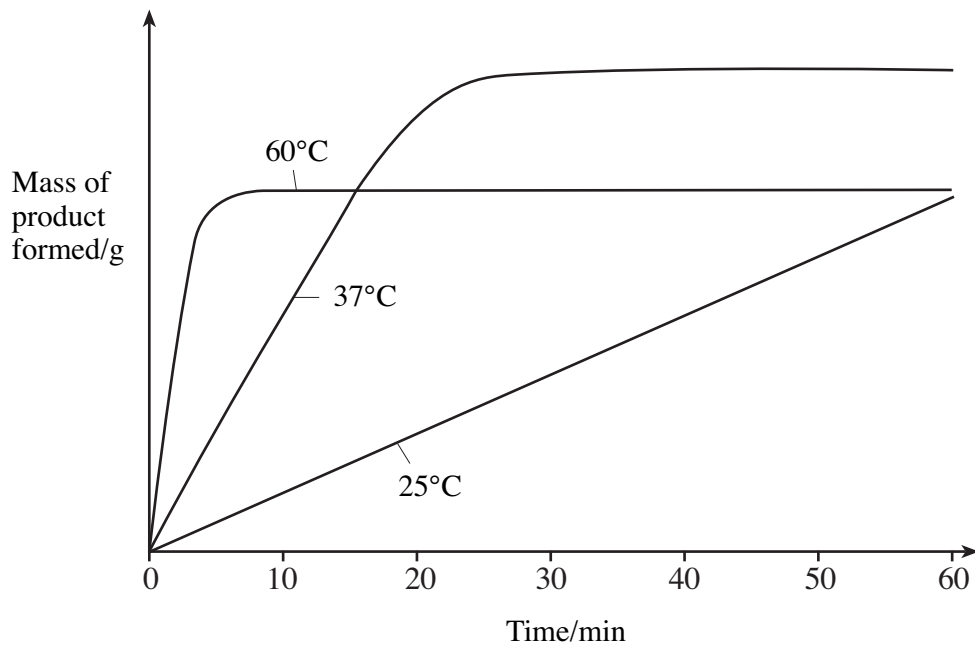
 3.

- (ii) Name **one other** type of globular protein. [1]

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(Total 9 marks)

3. The graph shows the mass of product formed when a fixed concentration of enzyme is added to a fixed concentration of substrate and then placed in water baths at three different temperatures.



- (a) (i) Explain why the mass of product formed at 60°C is greater during the first five minutes than the masses formed at 25°C and 37°C. [3]

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- (ii) Explain why there is less overall product formed at 60°C than at 37°C. [3]

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- (b) Explain why the mass of product formed at 37°C levels off after approximately 20 minutes. [1]

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(c) Explain why the curve at 25°C has not levelled off after 60 minutes.

[3]

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(Total 10 marks)

4. The presence of glucose in a person's urine is an indication of diabetes. Glucose can be detected by placing, into a sample of urine, a coloured plastic strip containing the immobilised enzyme, glucose oxidase. The strip changes colour if glucose is present.

(a) (i) Describe **two** advantages of using immobilised enzymes. [2]

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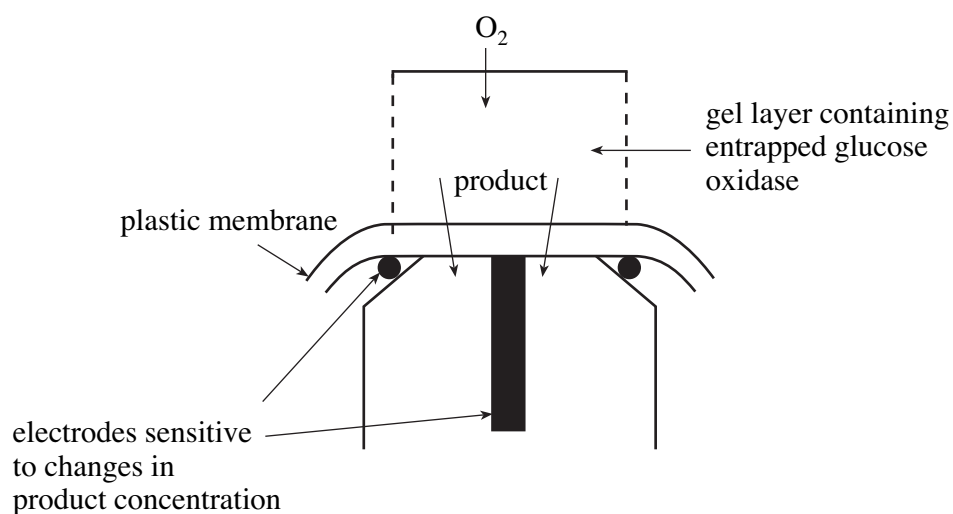
(ii) Explain why this diagnostic method is not suitable for the accurate measurement of the concentration of glucose in the urine. [2]

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(b) Another method used to measure glucose involves the use of a biosensor. The diagram below shows an enzyme electrode from a glucose biosensor.



(i) Explain what is meant by the term *biosensor*. [2]

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(ii) Describe the function of the enzyme. [2]

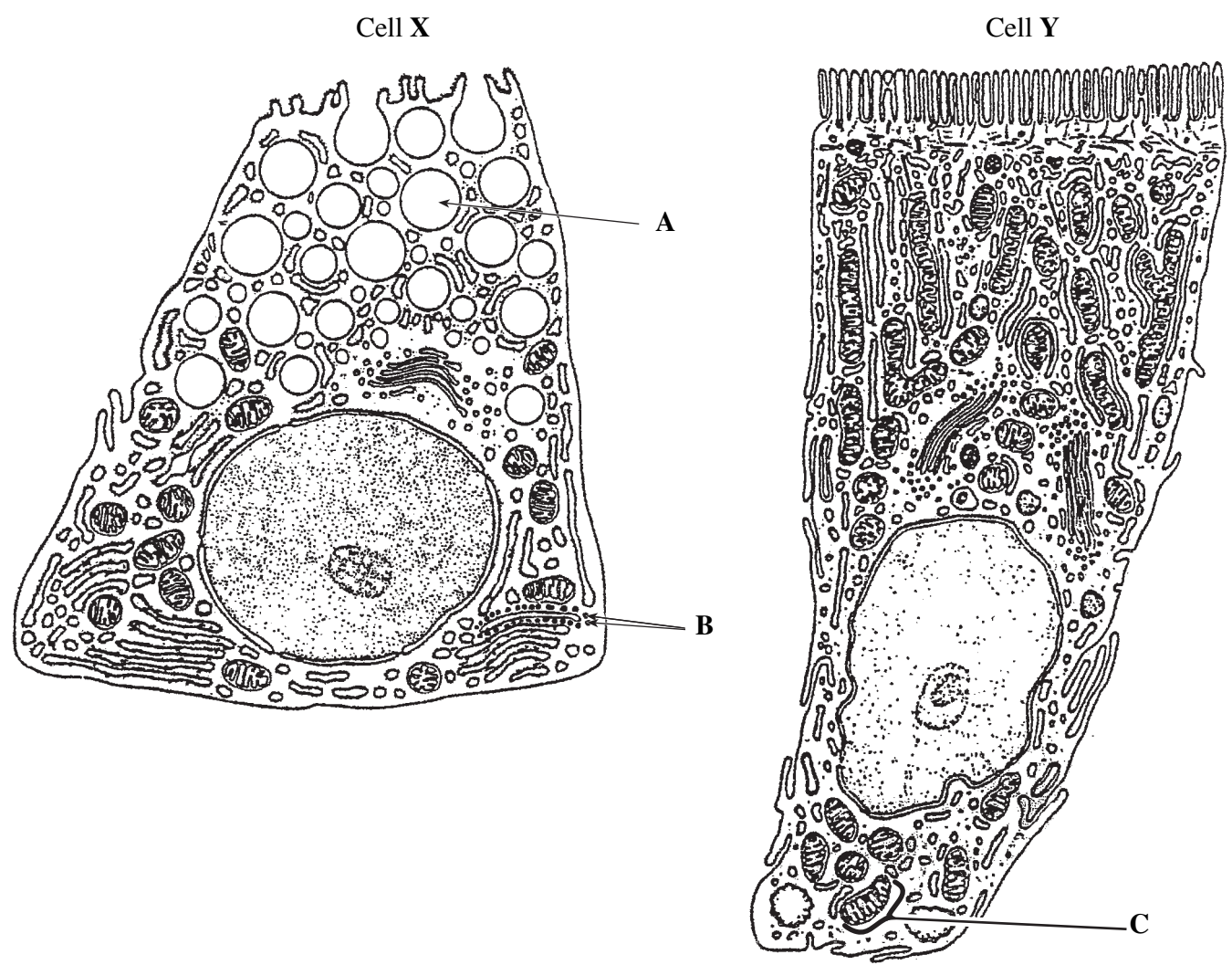
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(iii) Describe how this biosensor can be used to measure blood glucose concentration. [4]

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(Total 12 marks)

5. The diagrams show two cells X and Y, drawn to the same scale. Cell X is a secretory cell. Cell Y is involved in absorption.



(a) Complete the table by describing **three** ways in which the structure of cell X differs from the structure of cell Y. [3]

<i>Structural component of cell X</i>	<i>Structural component of cell Y</i>
1	
2	
3	

(b) Explain how the labelled structures help each cell to carry out its function. [3]

A

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B

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C

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(c) For cell **X**, name and describe the process by which secretory products are passed out of the cell. [2]

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(Total 8 marks)

6. (a) Name the cell organelle which is the site of energy release in a mammal. [1]

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- (b) The table shows figures from the respiration of carbohydrate and lipid in a mammal.

<i>Energy source</i>	<i>Energy released / kJg⁻¹ food</i>	<i>Metabolic water produced / g g⁻¹ food</i>	<i>Oxygen consumed / dm³ g⁻¹ food</i>
Carbohydrate	17.2	0.56	0.83
Lipid	38.9	1.07	2.02

- (i) With reference to the figures in the table, state **one advantage** and **one disadvantage** of storing lipid rather than carbohydrate. [2]

advantage

.....

disadvantage

.....

- (ii) Suggest **two other** reasons why mammals store lipids. [2]

1.

2.

- (c) The potato contains stored starch and protein.

- (i) State **two** uses for the protein in the growing potato plant. [2]

1.

2.

- (ii) The starch and protein must be hydrolysed before being used by the potato plant. Explain what is meant by the term *hydrolysed*. [2]

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- (iii) Name the products resulting from the **complete** hydrolysis of: [2]

Starch

Protein

(Total 11 marks)

7. In an experiment 1 cm^3 of blood was added to 10 cm^3 of isotonic saline (salt) solution. To three separate test tubes, 1 cm^3 of the blood was added to equal volumes of each of the following: distilled water, ammonium chloride solution with a water potential of -476 kPa and glycerol solution with a water potential of -896 kPa . The time taken for the red blood cells to burst (haemolysis) is shown in the table.

<i>Solution</i>	<i>Time taken for haemolysis/s</i>	Ψ/kPa
Distilled water	10	0
Ammonium chloride solution	50	-476
Glycerol solution	720	-896

- (a) (i) Suggest **one** problem in performing any investigation using blood. [1]

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- (ii) Explain why haemolysis of the red blood cells occurred quickest when placed in distilled water. [3]

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- (b) A sample of red blood cells were placed in a concentrated solution ($\Psi -2000 \text{ kPa}$) of sodium chloride.
Draw a diagram to show the expected appearance of one of the blood cells after five minutes and explain its appearance. [3]

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(Total 7 marks)

8. Answer **one** of the following questions.
Any diagrams included in your answer must be fully annotated.

Either, (a) Describe the events that occur during one complete cell cycle including mitosis, in an animal cell. [10]

Or (b) Describe the similarities and differences in the structure of amino acids and nucleotides. [10]

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