

Candidate Name	Centre Number	Candidate Number

WELSH JOINT EDUCATION COMMITTEE  
**General Certificate of Education**  
 Advanced Subsidiary/Advanced



CYD-BWYLLGOR ADDYSG CYMRU  
 Tystysgrif Addysg Gyffredinol  
 Uwch Gyfrannol/Uwch

311/01

**BIOLOGY**

**MODULE BI1**

A.M. MONDAY, 4 June 2007

(1 hour 30 minutes)

**For Examiner's Use Only**

<b>Total Marks</b>	
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### **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.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

1. Complete the following sentences, about polysaccharides, by inserting the most appropriate word(s) to fill in the blanks. [7]

Starch, which is found in plants, consists of two components. The first is a branch-chained component known as amylopectin and the second is an unbranched component called ..... The unbranched component consists of a type of glucose known as ..... glucose whose molecules are joined together by ..... bonds. These bonds are formed by a condensation reaction which involves the elimination of a molecule of ..... to form a long chain. Cellulose, another plant polysaccharide, consists of ..... glucose molecules. Adjacent chains of cellulose are held together by ..... bonds. These chains are bundled together to form ..... which gives cellulose its high tensile strength.

(Total 7 marks)

2. The boxes contain events that occur during mitosis, meiosis or both.

<b>A</b>	crossing over between homologous pairs of chromosomes
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<b>B</b>	chromatids shorten and thicken
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<b>C</b>	centromeres split
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<b>D</b>	nuclear membrane disintegrates
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<b>E</b>	chiasmata formation
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<b>F</b>	unseparated chromatids arranged at cell equator
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<b>G</b>	contraction of spindle fibres
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<b>H</b>	formation of nuclear membrane
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- (a) For **mitosis only** put the letters in the boxes below to complete the order in which the events occur. [5]

<b>B</b>					
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- (b) The horse has a diploid number of 60. Complete the table below for cells produced by mitosis and meiosis in the horse. [2]

	<i>Mitosis</i>	<i>Meiosis</i>
Number of chromosomes in nucleus.		
Number of nuclei formed.		

- (c) Explain the significance of meiosis to organisms. [3]

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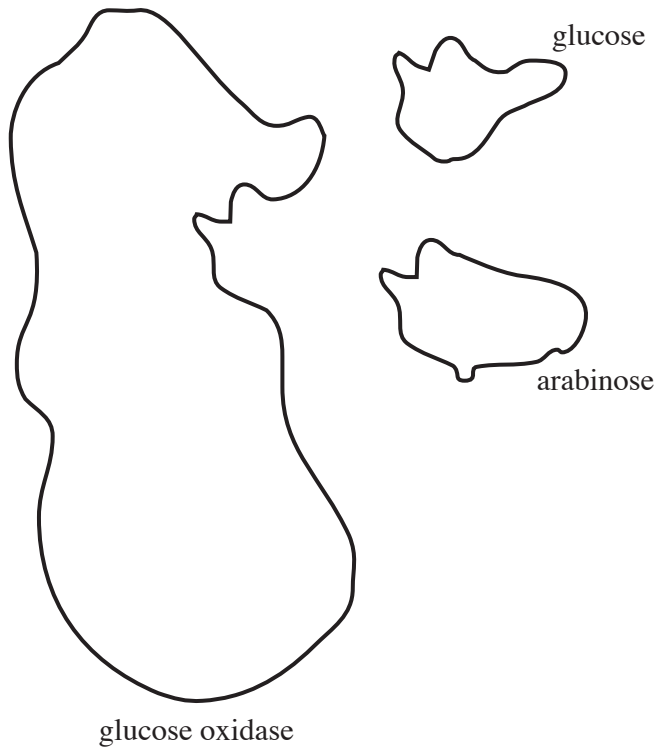
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**(Total 10 marks)**

3. Glucose oxidase is an enzyme, shown below, the normal substrate of which is glucose.

The molecule arabinose acts as an inhibitor for the glucose oxidase.



(a) (i) Name the class of molecule to which enzymes belong. [1]

.....

(ii) On the diagram, label the position of the enzyme's active site. [1]

(iii) Explain why you chose that position. [2]

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.....  
.....

(b) Explain how arabinose inhibits the activity of glucose oxidase. [4]

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(c) If a person drinks methylated spirits (meths), blindness can result because the body turns the meths into formaldehyde, which is highly poisonous. One form of hospital treatment is for the patient to drink alcohol (ethanol) which is a molecule of a similar structure to meths.

Suggest how this treatment will reduce the toxic effects of the meths. [3]

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**(Total 11 marks)**

4. Plant and animal cells are described as being eukaryotic. Bacteria are prokaryotic organisms.

- (a) Complete the table below by putting a tick (✓) if the feature is present, or a cross (X) if it is absent. [6]

<i>Feature</i>	<i>Bacterial cell</i>	<i>Palisade cell</i>	<i>Striated muscle cell</i>
cell wall			
large permanent vacuole			
nuclear envelope			
chloroplasts			
mesosomes			
mitochondria			

- (b) (i) State what is meant by the term *tissue*. [2]

.....

.....

.....

- (ii) The biceps muscle in the upper arm consists of striated muscle fibres bound together. Contraction of the biceps results in the forearm being raised.

Would it be correct to classify the biceps muscle as a tissue?  
Explain your answer.

[2]

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.....

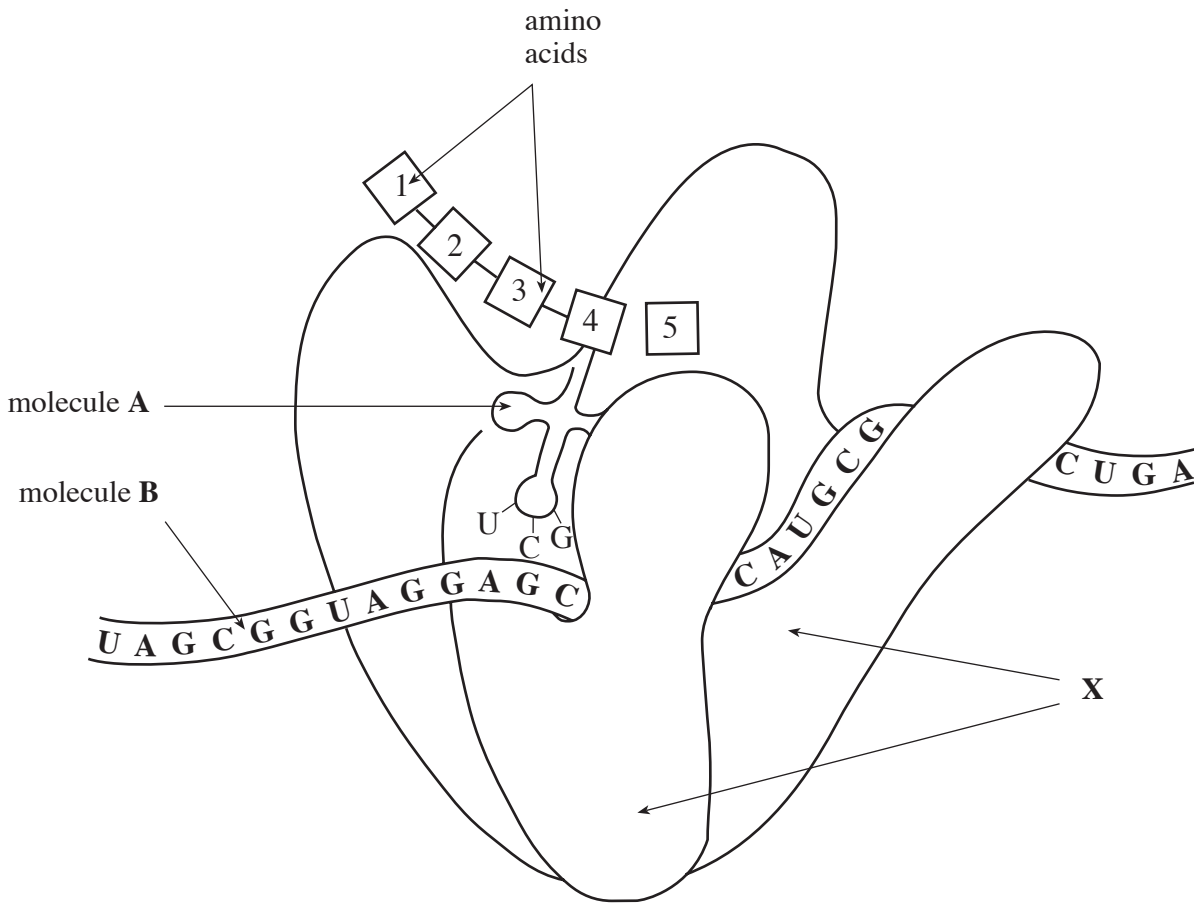
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**(Total 10 marks)**

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5. The diagram shows the part of the process in protein synthesis known as translation, occurring at organelle **X** within a cell.



- (a) (i) State where organelle **X** is to be found in a cell. [1]

.....

- (ii) Name organelle **X** and state the names of the **two** chemical components which it is made of. [3]

Name .....

Component 1 .....

Component 2 .....



(iii) Name molecules **A** and **B**. [2]

**A** .....

**B** .....

(b) (i) Describe how two amino acids are joined together.  
Name the bond formed. [3]

.....  
.....  
.....  
.....

(ii) Name **one** other molecule, not shown in the diagram, that is needed for the process of translation. [1]

.....

(c) (i) A random change can occur in the sequence of DNA bases, which code for a protein molecule.  
State the general name given to this type of change. [1]

.....

(ii) With reference to the process of protein synthesis, explain how a change in the base sequence of DNA causes a genetic disease. [2]

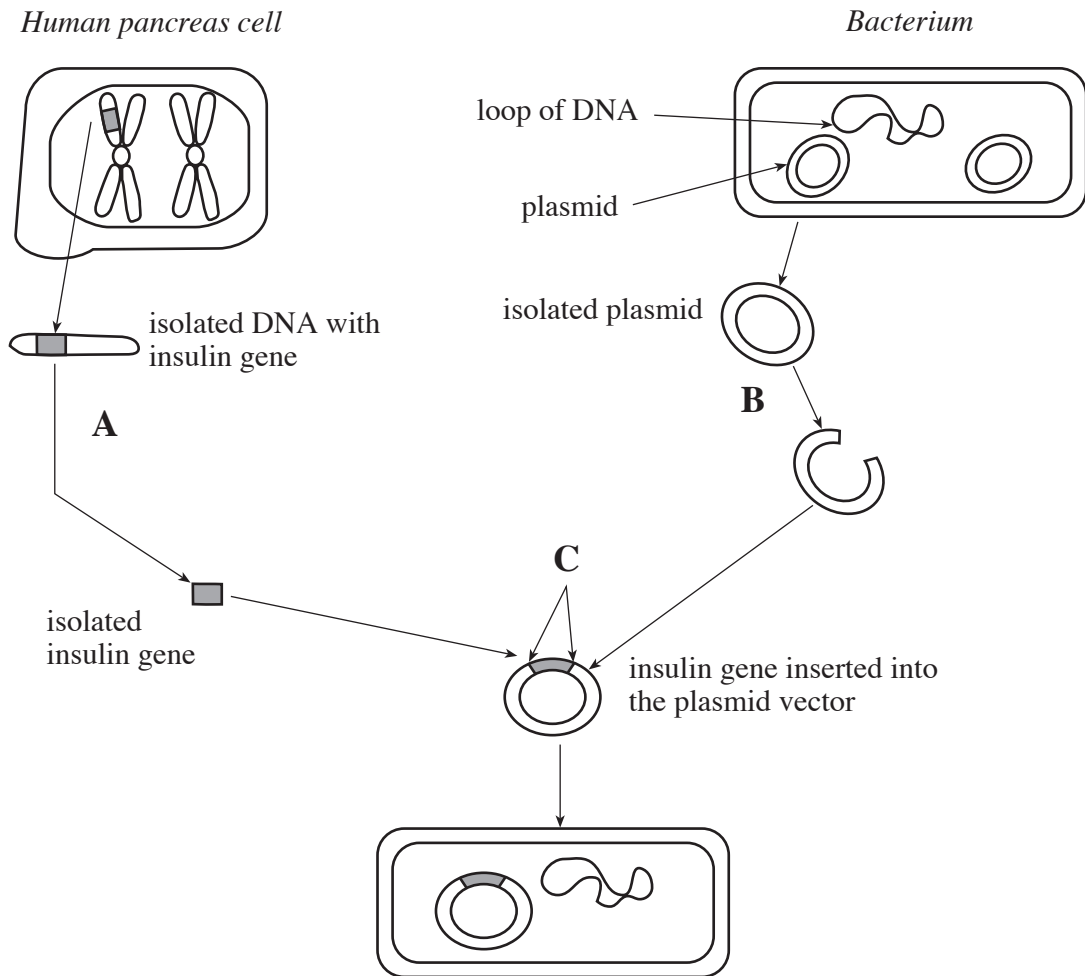
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(iii) Give an example of a disease that can be caused by this type of change. [1]

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**(Total 14 marks)**

6. The diagram shows how insulin can be produced by the process of genetic engineering.



(a) Describe the process involved at points A and B.

[4]

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- (b) At point **C** it is usual to insert a gene for antibiotic resistance in addition to the gene for insulin.  
Explain why it is necessary to insert the gene for antibiotic resistance. [2]

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- (c) Before the development of genetic engineering, insulin for human injection was extracted from the pancreas of other animals. Apart from cost, suggest **two** advantages of producing insulin by genetic engineering. [2]

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**(Total 8 marks)**



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**(Total 10 marks)**