



RECOGNISING ACHIEVEMENT

H

A223/02

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**  
**TWENTY FIRST CENTURY SCIENCE**  
**BIOLOGY A**

Unit 3 Ideas in Context plus B7 (Higher Tier)

**WEDNESDAY 21 MAY 2008**

Afternoon

Time: 60 minutes



Candidates answer on the question paper.

**Additional materials (enclosed):**

Insert

Calculators may be used.

**Additional materials:** Pencil  
 Ruler (cm/mm)

Candidate  
Forename
Candidate  
Surname
Centre  
Number
Candidate  
Number
**INSTRUCTIONS TO CANDIDATES**

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided.

**INFORMATION FOR CANDIDATES**

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is 55.
-  Where you see this icon you will be awarded a mark for the quality of written communication in your answer.

**FOR EXAMINER'S USE**

Qu.	Max.	Mark
1	12	
2	10	
3	13	
4	9	
5	11	
<b>TOTAL</b>	<b>55</b>	

This document consists of 12 printed pages and an insert.

Answer **all** the questions.

**1 This question is based on the article about deadly pathogens.**

**(a)** The article refers to a pathogen using a host.

Suggest what is meant by a **pathogen using a host**.

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

[3]

**(b)** Old age pensioners are vaccinated against influenza every year.

Explain why a new influenza vaccine has to be developed every year.

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

[2]

**(c)** There is a correlation between the survival times of pathogens outside the human body and the number of deaths per 100 000 people infected.

Describe this correlation.

.....  
.....

[1]

(d) The article suggests that the most deadly pathogens can survive for the longest time outside the body.

(i) Give an example from the table and explain how it supports this suggestion.

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

[2]

(ii) Explain what scientists have to do to get their theories accepted as scientific knowledge.

.....  
.....

[2]

(e) People can be protected from pathogens by vaccination.

When new vaccines are used, some people are concerned about side-effects from the vaccine.

Explain what is meant by a **side-effect**.

.....  
.....

[2]

[Total: 12]

2 Some diseases such as sickle-cell anaemia can be inherited.

(a) Describe the symptoms of sickle-cell anaemia.

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

[2]

(b) Explain the cause of sickle-cell anaemia.

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

[2]

(c) Carriers of sickle-cell anaemia only have a mild form of the disease.

Explain what is meant by a **carrier** of sickle-cell anaemia.

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

[2]

(d) State **one** possible advantage of being a carrier of sickle-cell anaemia.

.....

[1]

(e) Natural selection has resulted in an increased frequency of the sickle-cell allele in certain populations.

Explain how.

.....

.....

.....

.....

.....

.....

.....

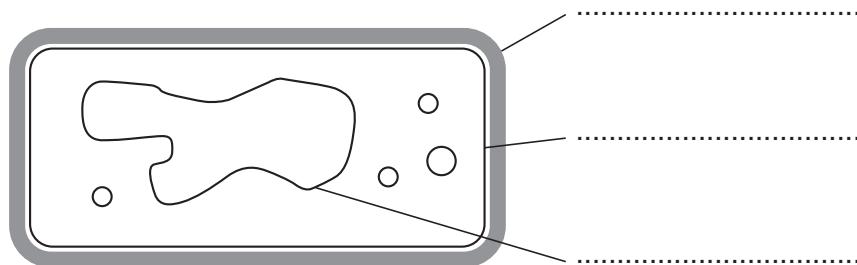
.....

[3]

[Total: 10]

3 Bacteria can be genetically modified to produce human insulin.

(a) Label the diagram of a **bacterium**.



[3]

**(b)** Explain how bacteria can be genetically modified to produce human insulin.

Use these words in your answer.

**isolate**      **replicate**      **transfer**



One mark is for a clear and ordered answer.

..... [3+1]

(c) A type of wheat has been genetically modified to be resistant to weed killer. This wheat is now grown in farmers' fields.

Look at the statements about **economic**, **social** and **ethical** implications of genetic modification of crops.

- It is morally wrong to alter the DNA of living things.
- All living things contain DNA.
- Farmers make more profit from their crops.
- People have the right to decide if genetically modified organisms should be released into the environment.

Write down **one** statement that is an example of each of these types of implications.

economic .....

.....

.....

social .....

.....

.....

ethical .....

.....

.....

[3]

(d) Other than insulin, name **three** products that can be produced by genetically modified bacteria.

1 .....

2 .....

3 ..... [3]

[Total: 13]

4 Anita is training to run a marathon.



(a) She knows that energy is released from respiration.

In what form is this energy made available to her muscles?

..... [1]

(b) The supply of oxygen and glucose to Anita's muscles increases when she runs.

Explain why this increase is important for aerobic respiration.

.....  
.....  
..... [2]

(c) During the race Anita starts to respire **anaerobically**.

She builds up an oxygen debt.

(i) Explain what is meant by an oxygen debt.

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

(ii) Explain why Anita continues to breathe heavily at the end of the race.

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

[4]

(d) Describe one **advantage** and one **disadvantage** of using anaerobic respiration rather than aerobic respiration.

advantage of **anaerobic** respiration .....

.....

disadvantage of **anaerobic** respiration .....

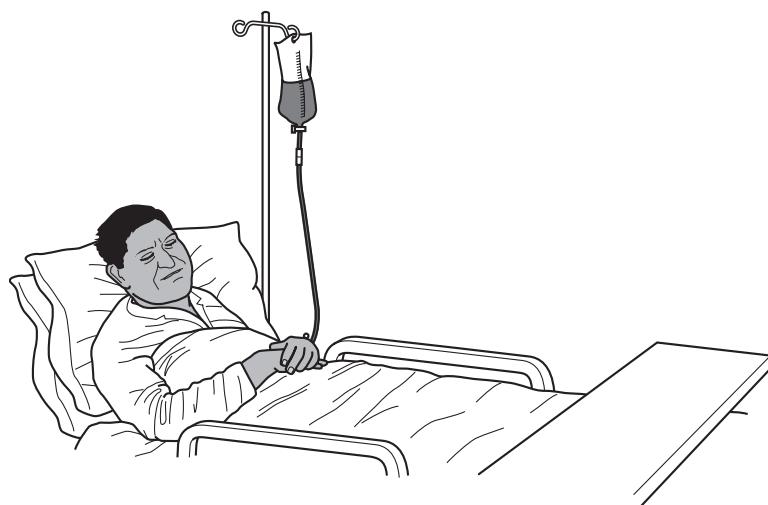
.....

[2]

[Total: 9]

10

5 Ranjit has an accident. He needs a transfusion of blood.



(a) State **three components** of blood and one **function** of each component.

component	function

[3]

(b) Ranjit is blood group **AB**.

Explain what is meant by blood group **AB**.

.....

.....

.....

.....

[2]

(c) Blood groups are determined by three alleles, **A**, **B** and **O**.

(i) State which allele is recessive.

..... [1]

(ii) State which alleles are co-dominant.

..... [1]

(d) Ranjit's father is blood group **A**. His mother is blood group **B**.

(i) Complete the genetic diagram showing the possible inheritance of blood groups for Ranjit and his brothers and sisters. [2]

		father	
		A	O
mother	B		
	O		

(ii) Ranjit is blood group **AB**.

What are the possible **blood groups** of Ranjit's brothers and sisters?

..... [2]

[Total: 11]

**END OF QUESTION PAPER**

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