

**ADVANCED SUBSIDIARY GCE  
HUMAN BIOLOGY**

Case Studies

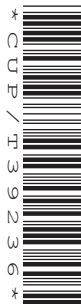
**WEDNESDAY 9 JANUARY 2008**

**2858/01**

Morning  
Time: 45 minutes

Candidates answer on the question paper.

**Additional materials:** Electronic calculator  
Ruler (cm/mm)



Candidate  
Forename

Candidate  
Surname

Centre  
Number

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Candidate  
Number

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**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.
- Do **not** write outside the box bordering each page.
- 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 **45**.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	22	
2	23	
TOTAL	45	

This document consists of **10** printed pages, **2** blank pages and an Insert.

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Answer **all** the questions.

**1** This question is based on the article ‘**THE CHEMICAL ORIGIN OF LIFE**’ (Case Study 1).

**(a)** DNA is a double-stranded polynucleotide. The genetic information carried by DNA is carried on only one of the strands. This strand is known as the sense strand.

**(i)** Name the type of bond between the two strands of DNA.

..... [1]

**(ii)** Explain how the following properties make DNA the ‘*ideal genetic material*’.

double-stranded .....

.....

.....

.....

four different bases .....

.....

.....

..... [4]

- (b)** You were told in the case study that three types of RNA play a role in protein synthesis.

Describe the roles of messenger RNA, transfer RNA and ribosomal RNA in protein synthesis.

[7]

(c) In the case study you were told that UV radiation can damage DNA molecules.

(i) Explain how a change in DNA structure can result in a gene mutation.

.....

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.....

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..... [3]

(ii) Explain why mutations caused by exposure to high levels of UV radiation can result in cancers such as skin cancer.

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..... [3]

(d) Melanoma is one form of skin cancer.

Fig. 1.1 shows the change in incidence of melanoma in males and females over the period 1974 to 1999.

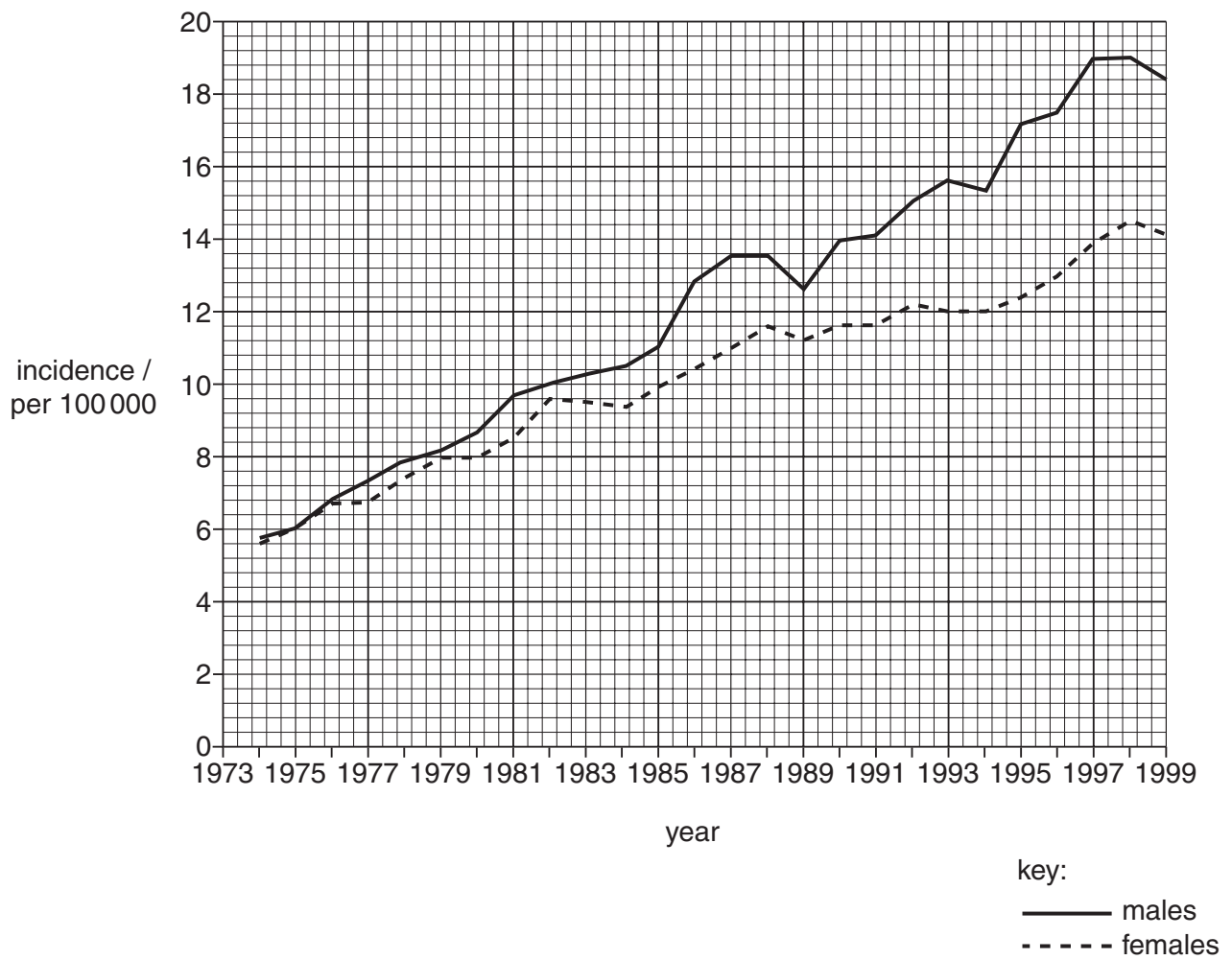


Fig. 1.1

- (i) Describe the changes in incidence of melanoma in **males** between 1974 and 1999 shown in Fig. 1.1.

.....

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..... [2]

- (ii) Suggest **one** reason for the differences in incidence of melanoma between males and females.

.....

..... [1]

- (iii) Explain the advantage of expressing the incidence of melanoma as numbers per 100 000.

.....

..... [1]

[Total: 22]

2 This question is based on the article '**BLOOD TRANSFUSION LABORATORY**' (Case Study 2).

- (a) You were told in the case study that, when blood cells are *less active*, they tend to lose potassium ions into the plasma.

Complete the following passage.

Potassium ions are the main intracellular ion and are normally taken into the cell against a concentration gradient by the process of ..... . The energy required for this process is in the form of ..... . At low temperatures, enzymes and substrates involved in respiration and other processes have less ..... energy and so the metabolic rate of the cell slows down. As a result, more potassium ions move out of the cell by ..... since the concentration of potassium in the cell is ..... than the concentration in the plasma. [5]

- (b) In the case study, you were told that TRALI – Transfusion Related Acute Lung Injury – was the second most common major transfusion injury. TRALI can lead to respiratory distress.

- (i) State what is meant by the term *acute*.

.....  
..... [1]

- (ii) Suggest **one** possible sign of respiratory distress in **adults**.

.....  
..... [1]

- (iii) Explain the difference between respiratory **arrest** and respiratory distress.

.....  
..... [1]

- (iv) Give one possible **cause** of respiratory arrest.

.....  
..... [1]



- (c) In the case study, you were told that the presence of anti-leucocyte antibodies can cause leucocytes to agglutinate.

Explain how the agglutination of **leucocytes** differs from the agglutination which would occur if patients were given the wrong blood group.

.....

.....

.....

..... [2]

- (d) The case study describes how blood samples are screened for a variety of infectious diseases.

- (i) Name one disease, **other than the ones given in the case study**, that is routinely screened for in blood samples.

..... [1]

- (ii) Discuss the **ethical** problems which might arise when populations are routinely screened for diseases.

.....

.....

.....

.....

..... [2]

- (e) In the case study, Neil describes some of the procedures involved in the collection of blood platelets.

Describe the **role of platelets** in the formation of a blood clot.

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..... [4]

- (f) Suggest explanations for the following statements in the case study, regarding the storage of blood and blood products.

- (i) Plasma is stored frozen but whole blood is stored at 4 °C.

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- (ii) Red blood cells are suspended in a solution containing mannitol.

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- (iii) Platelets are stored in gas permeable bags.

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..... [5]

[Total: 23]

**END OF QUESTION PAPER**

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*Copyright Acknowledgements:*

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Fig. 1.1      Adapted from SEER Program data. Reproduced by kind permission of the National Cancer Institute, Bethesda, USA.  
<http://seer.cancer.gov/>

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