OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE **2858/01**

HUMAN BIOLOGY

Case Studies

WEDNESDAY 9 JANUARY 2008 Morning

Time: 45 minutes

Candidates answer on the question paper.
Additional materials: Electronic calculator
Ruler (cm/mm)

CUP/T39236

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.
- 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 .....

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.....

..... [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.

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.... [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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..... [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.

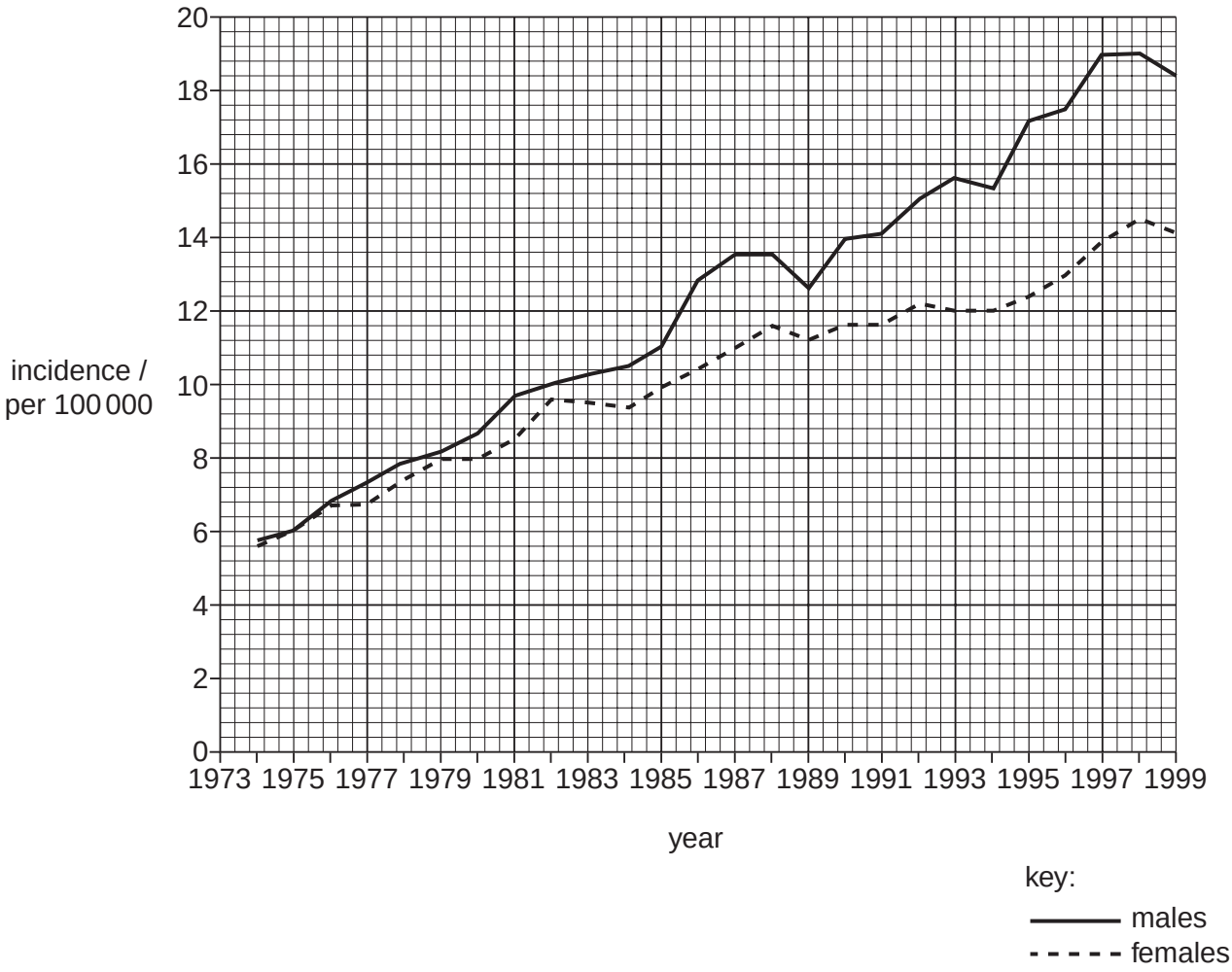

Fig. 1.1

(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.

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..... [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.

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..... [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.

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..... [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.

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..... [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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