OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced Subsidiary GCE

HUMAN BIOLOGY   **2857**

Growth, Development and Disease

| Monday | **5 JUNE 2006** | Morning | 1 hour |

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

Candidate Name		Centre Number	Candidate Number

TIME   1 hour

INSTRUCTIONS TO CANDIDATES

- Write your name in the space above.
- Write your Centre Number and Candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, in the spaces provided on the question paper.
- Read each question carefully before starting your answer.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- You will be awarded marks for quality of written communication where this is indicated in the question.
- 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	8	
2	14	
3	12	
4	8	
5	10	
6	8	
TOTAL	60	

This question paper consists of 13 printed pages and 3 blank pages.

[Turn over

2

BLANK PAGE

Answer all the questions.

1 Fig. 1.1 shows a scanning electron micrograph of a breast cancer cell (magnification x6000).

An image has been removed due to third party copyright restrictions

Details:

An electron micrograph of a breast cancer cell
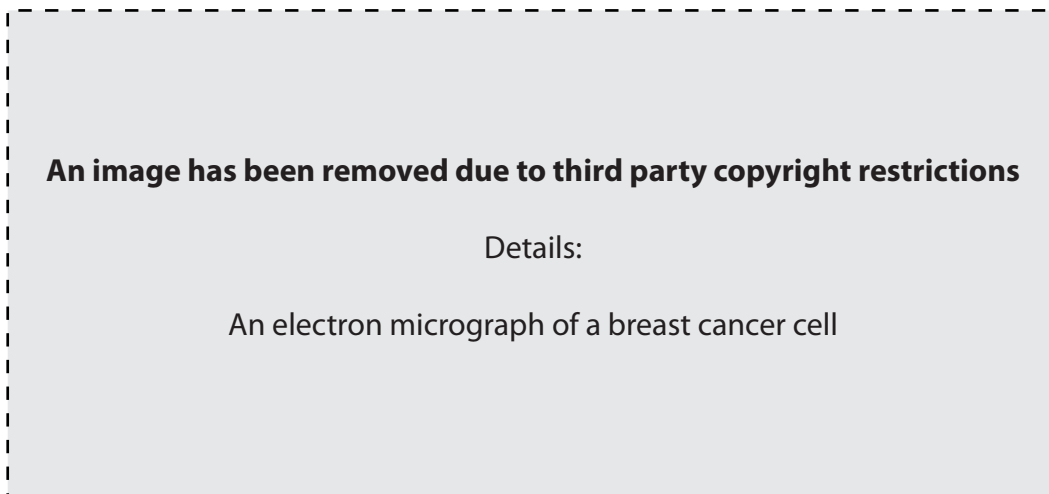
Fig. 1.1

(a) Name the genes which control cell division in a normal cell.

.... [1]

(b) Describe how cell division is different in a cancerous cell.

....

....

....

.... [2]

(c) Name two factors that increase the risk of developing breast cancer.

1 ....

2 .... [2]

(d) Outline how X-rays detect cancers of the breast.

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.... [3]

[Total: 8]

[Turn over

2 Fig. 2.1 shows the mean weight (mass) in kilograms for boys and girls of different ages in 1994 and 2002 in the UK.
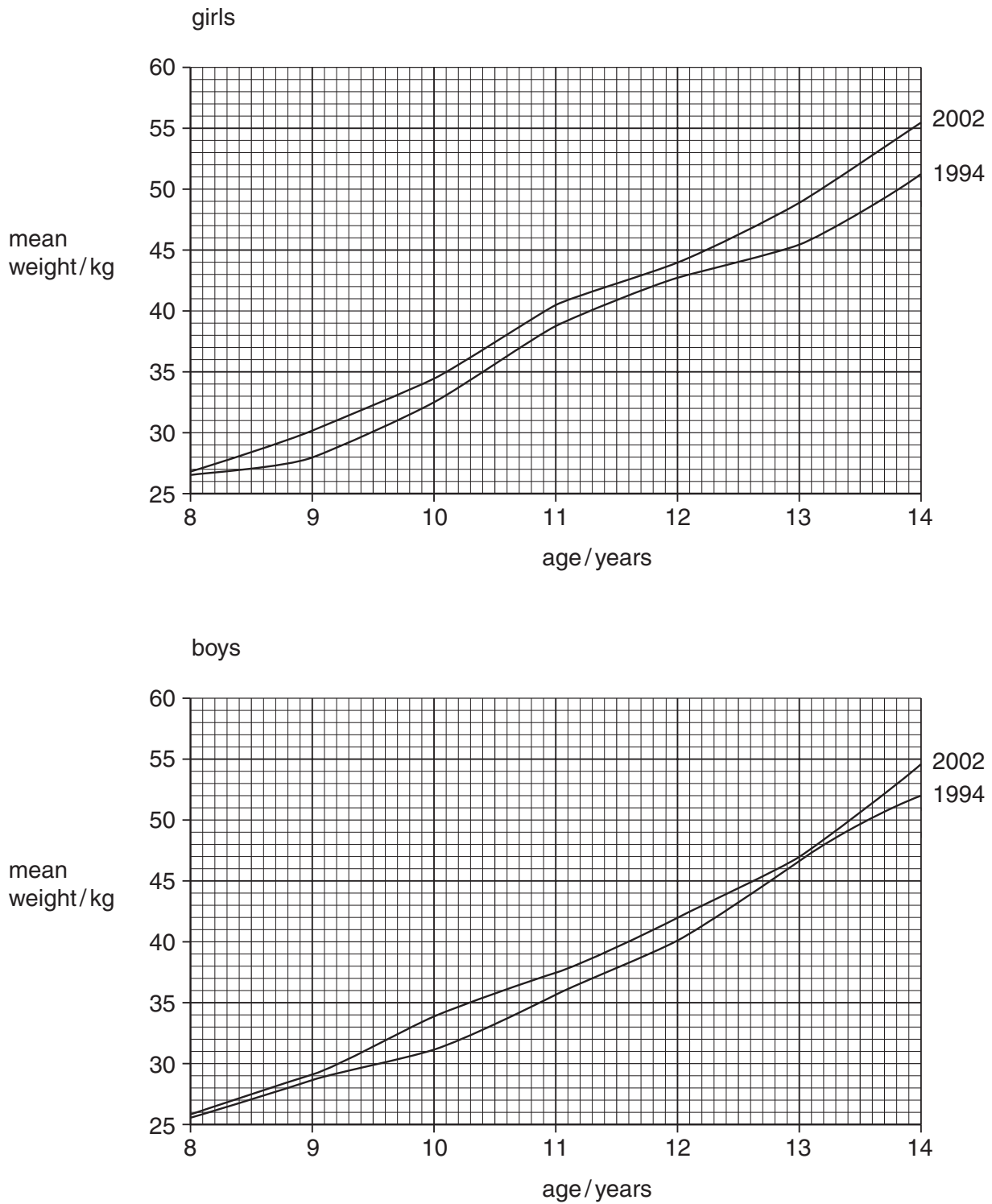
girls

boys

Fig. 2.1

(a) **(i)** Identify **two** trends shown by the data for **boys** in Fig. 2.1.

1 ....

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2 ....

.... [2]

(ii) Suggest why girls tend to weigh more than boys at the age of 12 years.

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.... [3]

(iii) Calculate the percentage increase in the mean weight of 14 year old boys between 1994 and 2002.

Show your working and give your answer **to the nearest whole number**.

Answer = ... % [2]

(iv) Suggest possible explanations for the changes seen in the mean weights of both boys and girls between 1994 and 2002.

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.... [3]

[Turn over

(b) Weight is also used to monitor **infant** growth rate.

State **one other** way in which infant growth can be monitored.

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.... [1]

(c) Describe how you would use **weight** measurements to calculate the **relative** growth rate of a child.

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.... [3]

[Total: 14]

BLANK PAGE

[Turn over

3 •   In the past 20 years, 65 million people have been infected with HIV.

•   25 million people have died from AIDS.

•   8 000 people die from AIDS every day.

•   By 2010, experts predict 100 million HIV infections worldwide and 25 million AIDS orphans.

(a)   Describe one way in which an individual is tested for HIV.

....

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.... [2]

Fig. 3.1 shows the estimated total numbers of HIV infections in adults in different parts of the world in 2004.

A map has been removed due to third party copyright restrictions

Details:

A map of the World showing estimated numbers of people
with HIV infections in adults

Fig. 3.1

(b)   Using the information in Fig. 3.1

(i)   name the geographical region with the highest number of HIV infected adults;

.... [1]

(ii)   state what other information would be needed in order to compare HIV infection in different geographical regions.

....

.... [1]

(c) In this question, one mark is available for the quality of spelling, punctuation and grammar.

Describe the social, economic and biological factors involved in the **prevention** and **control** of HIV infection.

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.... [7]

Quality of Written Communication [1]

[Total: 12]

[Turn over

4 Fig. 4.1 shows a normal strand of mRNA with the amino acids it codes for, and Fig. 4.2 shows a mutated version of the same mRNA strand.
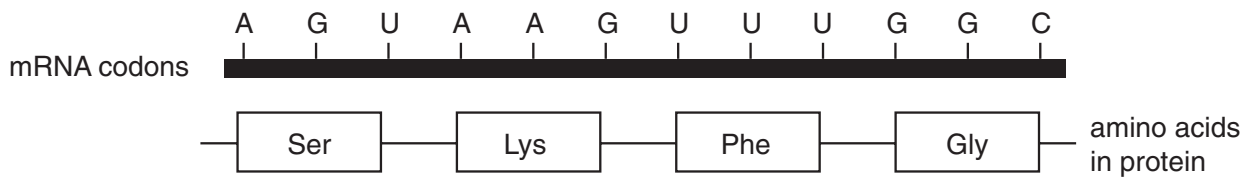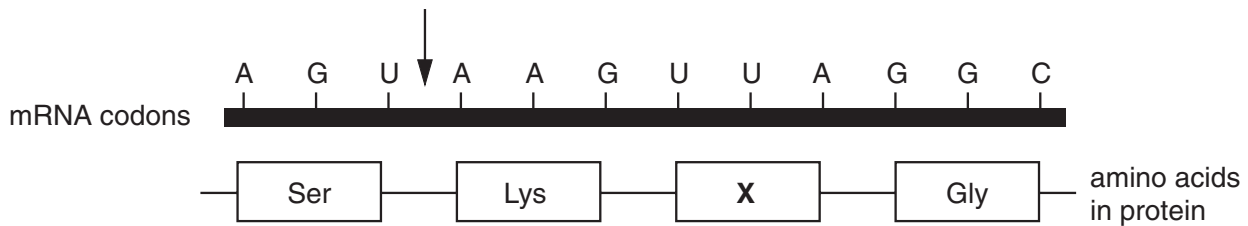

Fig. 4.1

Fig. 4.2

Table 4.1 shows the mRNA codons for each amino acid.

Table 4.1

mRNA codon	amino acid
UUG	Leu
AGU	Ser
AAG	Lys
UCA	Ser
UUU	Phe
GGC	Gly
UUA	Leu
UAA	(STOP)
UGA	(STOP)
GGG	Gly
GAA	Glu
UAG	(STOP)

(a) State the name given to the type of point mutation shown in Fig. 4.2.

.... [1]

(b) Use the information in Table 4.1 to identify the amino acid labelled **X** in Fig. 4.2.

X .... [1]

(c) An extra uracil base (U) is added to the mRNA strand at the point shown by the arrow in Fig. 4.2.

Describe and explain the effect that this would have on the polypeptide chain produced.

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.... [3]

(d) Explain why **point** mutations do not always have an effect on the function of the protein produced by the gene.

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.... [3]

[Total: 8]

[Turn over

5 (a) TB is an infectious disease. State what is meant by the term *infectious disease*.

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.... [2]

(b) Tuberculosis (TB) kills approximately 2 million people worldwide each year. The global epidemic is growing and the emergence of multidrug-resistant TB (MDR-TB) is contributing to the worsening impact of this disease.

In 1993, the World Health Organisation (WHO) took an unprecedented step and declared tuberculosis a global emergency.

So great was the concern about the modern TB epidemic, that it is estimated that between the years 2002 and 2020, approximately

- 1000 million people will be newly infected

- over 150 million people will become ill

- 36 million people will die of TB if control is not further strengthened.

(i) Explain why MDR-TB is a problem in the control of the disease.

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.... [2]

(ii) Outline **two other** reasons why it is difficult to control the spread of TB.

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.... [2]

(c) Some scientists argue that the world's tropical rainforests could prove to be valuable in the fight to prevent and control TB.

   (i) Suggest why this might be true.

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.... [2]

   (ii) Explain **one** conflict which may exist between conserving the rainforests and using their natural resources.

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.... [2]

[Total: 10]

[Turn over

6 Osteogenesis imperfecta (brittle bone disorder), is a genetic disorder characterised by bones that break easily, often from little or no apparent cause. People with the disorder have deformed skeletons and stunted growth.

Adult bone marrow stem cells transplanted into children with osteogenesis imperfecta have stimulated growth of bone in these children. During the 6 months immediately following the transplant, the children's growth reached 60% to 94% of expected normal values for children their age.

(a) What is a *stem cell*?

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.... [2]

(b) Suggest how the adult bone marrow stem cells may increase growth in children with osteogenesis imperfecta.

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.... [3]

(c) Adult bone marrow stem cells will be recognised as foreign by child's immune system and an immune response may occur.

(i) State the name of the cells involved in this type of immune response.

.... [1]

(ii) Outline the role of **memory cells** in an immune response.

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.... [2]

[Total: 8]

END OF QUESTION PAPER

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