OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE **2857**

HUMAN BIOLOGY

Growth, Development and Disease

WEDNESDAY 9 JANUARY 2008 Morning

Time: 1 hour

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

CUP/T40045

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 **60**.
- You will be awarded marks for the 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	**11**	
2	**10**	
3	**13**	
4	**16**	
5	**10**	
TOTAL	**60**	

This document consists of **12** printed pages.

[Turn over

Answer **all** the questions.

1 A new individual starts life as a fertilised egg. This single cell will divide by mitosis to produce new body cells as a human grows and develops. Mitosis is part of the pattern of events called the cell cycle.

(a) Fig. 1.1 shows the stages in a cell cycle that lasts 24 hours.

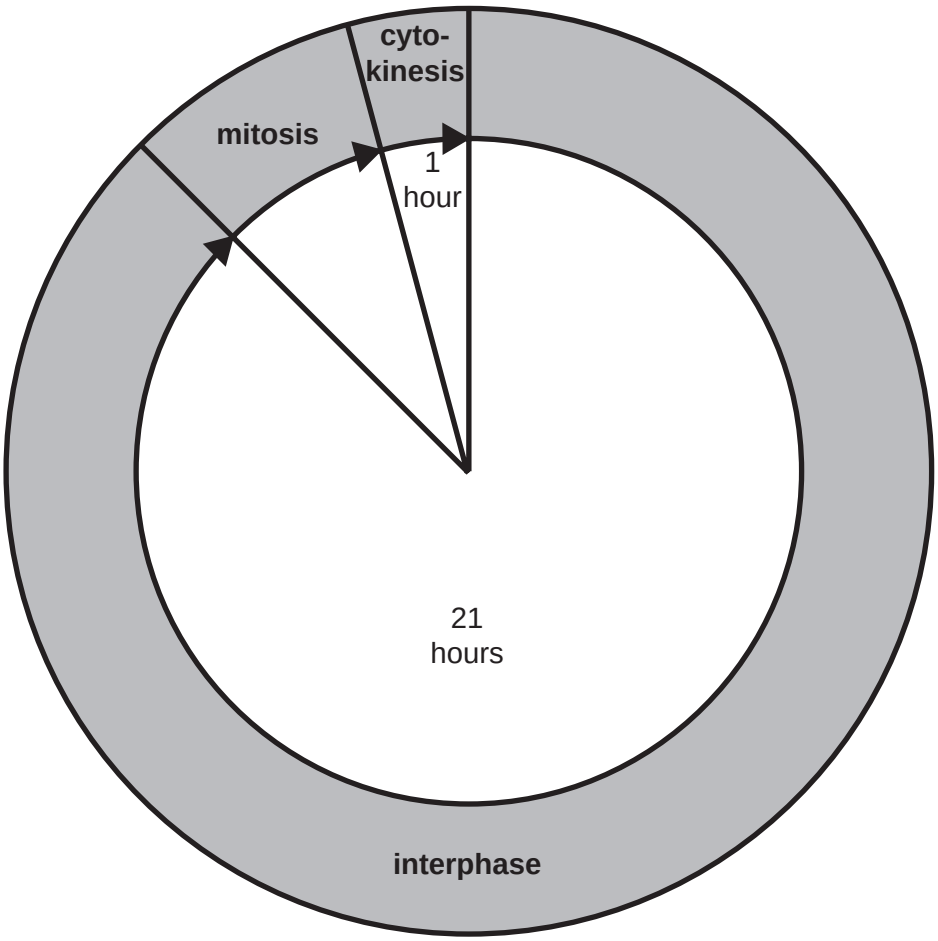

Fig. 1.1

(i) Using the data from Fig. 1.1, calculate the percentage of time of the cell cycle spent in the mitotic stage.

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

Answer = ... % [2]

(ii) Table 1.1 shows some of the processes in the cell cycle.

Identify the stage in **the cell cycle** where each of the following processes occurs.

Table 1.1

process	stage
new cellular proteins are synthesised	
cytoplasm separates into two cells	
DNA replicates	
genetic material separates to form two nuclei	

[4]

(b) Another type of cell division produces the sex cells or gametes.

(i) Name this type of cell division.

..... [1]

(ii) Explain **two** important roles of this type of cell division in the human life cycle.

1 .....

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2 .....

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..... [4]

[Total: 11]

2 Breast cancer is a common cancer in women in the UK.

Fig. 2.1 shows the incidence and mortality rate for breast cancer per 100 000 women between 1971 and 2003 in the UK.

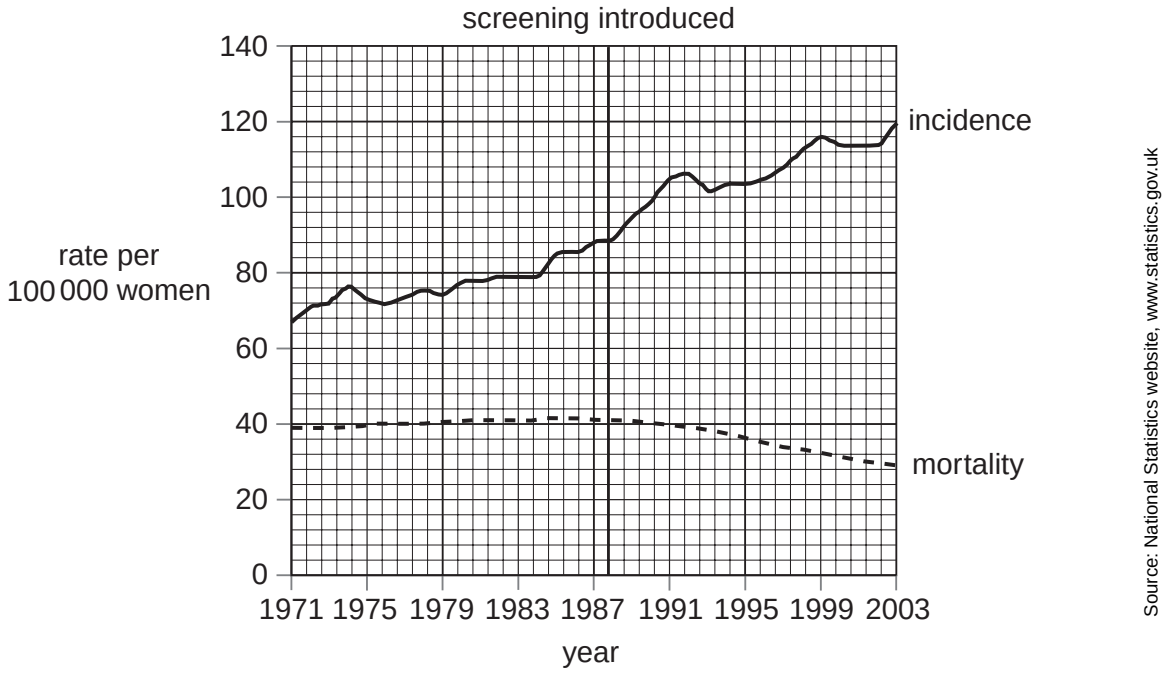

Fig. 2.1

(a) (i) Using the information in Fig. 2.1, describe the trends in the incidence and mortality rate for breast cancer between 1971 and 2003.

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..... [3]

(ii) Suggest reasons for the trends described in **(a)(i)**.

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..... [2]

(b) (i) State **two** factors that increase the risk of developing breast cancer.

1 .....

2 ..... [2]

(ii) Outline how surgery and chemotherapy are used to treat breast cancer.

surgery .....

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chemotherapy .....

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..... [3]

[Total: 10]

3 Foetal health is monitored at antenatal clinics by a wide range of medical personnel.

(a) Table 3.1 shows some nutrients required for the **growth** of the embryo and foetus.

Complete the table by describing the role of each nutrient.

Table 3.1

nutrient	role in growth of embryo and foetus
carbohydrates	....
vitamin A	....
folic acid	....
amino acids	....

[4]

(b) Describe how foetal growth can be measured.

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..... [2]

(c) Pregnant women are advised not to drink alcohol during pregnancy.

Describe how alcohol can affect the growth and development of the foetus.

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..... [3]

(d) Amniocentesis is used to obtain foetal cells. These cells can be used to test for genetic diseases.

Describe how these cells would be cultured and used to diagnose Klinefelter's syndrome.

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..... [4]

[Total: 13]

4 An immune response is stimulated by the presence of foreign substances such as bacteria or viruses.

(a) Explain the meaning of the term *immune response*.

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..... [2]

(b) T helper cells need to be activated to stimulate the immune response.

Complete the following description of the activation of T helper cells by using the most appropriate word from the list below.

meiosis **neutrophils** **macrophages** **clones** **enzymes**

antigens **mitosis** **cytokines** **receptors** **antibodies**

Antigen-presenting cells called …… engulf and breakdown bacteria.

Some protein fragments (from the bacteria) called …… are displayed on the surface of the cells. T helper cells with complementary shaped …… bind to the protein fragments. The T helper cells are activated and start to divide by …… to produce …… of active T helper cells.

Active T helper cells produce …… which stimulate the response of the B cells and T killer cells. [6]

(c) In this question, one mark is available for the quality of use and organisation of scientific terms.

Activated T helper cells stimulate the response of B cells and T killer cells to bacteria and viruses.

Describe how B cells and T killer cells respond to bacteria and viruses.

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Quality of Written Communication [1]

[Total: 16]

5 One third of the world's population is currently infected with the bacterium that causes tuberculosis (TB).

5 to 10% of people infected with this bacterium develop TB at some time during their life.

(a) Table 5.1 shows the number of cases of TB in 2004 in Africa and Europe.

Table 5.1

region	number of cases of TB per 100 000 population
Africa	518
Europe	65

Suggest reasons for the difference in the number of cases of TB in Africa and Europe shown in Table 5.1.

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..... [3]

(b) TB is a notifiable disease.

State what is meant by the term *notifiable disease*.

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..... [2]

(c) Strains of bacteria that cause TB have developed resistance to antibiotics.

Explain how bacteria that cause TB have developed resistance to antibiotics.

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..... [5]

[Total: 10]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE