OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE

HUMAN BIOLOGY

Growth, Development and Disease

F222/TEST

Candidates answer on the question paper.

OCR supplied materials:
- Advance Notice (inserted)

Other materials required:
- Electronic calculator
- Ruler (cm/mm)

Tuesday 18 January 2011
Afternoon

Duration: 1 hour 45 minutes

OCE/32223

F222

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- The Advance Notice will be found in the centre of this document.
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer **all** the questions.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **100**.
- You are advised to show all the steps in any calculations.
- You may use an electronic calculator.
- Where you see this icon you will be awarded marks for the quality of written communication in your answer.
- This document consists of **20** pages. Any blank pages are indicated.

DC (SHW (SW) 00611 4/10) 32223/3

Answer **all** the questions.

1 This question is based on the case study '***BRCA-1* FREE AT BIRTH' (Case Study 1)**.

You were told in the case study that the overall lifetime risk of developing breast cancer is one in nine in the general population.

(a) (i) Fig. 1.1 (in the Case Study) shows the cumulative risk (%) of developing breast cancer in *BRCA-1* mutation carriers.

Suggest what is meant by the 'cumulative risk' of developing breast cancer.

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

(ii) Using the information from Fig. 1.1, describe the effect of age on the cumulative risk of developing breast cancer in *BRCA-1* mutation carriers.

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(iii) Explain the difference between the causes of sporadic breast cancer and familial breast cancer.

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

(b) Easton and Pharoah used random sampling in their investigations.

(i) Describe what is meant by random sampling.

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

(ii) State **one** disadvantage of using random sampling.

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

(c) Breast cancer mortality in the UK has decreased in all age groups since the 1990's.

Fig. 1.2 shows the mortality rates from breast cancer in females in the UK between 1988 and 2008.

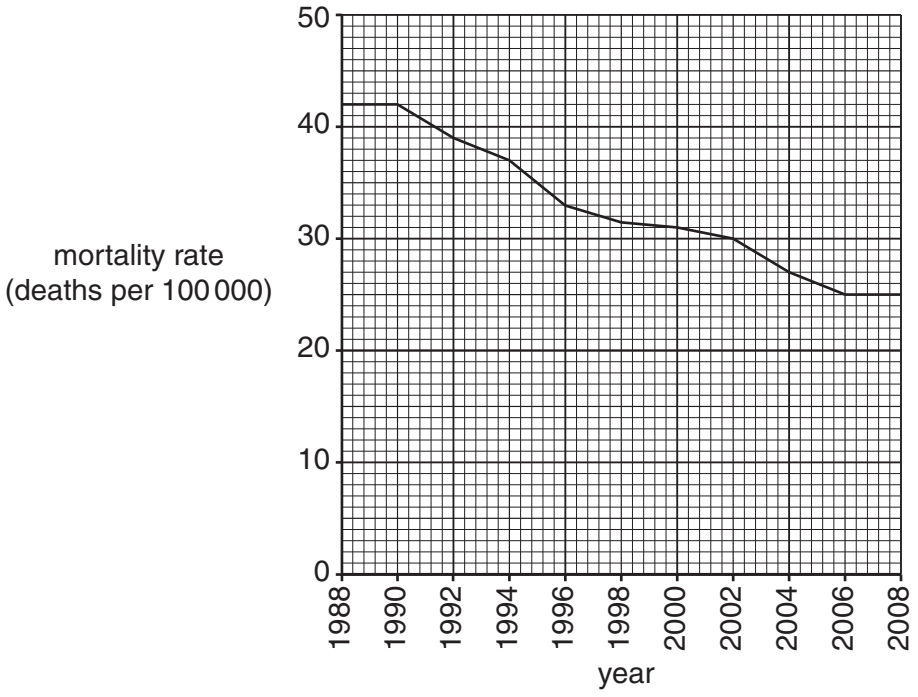

Fig. 1.2

(i) Calculate the **percentage decrease** in mortality rate between 1990 and 2007.

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

Answer = ... % **[2]**

(ii) Suggest **three** reasons for this reduction in mortality rate from breast cancer.

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..... **[3]**

(d) For breast cancer to develop, the cells will need to have more than one gene mutation.

Suggest why some carriers of the *BRCA-1* gene mutation do **not** develop breast cancer.

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

(e) Chemicals that induce apoptosis are often used to treat cancer.

(i) Define the term *apoptosis*.

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

(ii) Name **and** describe **two** types of treatment for breast cancer, other than chemotherapy.

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2 .....

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..... **[4]**

[Total: 22]

2 This question is based on the case study '**RHESUS INCOMPATIBILITY**' **(Case Study 2)**.

(a) You were told in the case study that the mother's body recognises the baby's red blood cells as foreign.

(i) Complete the following paragraph, using the correct term(s) from the list below, to describe how a baby's red blood cells are recognised as foreign.

antibodies	**complementary**	**macrophages**
antigens	**endocytosis**	**neutrophils**
cell surface membrane	**exocytosis**	**T-helper**
cell wall	**identical**	**T-killer**

When the baby's Rhesus positive red blood cells enter the mother's circulation,

antigen presenting cells (APCs) called ..... engulf the

Rhesus positive cells by a process called ..... .

The APCs breakdown the Rhesus positive cells into their component molecules.

These molecules act as ..... . They are displayed

on the ..... of the APCs and are recognised

by ..... receptors on .....

cells. **[6]**

(ii) The recognition of the baby's red blood cells as foreign, triggers a specific immune response in the mother's body.

The specific immune response involves several different types of cells and molecules.

Complete the table below by stating **one** role for each type of cell or molecule.

cell or molecule	role in specific immune response
B cell	
cytokine	
plasma cell	
memory cell	

[4]

(b) (i) Most Rhesus incompatibility can be prevented by giving the mother injections of anti-D Rhesus antibodies within 72 hours of birth and during subsequent pregnancies.

State precisely the type of immunity given to the mother by the anti-D Rhesus antibody injections.

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

(ii) Explain why this type of immunity only lasts a few weeks.

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

(c) It is estimated that about 520 women each year are at risk of having a baby with Rhesus incompatibility.

Without the use of anti-D Rhesus antibody injections, about 7% of these babies would not survive.

Calculate how many babies could be saved each year by the use of the anti-D Rhesus antibody injections.

Show your working.

Answer = ... **[2]**

(d) Anti-D antibodies are obtained from donated blood.

Suggest why it is **unlikely** that viruses will be transmitted by donated anti-D antibodies.

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

(e) As well as being tested for Rhesus negative blood, pregnant women are also tested for immunity to *Rubella*.

Explain why it is important that pregnant women are tested for their immunity to *Rubella*.

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..... **[3]**

[Total: 20]

3 **(a)** Table 3.1 shows the changes in the incidence of tuberculosis (TB) in Europe and in Africa between 1992 and 2008.

Table 3.1

year	incidence of TB (per 100000)	
	Europe	Africa
1992	55	220
1996	53	270
2000	54	360
2004	51	370
2008	48	350

(i) What is meant by the term *incidence*?

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

(ii) Using the information given in Table 3.1, describe the trends shown in the incidence of TB in Europe and in Africa **and** suggest reasons for the differences.

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..... **[8]**

(b) (i) In 2009, a new vaccine against TB was used in clinical trials in Africa.

Describe the reasons for conducting clinical trials.

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

(ii) One role of vaccination programmes is to prevent epidemics by establishing herd immunity.

Define the term *epidemic*.

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

(iii) Explain what is meant by herd immunity and how it helps to prevent epidemics.

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

[Total: 15]

4 Chronic obstructive pulmonary disease (COPD) is a chronic disease of the lungs. It affects at least 900 000 people in the UK. The main cause of COPD is smoking.

(a) (i) Why is COPD described as a chronic disease?

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

(ii) Asthma can be associated with COPD.

Name **two other** conditions that contribute to COPD.

1 .....

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

(iii) How is COPD tested for in a health clinic?

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

(b) Suggest why people with COPD are provided with air supplies enriched with oxygen to relieve their symptoms.

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

(c) Fig. 4.1 shows a photomicrograph of a bronchiole and alveoli in a healthy lung.

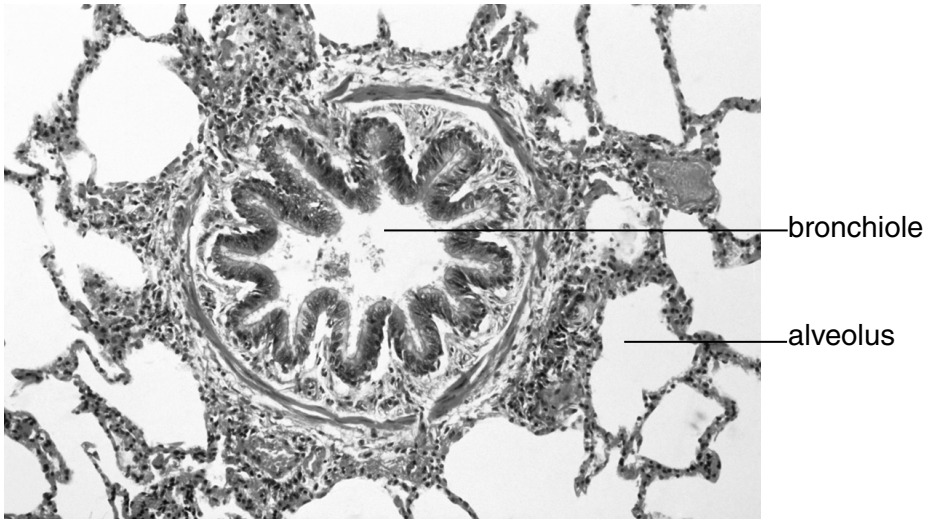

Fig. 4.1

Describe how tobacco smoke causes changes in the lining of the bronchioles **and** alveoli leading to the development of COPD.

In your answer, you should provide a balanced account of changes in the bronchioles and alveoli.

[8]

[Total: 15]

5 Coronary heart disease is not caused by a pathogen and cannot be spread from one person to another.

(a) What term is used to describe this type of disease?

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

Fig. 5.1 is an incomplete crossword of key terms used to describe coronary heart disease.

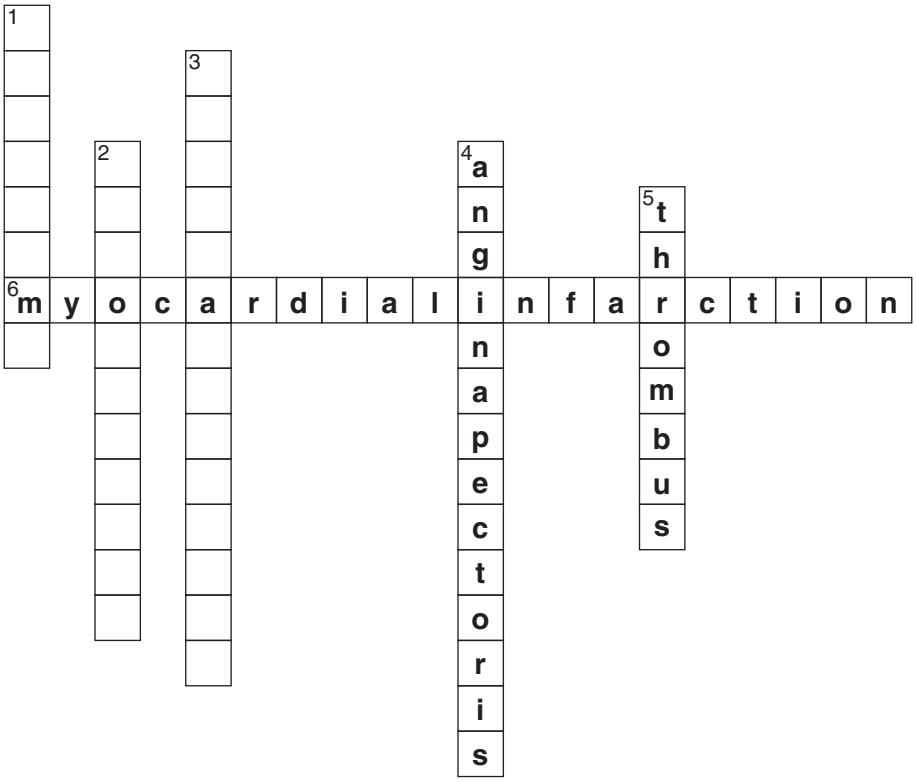

Fig. 5.1

(b) Complete the crossword above by writing in the most appropriate word(s) for the following clues.

(i) **1 down** – a build up of fatty deposits in the wall of an artery.

2 down – the innermost lining of the wall of an artery.

3 down – supplies blood to the cardiac muscle. **[3]**

(ii) Write a clue for each of the following answers in the crossword:

6 across – myocardial infarction

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4 down – angina pectoris

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5 down – thrombus

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..... **[3]**

QUESTION 5(c) STARTS ON PAGE 16

(c) Describe the sequence of events that may lead to a myocardial infarction in a patient suffering from angina pectoris.

In your answer, you should make clear the order in which events occur.

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.... **[6]**

(d) (i) To help to prevent deaths from coronary heart disease, the British Heart Foundation has donated over 6000 defibrillators to be used by trained support workers in the community.

What is a defibrillator?

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

(ii) Suggest how defibrillators donated to sports centres have saved lives.

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

[Total: 17]

QUESTION 6 STARTS ON PAGE 18

6 Pregnant women are offered many different tests to monitor the health of their developing baby.

Fig. 6.1 shows an ultrasound scan of a fetus at 13 weeks of pregnancy.

Fig. 6.1

(a) Ultrasound scans are used to visualise the fetus during an amniocentesis test.

Describe how an amniocentesis test is carried out.

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..... **[4]**

(b) The fetal cells obtained by amniocentesis may be used to produce a karyotype.

(i) Give **two** reasons why a doctor might advise a woman to have an amniocentesis test.

1 .....

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2 .....

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

(ii) State an alternative test that could be used instead of amniocentesis to obtain a karyotype and suggest **one** advantage of this test compared to amniocentesis.

test .....

advantage .....

.....

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

(c) Both the ultrasound and karyotype results are used to detect disorders in the developing fetus.

(i) Name **one** disorder that could be detected by the **ultrasound** scans.

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

(ii) Name **two** disorders that could be detected by the **karyotype**.

1 .....

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

[Total: 11]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE