

Candidate forename						Candidate surname					
Centre number						Candidate number					

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE

A161/02

TWENTY FIRST CENTURY SCIENCE
BIOLOGY A

Modules B1 B2 B3
(Higher Tier)

TUESDAY 15 MAY 2012: Morning
DURATION: 1 hour
plus your additional time allowance

MODIFIED ENLARGED

Candidates answer on the Question Paper.
A calculator may be used for this paper.

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:


Pencil
Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer ALL the questions.
- 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).

INFORMATION FOR CANDIDATES

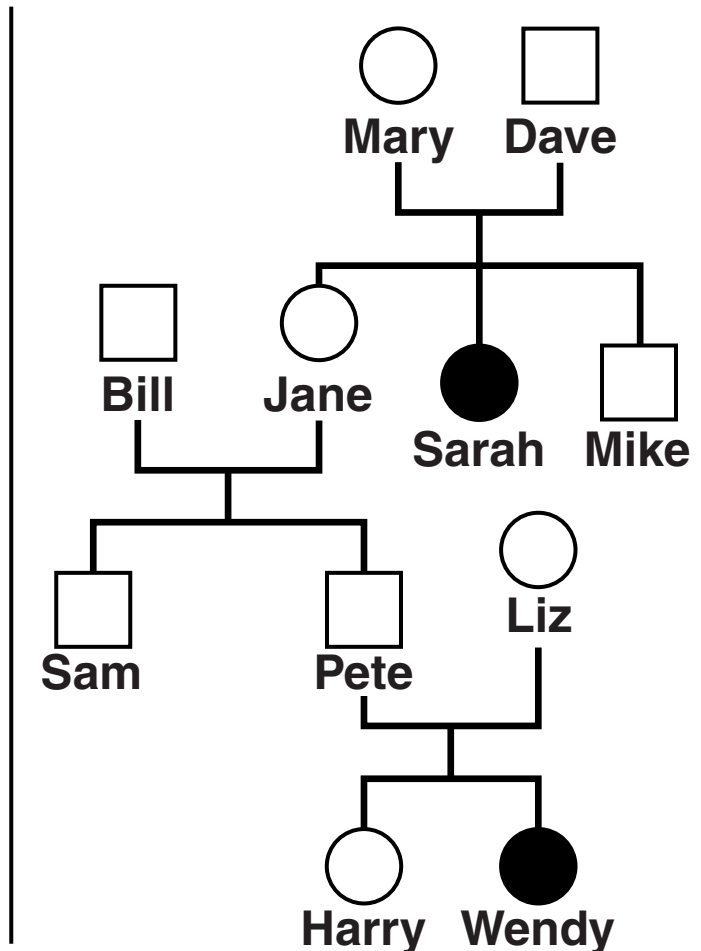
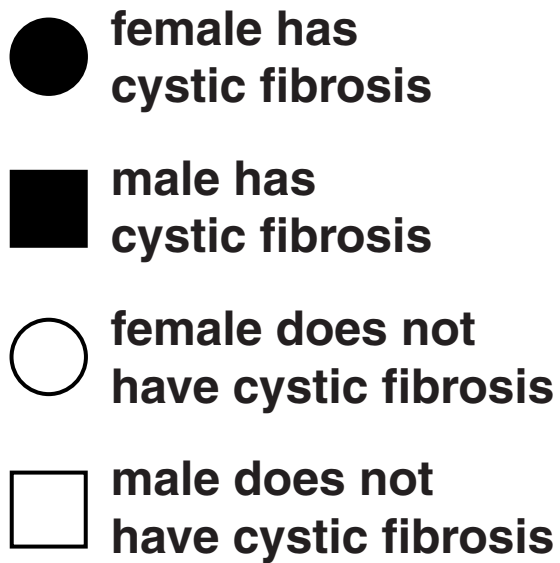
- Your quality of written communication is assessed in questions marked with a pencil ().
- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is 60.

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Answer ALL the questions.

1 This question is about cystic fibrosis.

(a) Look at the family tree of Mary and Dave.



(i) Which two members of the family are definitely **HOMOZYGOUS** for the allele that causes cystic fibrosis?

Write down their names.

name 1 _____

name 2 _____

[1]

- (ii) Bill finds out that he is homozygous for the gene that determines whether an individual has cystic fibrosis or not.

Which members of the family are definitely **HETEROZYGOUS** for the gene that causes cystic fibrosis?

Write down their names.

[3]

(iii) Which of these statements about cystic fibrosis are true?

Put a tick (✓) in the box next to each correct statement.

☐

Cystic fibrosis is caused by a recessive allele.

☐

The symptoms of cystic fibrosis appear at about the age of forty.

☐

Cystic fibrosis is caused by environmental factors.

☐

The symptoms include breathing difficulties because of thick mucus.

☐

If a person with cystic fibrosis has a non-carrier partner, there is a 50:50 chance of having children with cystic fibrosis.

☐

The genotype of a cystic fibrosis carrier is heterozygous.

☐

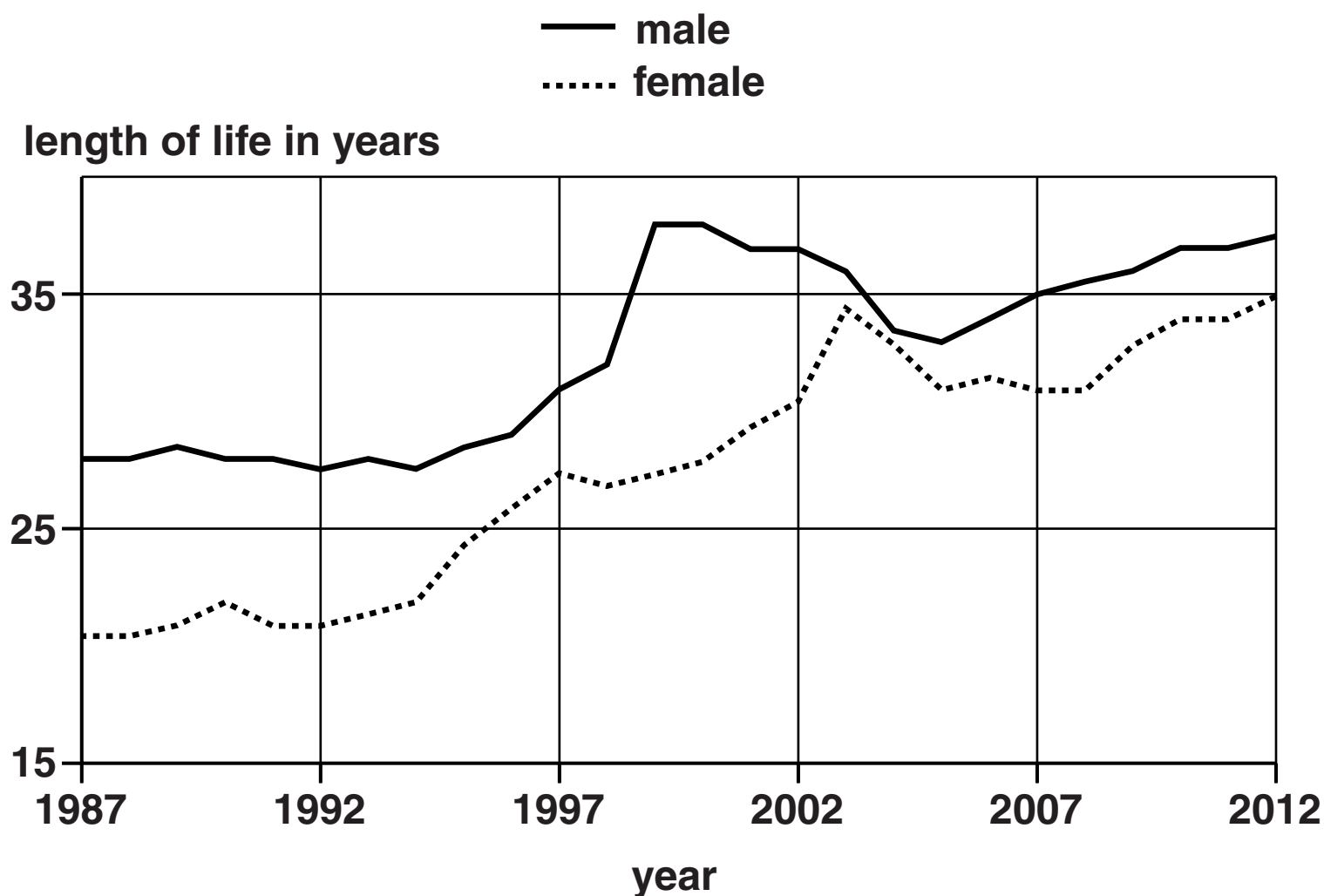
The alleles for cystic fibrosis occur in two different places on the same chromosome.

☐

Cystic fibrosis can be transmitted by coughs and sneezes.

[3]

(b) The graph shows the average length of life for people with an inherited disorder.



(i) Compare the patterns shown by the lines for females and males on the graph.

[2]

- (ii) Predict what the graph will show for 2015.
Explain your answer.

[2]

[Total: 11]

- 2 Adults can be tested to see if they have inherited the alleles for genetic disorders.**

Embryos can be tested for a range of genetic disorders.

Explain the IMPLICATIONS of genetic testing for the INDIVIDUAL, for PARENTS and for SOCIETY as a whole.



The quality of written communication will be assessed in your answer.

[6]

[Total: 6]

3 This question is about disease.

- (a) All infectious diseases have symptoms, although these depend on the particular disease.**

What is the cause of these symptoms for most infectious diseases?

Put ticks (✓) in the boxes next to the TWO best answers.

☐

the medicine taken to cure the disease

☐

other microorganisms that take advantage of the situation

☐

damage done to cells

☐

the length of time that the illness lasts

☐

toxins produced by the microorganism

☐

people eating less food when they feel ill

[1]

- (b) The first time we come into contact with a disease-causing microorganism we may become ill.**

Our immune system can protect us from getting ill if we are infected with the same microorganism again.

Explain how our immune system does this.



The quality of written communication will be assessed in your answer.

[6]

(c) Scientists regularly produce new drugs to fight disease.

Using drugs always carries a risk.

NICE is the official body that licenses new drugs. NICE has licensed a new drug to treat cancer, even though scientists know that the drug could cause the deaths of a small number of people.

Suggest why the new cancer drug has been licensed.

[2]

(d) Influenza is a serious disease.

Look at the table of data about influenza (flu). The fatality rate is the percentage of people with the disease who die.

TYPE OF FLU	DATE	NUMBER OF DEATHS IN MILLIONS	FATALITY RATE (%)	SEVERITY INDEX
Spanish flu	1918-20	80	2	5
Asian flu	1957-8	1.25	0.13	2
Hong Kong flu	1968-9	0.8	0.1	2
2009 flu	2009-10	0.018	0.03	not available

(i) Use the data in the table to suggest what may be indicated by the ‘severity index’.

_____ [1]

(ii) Describe the correlation between the number of deaths and the fatality rate.

_____ [1]

- (iii) Spanish flu killed 80 million people worldwide between 1918 and 1920.**

One hundred years earlier, Russian flu killed 1 million people worldwide.

Suggest TWO reasons why Russian flu killed fewer people worldwide than Spanish flu.

[2]

[Total: 13]

4 New drugs and food products need to be tested.

Read the information below about four different tests, A, B, C and D.

TEST A	A patient talks to their doctor about a new drug to reduce blood pressure. The patient agrees to take the drug as part of a trial to test the new drug.
TEST B	A researcher pours different drinks into three glasses. The researcher knows which drink is in each glass but the glasses all look the same. A person is then brought into the room and samples each drink before telling the researcher which they prefer.
TEST C	A food researcher gives a person three different popular chocolates. Each chocolate has a wrapper with the name of the chocolate. The subject discusses with the researcher which chocolate tastes the best.
TEST D	After talking with their doctor, a patient agrees to become part of a trial for a new drug to reduce headaches. A researcher will record the results, but neither the doctor nor the patient will know whether the new drug or a placebo will be given to the patient.

- (a) Complete the table to show whether each test is an open-label, blind or double-blind test.**

Put a tick (✓) in each row of the table below to show the correct answer.

TEST	OPEN-LABEL	BLIND	DOUBLE-BLIND
A			
B			
C			
D			

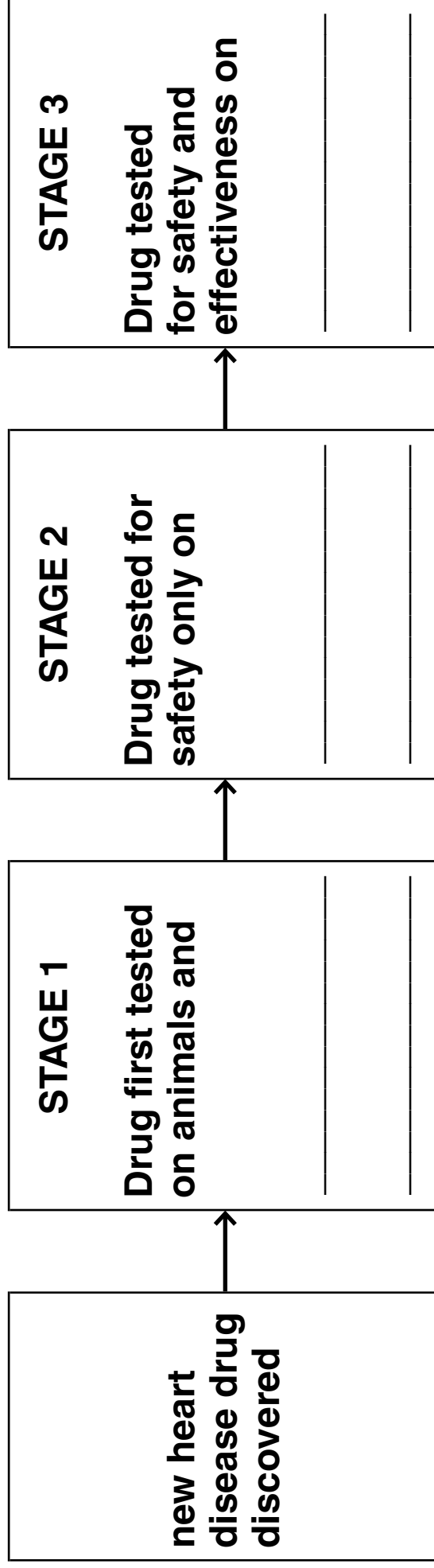
[3]

- (b) It is important that when a new drug is discovered it is tested carefully.**

The flow diagram opposite shows the order in which a new drug for heart disease is tested.

Complete the missing parts of the three testing stages.

[3]



- (c) A new drug is discovered that will significantly reduce a person's chance of developing heart disease. The drug has rare but serious side effects.**

Prescribing the drug will mean that healthy people will be given this new drug.

The organisation NICE will need to decide whether or not to license this new drug.

Explain the issues that will have to be considered by NICE when deciding whether or not to license the drug.



The quality of written communication will be assessed in your answer.

[6]

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Question 4 continues on page 20

(d) The bar chart opposite shows the death rate from heart disease in males and females of different races.

(i) The bar labelled “white” is missing from the bar chart.

Use other data from the bar chart to estimate the death rate for this group.

Draw the bar onto the bar chart. [1]

(ii) Which race shown on the bar chart consistently has a higher death rate from heart disease?

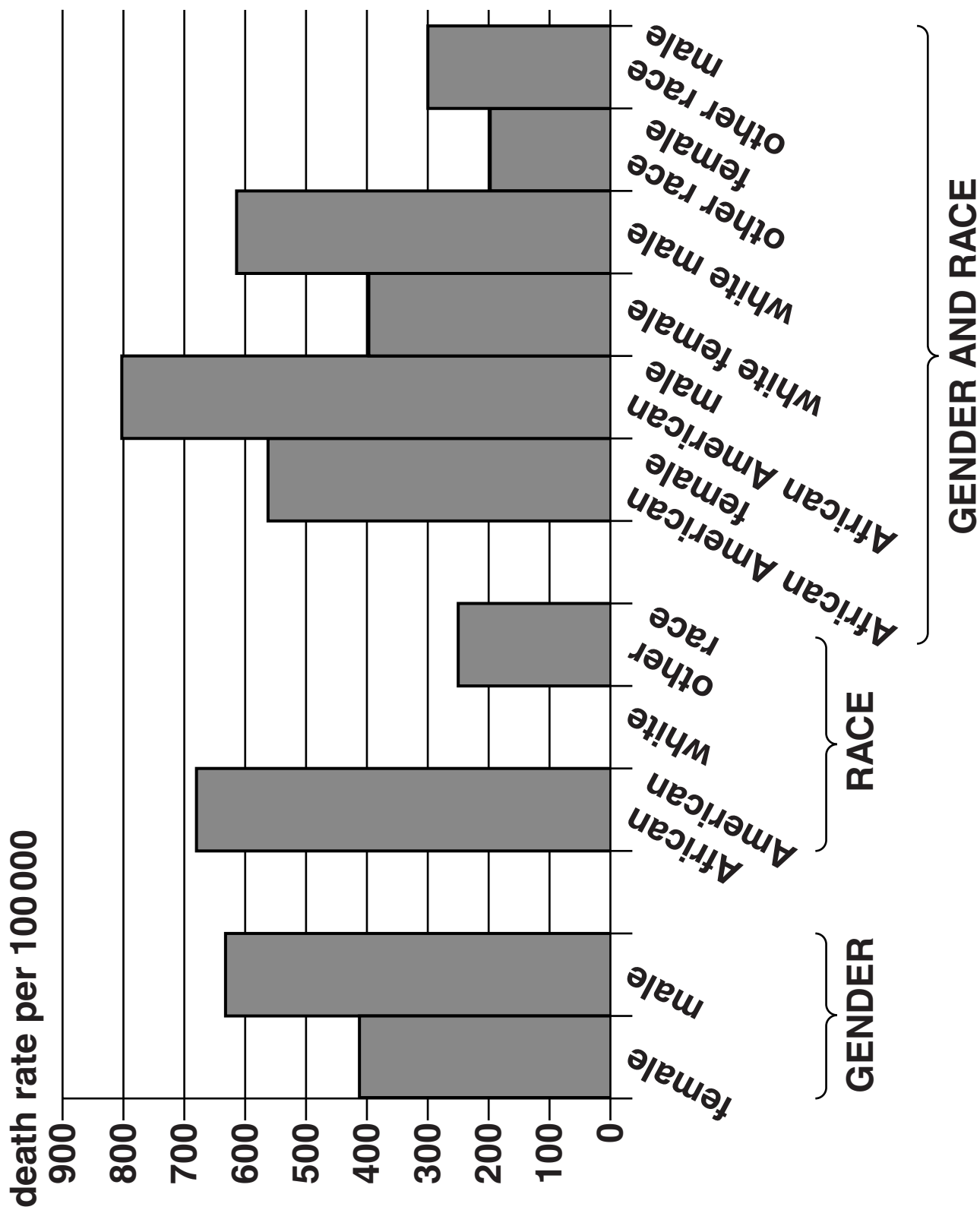
race _____ [1]

(iii) The bar chart groups people according to gender and race.

Suggest other ways of grouping people to show different incidences of heart disease.

1. _____

2. _____ [2]



- (iv) The bar chart provides data on heart disease for African Americans.**

These are people of African origin who live in America.

Africans who still live in Africa show a much lower incidence of heart disease.

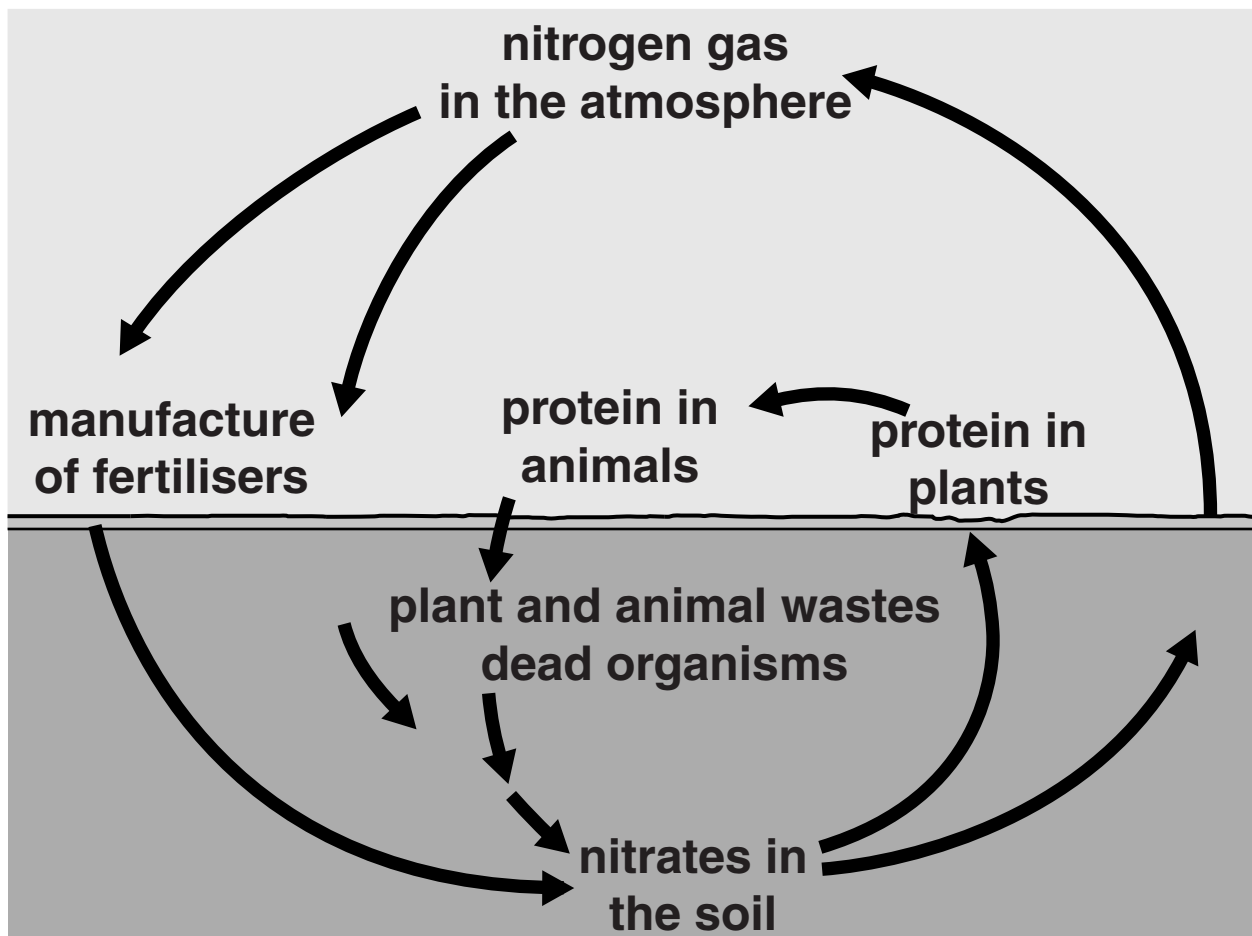
Suggest why.

[2]

[Total: 18]

5 This question is about recycling nutrients through the environment.

(a) Look at the diagram of the nitrogen cycle.



- (i) Draw the letter F on the diagram to show where NITROGEN FIXATION takes place. [1]
- (ii) Draw the letter D on the diagram to show where DENITRIFICATION takes place. [1]
- (iii) Write down the type of organism that is involved in both nitrogen fixation and denitrification.

_____ [1]

(b) Carbon is also recycled in nature.

Combustion and decomposition are two processes found in the CARBON CYCLE.

Name TWO OTHER processes in which carbon dioxide is cycled between the atmosphere and living organisms.

1. _____

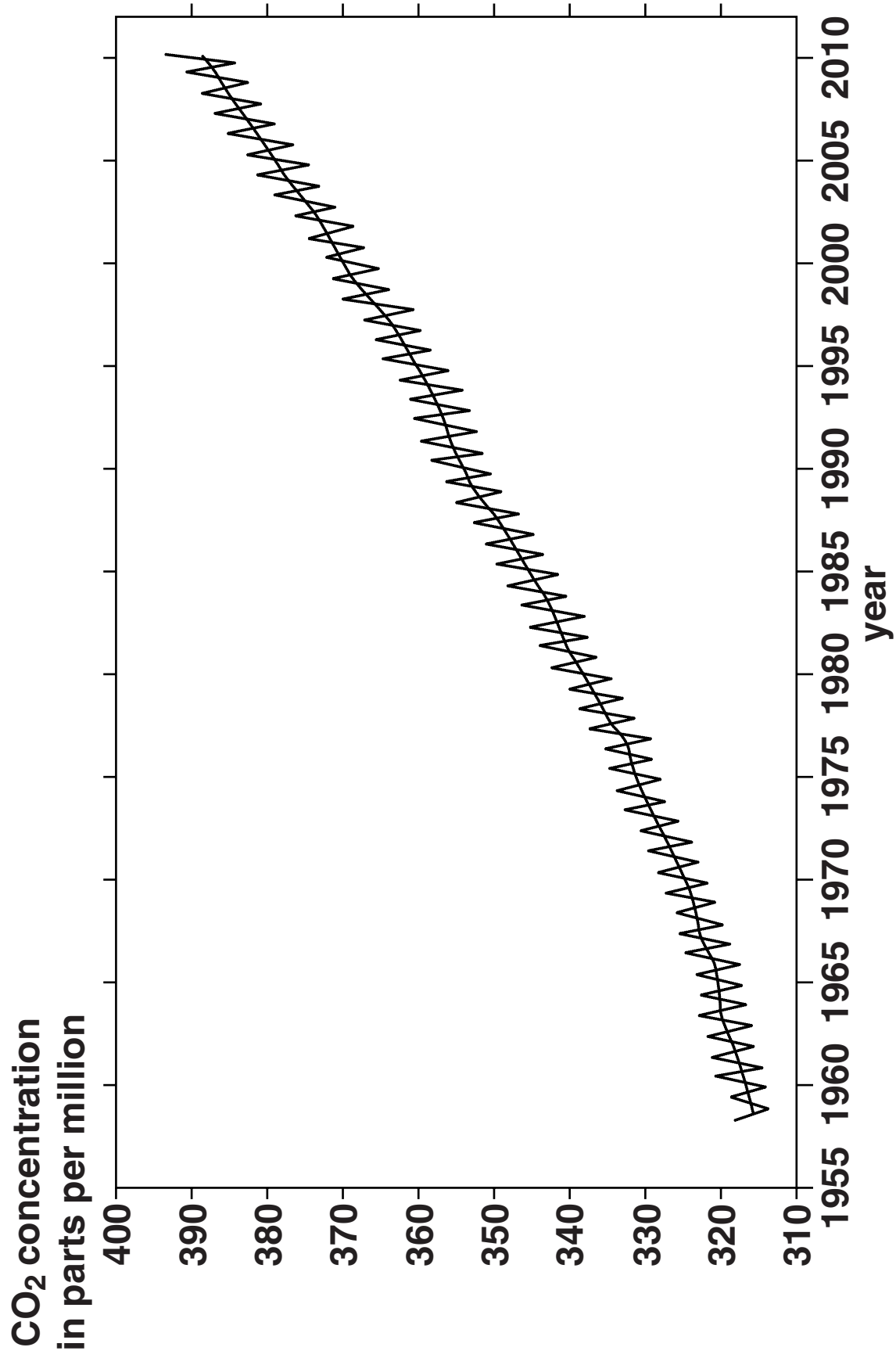
2. _____

[2]

(c) The graph (opposite) shows the levels of carbon dioxide in the atmosphere from 1958 to 2010.

(i) Describe the patterns shown in the graph.

_____ **[2]**



- (ii) The data shown in the graph are collected from a recording station on top of a very high mountain in Hawaii.

Some scientists have criticised this data.

They say it does not represent real and widespread changes in carbon dioxide concentration.

Others say that it does.

Evaluate the advantages and disadvantages of collecting data in this way when studying changes in global carbon dioxide levels.

[3]

- (iii) Suggest and explain a reason for the small fluctuations on the graph.**

[2]

[Total: 12]

END OF QUESTION PAPER

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