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**Tuesday 15 May 2012 – Morning**

**GCSE TWENTY FIRST CENTURY SCIENCE  
BIOLOGY A**

**A161/02** Modules B1 B2 B3 (Higher Tier)

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)

**Duration:** 1 hour



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**INSTRUCTIONS TO CANDIDATES**

- Write your name, centre number and candidate number in the boxes above. 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).
- Do **not** write in the bar codes.

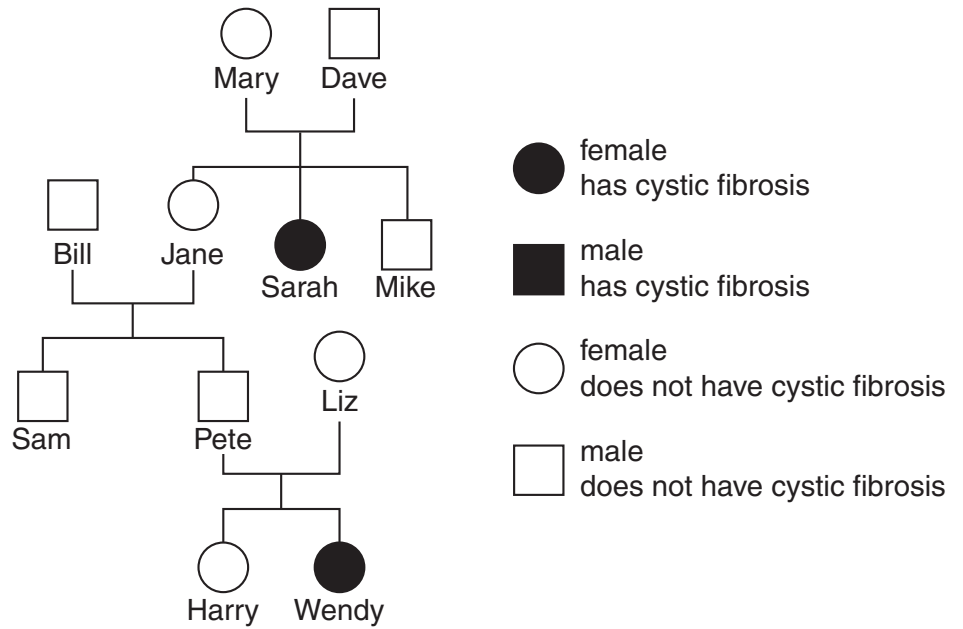
**INFORMATION FOR CANDIDATES**

- 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**.
- This document consists of **20** pages. Any blank pages are indicated.

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.

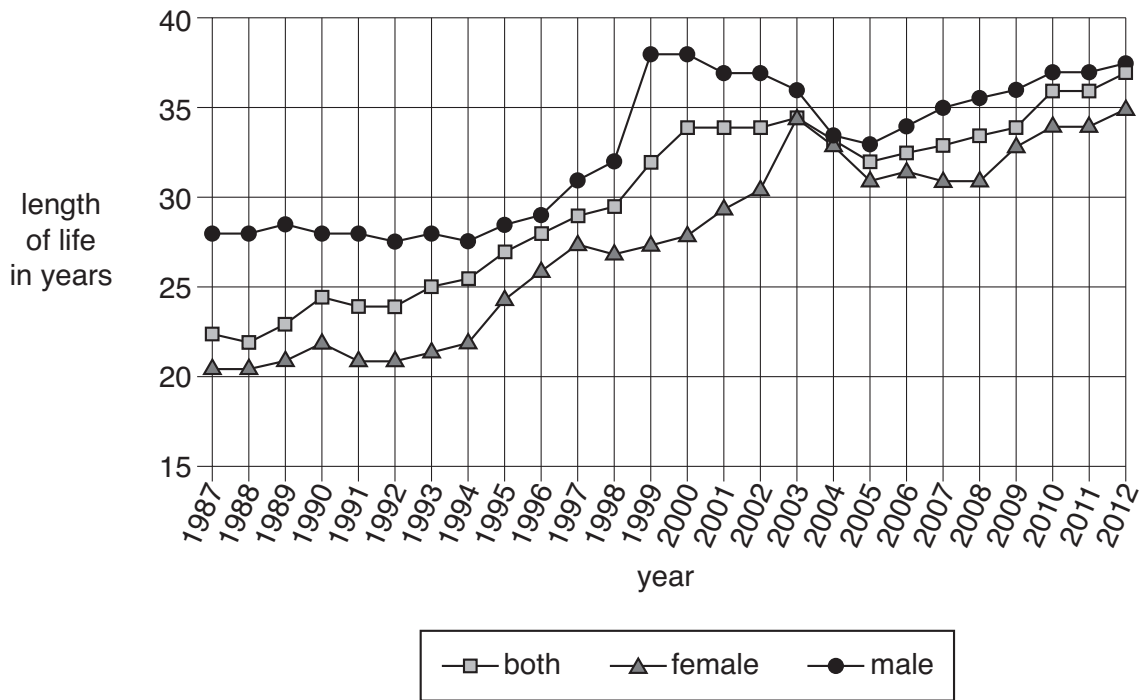
The genotype of a cystic fibrosis carrier is heterozygous.

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]



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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]





(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**.

<b>Test A</b>	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.
<b>Test B</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.
<b>Test C</b>	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.
<b>Test D</b>	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 to show the correct answer.

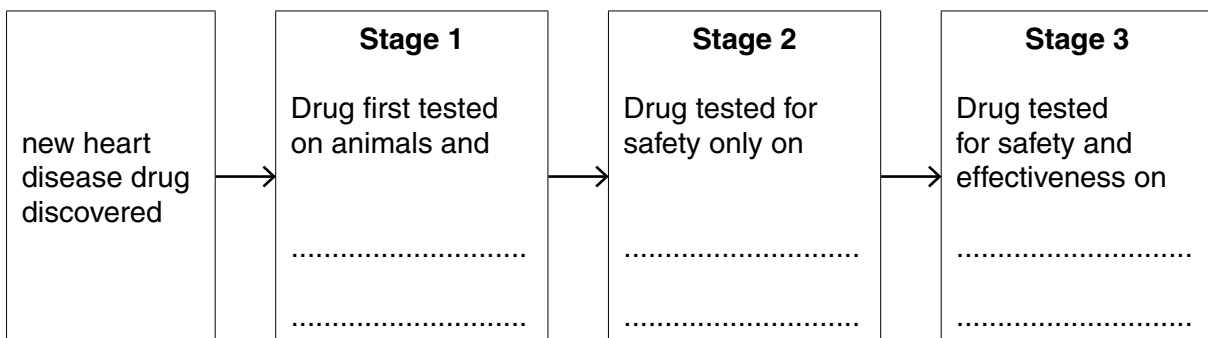
Test	Open-label	Blind	Double-blind
<b>A</b>			
<b>B</b>			
<b>C</b>			
<b>D</b>			

[3]

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

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

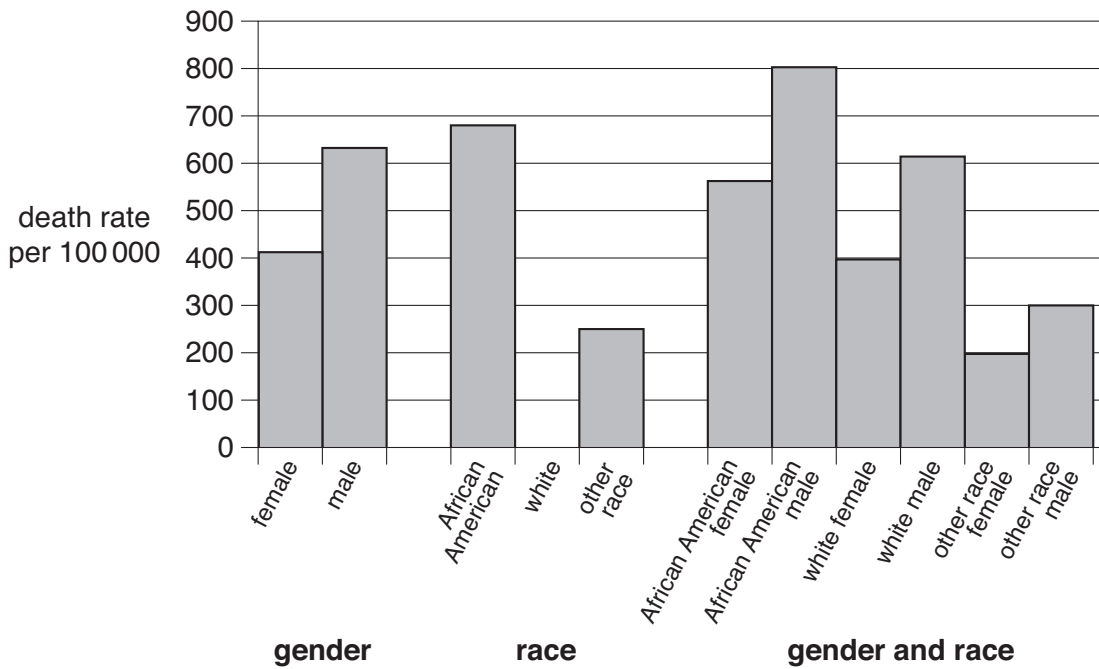
Complete the missing parts of the three testing stages.



[3]



(d) The bar chart 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]

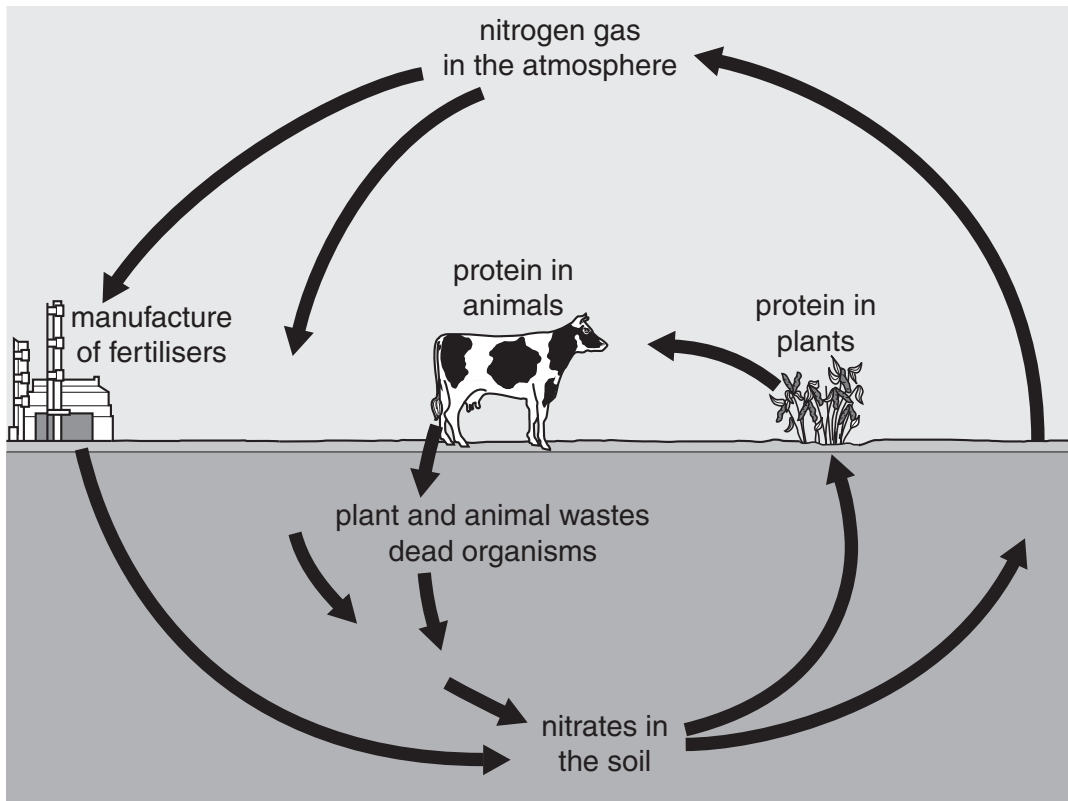
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5 This question is about recycling nutrients through the environment.

(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**.

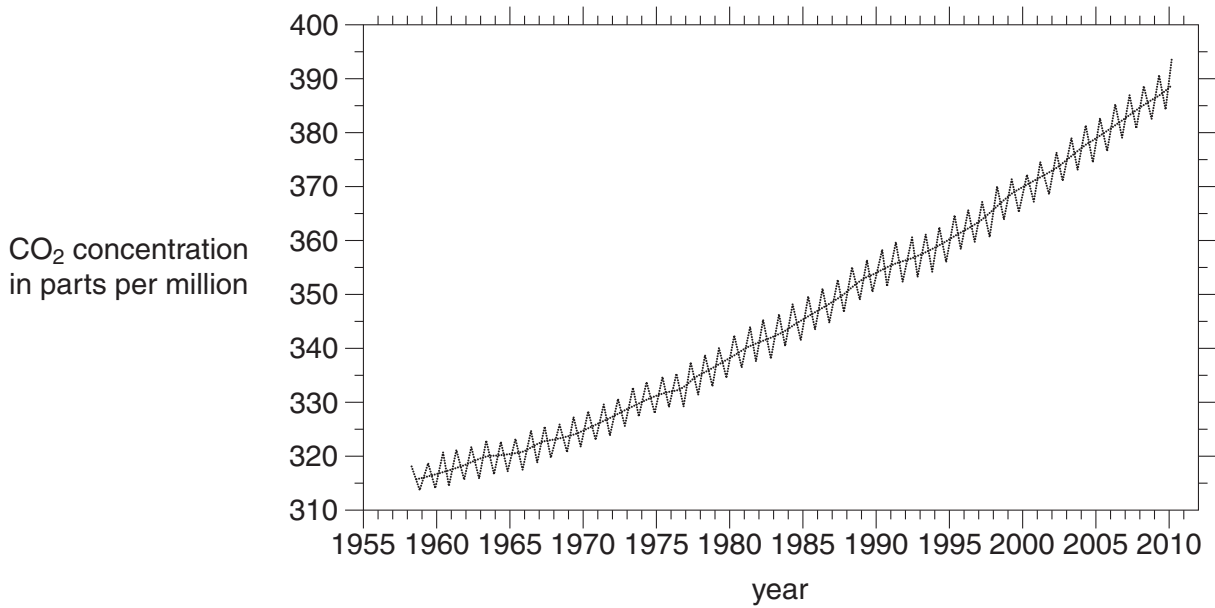
Name **two other** processes in which carbon dioxide is cycled between the atmosphere and living organisms.

1. ....

2. ....

[2]

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



(i) Describe the patterns shown in the graph.

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





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