

**Tuesday 24 January 2012 – Morning**

**GCSE TWENTY FIRST CENTURY SCIENCE  
BIOLOGY A**

**A221/02** Unit 1: 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:** 40 minutes



|                       |  |  |  |  |  |                      |  |  |  |  |  |
|-----------------------|--|--|--|--|--|----------------------|--|--|--|--|--|
| Candidate<br>forename |  |  |  |  |  | Candidate<br>surname |  |  |  |  |  |
| Centre number         |  |  |  |  |  | Candidate number     |  |  |  |  |  |

**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**

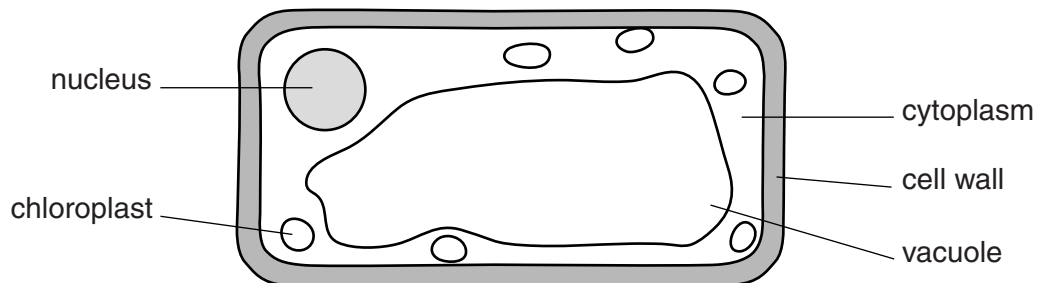
- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **42**.
- This document consists of **16** pages. Any blank pages are indicated.

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Answer **all** the questions.

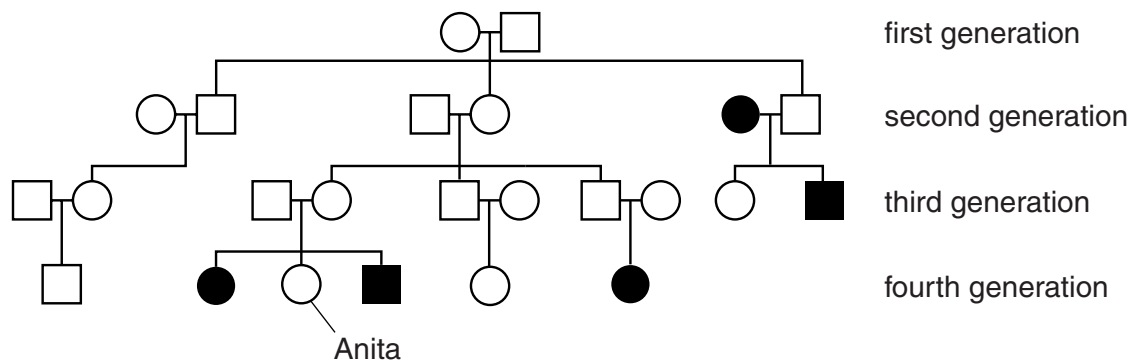
1 Cells contain instructions for how an organism develops.

- (a) Draw an **X** on the diagram of a plant cell, to show where the instructions for how an organism develops are found. [1]



- (b) Sometimes these instructions are faulty.

The family tree shows the inheritance of a faulty allele that causes cystic fibrosis.



- (i) Which word describes the allele that causes cystic fibrosis?

Put a ring around the correct answer.

maternal

dominant

independent

recessive

[1]

- (ii) The third generation of the family tree consists of ten people.

Put rings around all the people in the **third generation** who are **definitely** carriers for cystic fibrosis. [3]

3

- (iii) Anita's mother is expecting another baby.

What are the chances of this baby being a carrier for cystic fibrosis?

Put a ring around the correct answer.

100%      75%      50%      33.3%      30%      25%      0%

[1]

- (c) Both cystic fibrosis and Huntington's disorder are inherited.

The tables show six people, **A**, **B**, **C**, **D**, **E** and **F**, with different combinations of alleles.

cystic fibrosis

| person   | alleles |
|----------|---------|
| <b>A</b> | CC      |
| <b>B</b> | Cc      |
| <b>C</b> | cc      |

Huntington's disorder

| person   | alleles |
|----------|---------|
| <b>D</b> | HH      |
| <b>E</b> | Hh      |
| <b>F</b> | hh      |

Choose from the six people, **A**, **B**, **C**, **D**, **E** and **F**, to answer the questions.

- (i) Write down all of the people that are carriers.

..... [1]

- (ii) Write down all of the people that **cannot** pass the allele for the disorder on to their children.

..... [2]

[Total: 9]

## 2 Genetic disorders can have serious symptoms.

- (a) People can be tested to see if they have the allele for a genetic disorder.

A couple are thinking about having children.  
They are told that they are both carriers of a genetic disorder.

What decision do they have to consider?

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

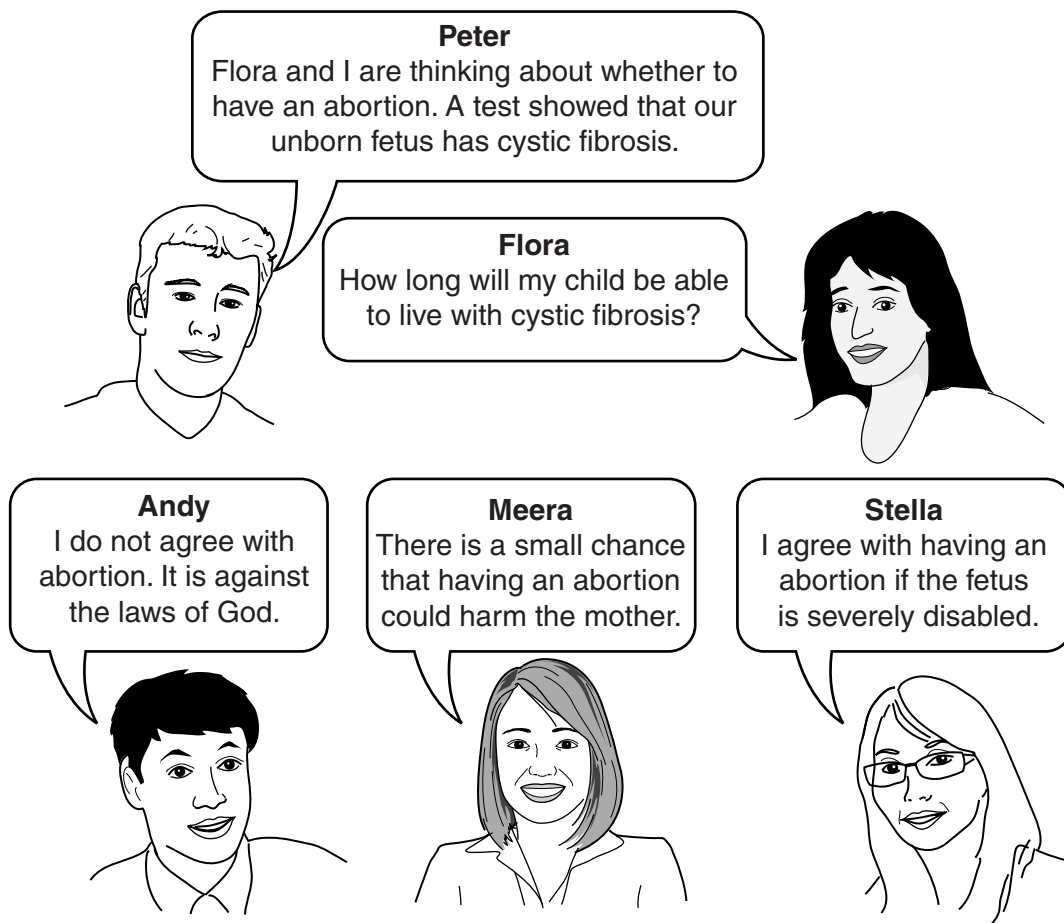
Cystic fibrosis is a genetic disorder.

- (b) State **two** symptoms of cystic fibrosis.

symptom 1 .....

symptom 2 ..... [1]

- (c) Peter and Flora talk about a difficult issue with their friends.



5

- (i) What **issue** is being discussed by the five people?

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

- (ii) Which **two** people are stating **views** on what is being discussed?

..... and ..... [1]

- (iii) Flora's question cannot be answered using a scientific approach.

Suggest why.

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

[Total: 6]

### 3 Vaccination prevents epidemics.

A doctor was worried that the measles, mumps and rubella (MMR) vaccination increased the risk of autism as a side effect in children.

(a) Identify the claimed causal link.

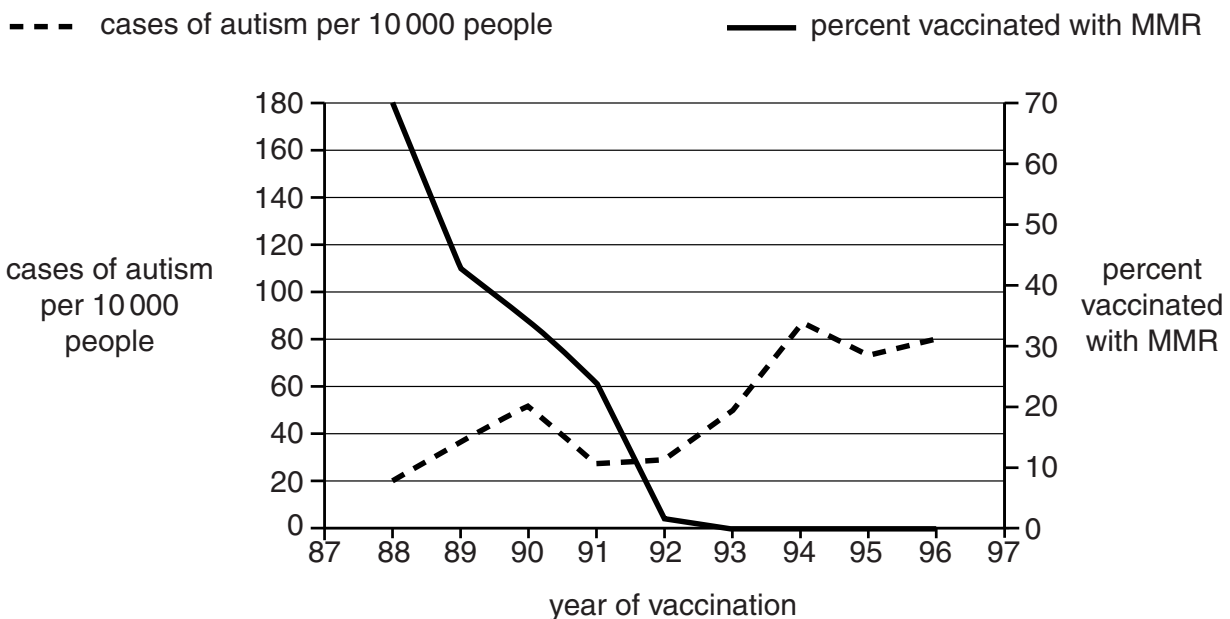
..... [1]

(b) The doctor's claims were not supported by the scientific community because the results could not be replicated by other scientists.

Explain why scientists regard it as important that a scientific claim can be replicated by other scientists.

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

(c) New data were collected. Look at the graph.



(i) Between which years does the graph show a positive correlation between MMR vaccination and autism.

..... [1]

(ii) Explain whether or not the graph supports the doctor's worry.

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

7

- (d) Here are some statements about limitations surrounding the use of the MMR vaccine in England.

Some of the limitations are due to technical difficulties (**T**).

Some are due to value decisions (**V**).

Read the statements about the vaccination policy.

Put a **T** or a **V** in the box next to **each** statement to show if the limitation is due to technical or value reasons.

|                                                                           |  |
|---------------------------------------------------------------------------|--|
| The vaccine is not 100% effective.                                        |  |
| Some parents would prefer their children to have three separate vaccines. |  |
| It is difficult to keep track of who has been vaccinated.                 |  |
| The vaccine has been in short supply at times.                            |  |
| The worry over autism has reduced uptake of the vaccine.                  |  |

[3]

- (e) To prevent epidemics not everyone has to be vaccinated.

Explain why.

.....

.....

.....

..... [2]

[Total: 10]

8

- 4 A species is a group of organisms that can interbreed to produce fertile offspring.

New species are produced as a result of evolution.

Put a tick (✓) in the boxes next to the statements that are important mechanisms in the evolution of new species.

Individuals grow to fit changes in their environment.

☐

Random mutations occur in genes.

☐

Mutations occur in body cells.

☐

Genes may contain two alleles that are the same or different.

☐

Organisms that have mutated genes cannot survive.

☐

Mutated genes in sex cells can be passed on to the offspring.

☐

Two clones can grow into two different species.

☐

The combined effects of changes in genes, environmental changes and natural selection can produce a new species.

☐

[3]

[Total: 3]

9

- 5 Humans evolved both a nervous system and a hormonal system.

Draw straight lines to correctly link each **description** with either the **nervous system** or the **hormonal system**.

**description**

completely coordinated by the CNS

slow response

short-lived response

mainly electrical in nature

transmission relies on blood stream

**nervous system**

**hormonal system**

[2]

[Total: 2]

10

6 There are alternative views about the origin of life on Earth.

**View 1** All life started on Earth from molecules that existed in the warm oceans.

**View 2** All life on Earth arrived as primitive life forms on asteroids and meteors.

**View 3** All life on Earth, as it is now, was created by God.

Look at the statements about these views.

Put ticks (✓) in the boxes next to the **two** statements that are true.

**View 2** required imagination and creativity in the development of the explanation.

☐

**View 1** contains data and is an explanation.

☐

**View 2** conflicts with **View 1**.

☐

**View 3** accounts for all the scientific observations about the origin of life on Earth.

☐

**View 1** and **View 3** are supported by divergence of the hominid species.

☐

[2]

[Total: 2]

7 Organisms are affected by natural selection and selective breeding.

Explain how selective breeding is

- similar to natural selection
- different from natural selection.

.....

.....

.....

.....

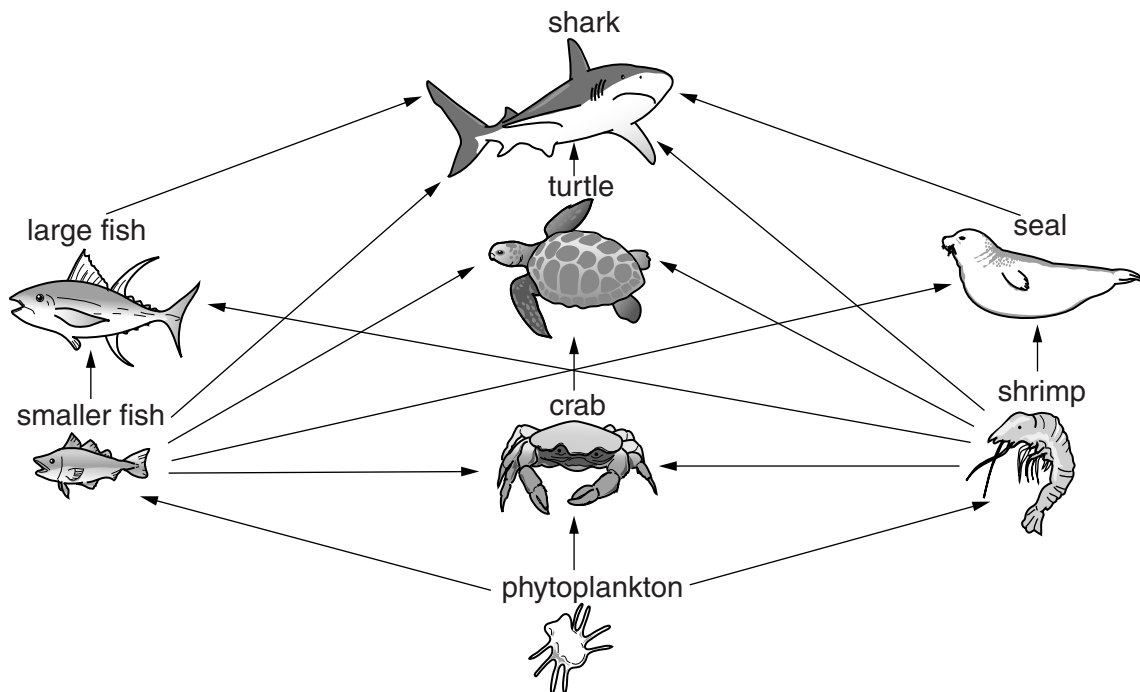
.....

..... [4]

[Total: 4]

- 8 Changes affecting one species in a food web can also affect other species within the food web.

Look at this food web.



- (a) Large fish do not eat crabs.

A disease reduces the numbers of the crab population.

This upsets the balance of the whole web.

The large fish population remains unchanged.

Explain how this is possible.

.....

.....

..... [3]

13

(b) Complete the sentences about organisms in the food web.

Choose words from this list.

**compete****direct****indirect****positive****reproduce****rapid****slow****beneficial****work**

The organisms in the food web ..... with each other for resources.

Pollution has reduced the amount of food available to the seals.

This is an example of ..... human activity.

A ..... change in the environment could cause some of the organisms to become extinct.

**[3]****[Total: 6]****END OF QUESTION PAPER**

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