Candidate forename		Candidate surname	

Centre number						Candidate number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

GCSE

A221/02

TWENTY FIRST CENTURY SCIENCE

BIOLOGY A

Unit 1: Modules B1 B2 B3 (Higher Tier)

TUESDAY 24 JANUARY 2012: Morning
DURATION: 40 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

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

DC (LEO/SW) 12MEP01156 56471

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).**

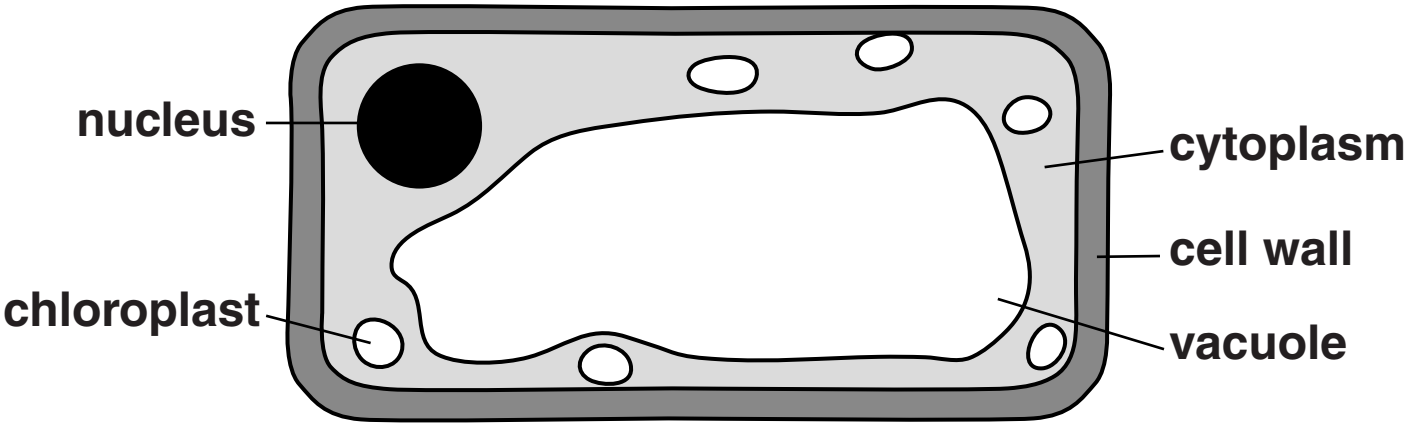
INFORMATION FOR CANDIDATES

- **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.**

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 opposite 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

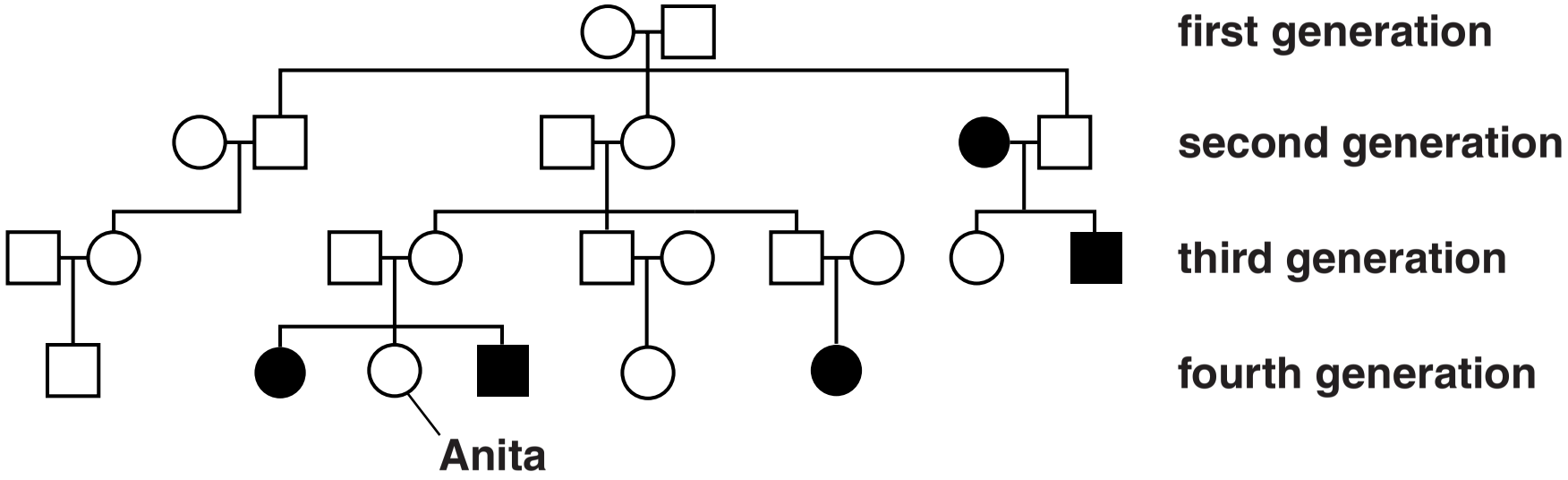
INDEPENDENT

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]



female without cystic fibrosis

male without cystic fibrosis

female with cystic fibrosis

male with cystic fibrosis

(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
A	CC
B	Cc
C	cc

HUNTINGTON'S DISORDER

PERSON	ALLELES
D	HH
E	Hh
F	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]

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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]**

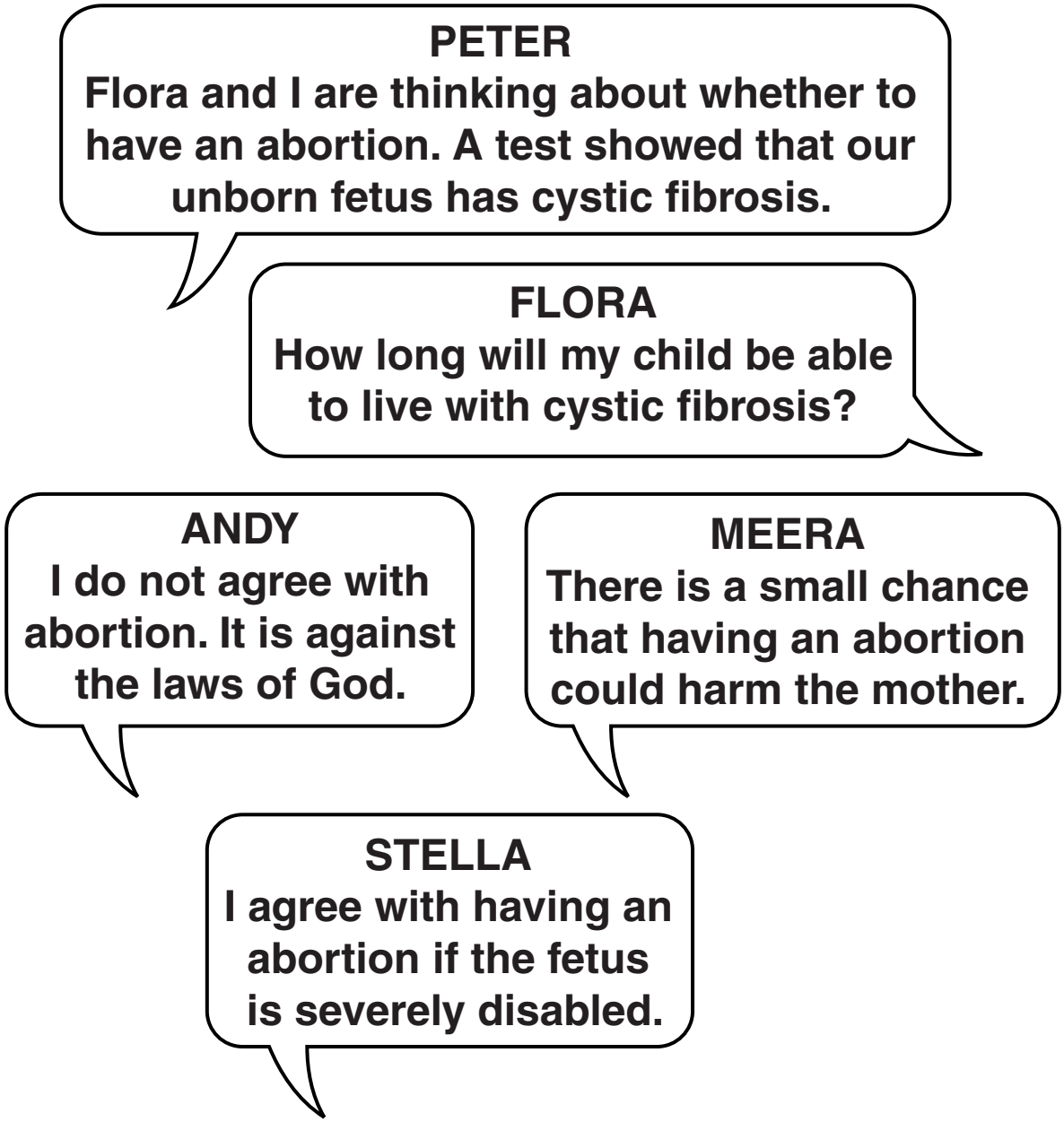
Cystic fibrosis is a genetic disorder.

(b) State TWO symptoms of cystic fibrosis.

symptom 1 _____

symptom 2 _____ **[1]**

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



(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.

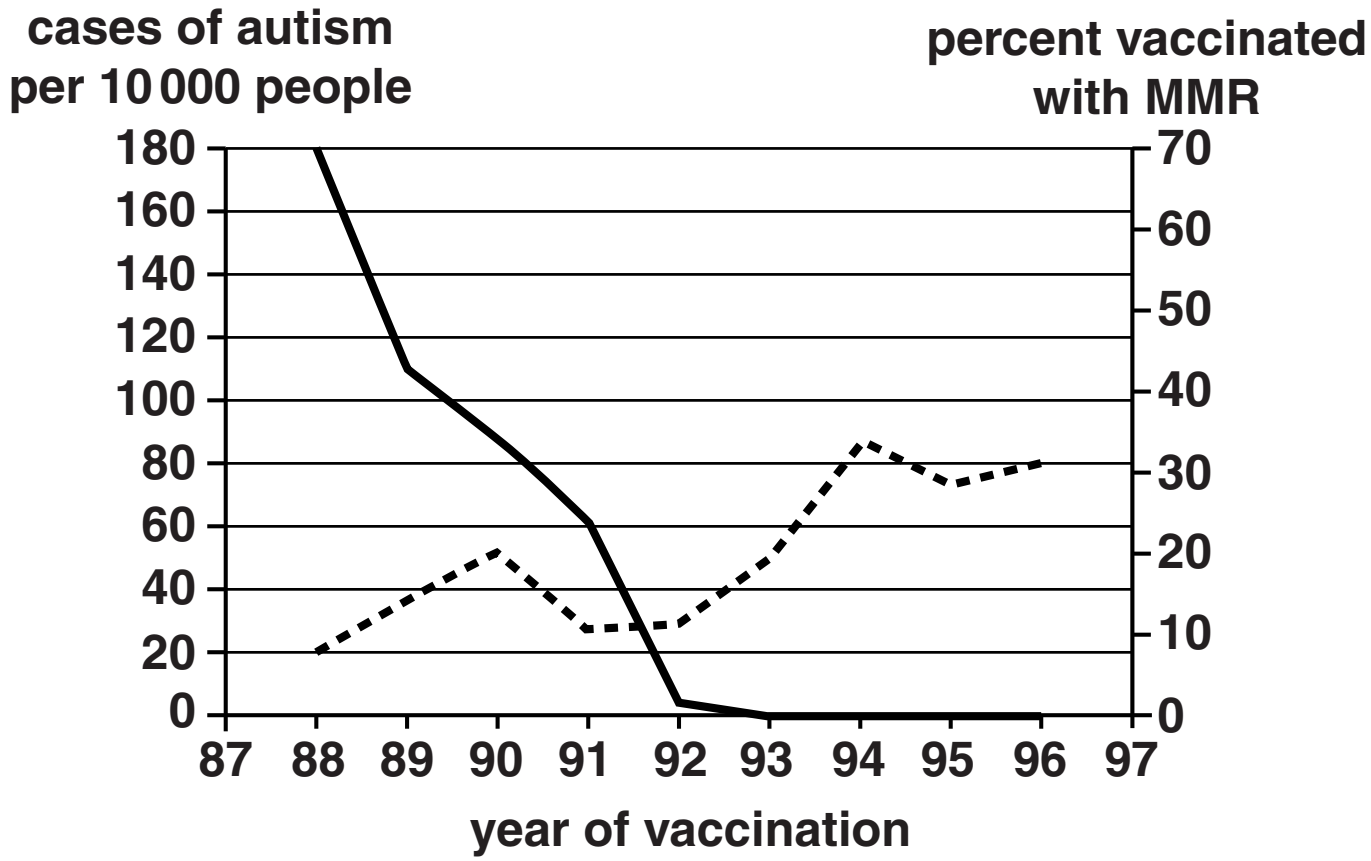
Explain why scientists regard it as important that a scientific claim can be replicated by other scientists.

_____

_____

_____ **[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]**

(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]

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]

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	NERVOUS SYSTEM
short-lived response	
mainly electrical in nature	HORMONAL SYSTEM
transmission relies on blood stream	

[2]

[Total: 2]

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.**

_____

_____

_____

_____

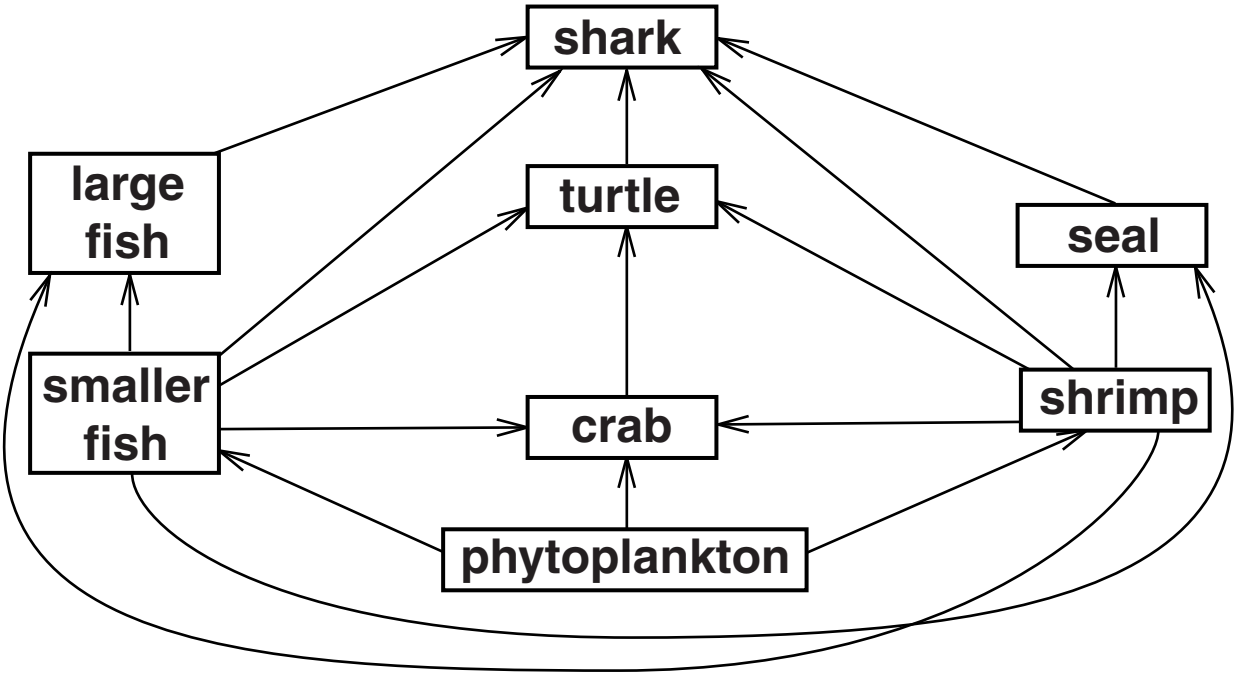
_____

_____ **[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]**

(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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