THIS IS A NEW SPECIFICATION

OCR RECOGNISING ACHIEVEMENT

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Tuesday 14 May 2013 – Morning

GCSE TWENTY FIRST CENTURY SCIENCE BIOLOGY A

A161/01   Modules B1 B2 B3 (Foundation Tier)

Candidates answer on the Question Paper. A calculator may be used for this paper.	**Duration:** 1 hour
OCR supplied materials: None	
Other materials required: • Pencil • Ruler (cm/mm)	

Candidate forename		Candidate 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

* 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 **16** pages. Any blank pages are indicated.

OCR is an exempt Charity

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2
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3

Answer **all** the questions.

1 Humans have different characteristics.

These characteristics have different causes.

(a) Complete the table by writing each **characteristic** in the correct column to show its **cause**.

dimples   scars   weight   eye colour

Cause		
Genes	**Environment**	**Both genes and environment**

[2]

(b) Another difference between humans is whether they are male or female.

A student looks at a Punnett square that shows inheritance of sex.

		female	
		X	X
male	X	XX	XX
	Y	XY	XY

The student makes these two conclusions.

> 1. Out of 100 babies born, 50 will be male and 50 will be female.
>
> 2. If a mum and dad have two girls there is a 25% chance that the next baby will be a boy.

State whether the conclusions are correct and explain your answer.

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.... [3]

[Total: 5]

      Turn over

4

2 Genetic testing can be used for screening adults, children and embryos for genetic disorders.

There are different reasons for genetic testing and the results can lead to different decisions.

(a) Draw a straight line from each **result of the test** to a **possible decision** the person makes.

result of the test	**possible decision**

| embryos are tested and one has a single allele for cystic fibrosis | | to tell her children as soon as possible |

| a fetus has two alleles for cystic fibrosis | | which embryo to implant |

| a fifty-year-old woman has one copy of the allele for Huntington's disorder | | to have a termination |

| a twenty-year-old woman has one allele for Huntington's disorder | | not to have any children |

[3]

(b) Two different sets of parents get the results of a genetic test.

Steve and Val are told their fetus has a type of genetic disease that causes brain damage and death during early childhood.

Mel and Jo are told their fetus has polydactyly.

Polydactyly is when a person has an extra finger or toe.

One consequence of genetic testing is to decide whether or not to have the pregnancy terminated.

Based on this information, each set of parents may make a different decision about terminating the pregnancy.

Suggest why.

....

....

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.... **[2]**

5

(c) The gene that controls polydactyly is shown on one of the chromosomes below.

(i) Draw the gene in the correct position on the second chromosome of the pair.

[1]

(ii) What is the maximum number of alleles one person can have for this gene?

Put a ⬭ring around the correct answer.

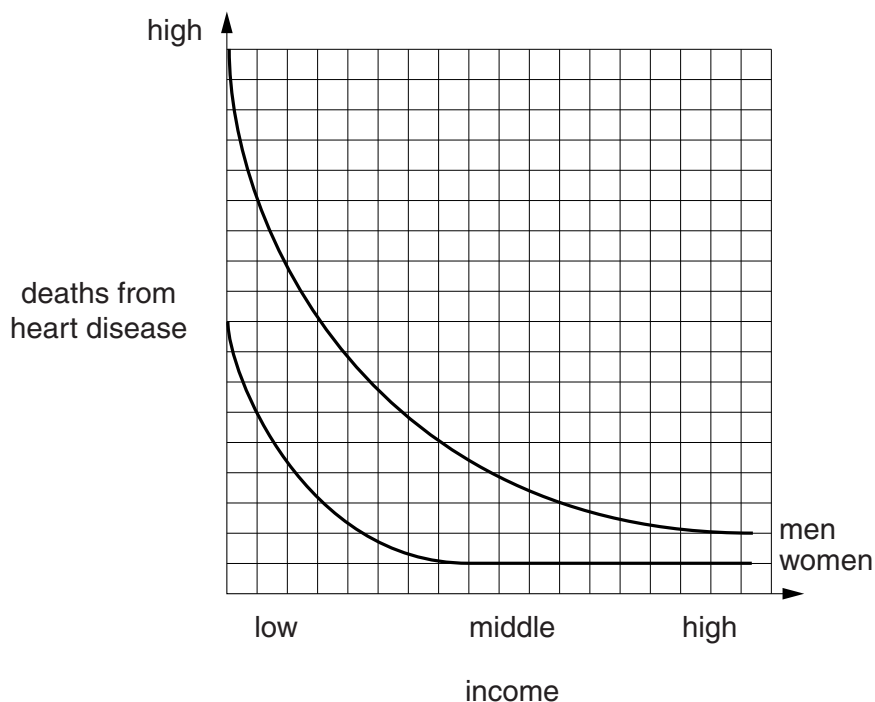   0   1   2   23   46

[1]

[Total: 7]

Turn over

6

3   Cystic fibrosis and Huntington's disease are genetic disorders in humans.

They are inherited in different ways.

Explain how they are inherited, including genetic diagrams in your answer.

You must include a key for the symbols you use.

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

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.... **[6]**

[Total: 6]

7

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Question 4 begins on page 8

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8

4 A student examined this graph about heart disease.

It shows the deaths from heart disease in men and women, depending upon how much money they earned (income).

(a) The student made the following conclusions.

Using **only** information from the graph, put ticks (✓) in the boxes next to the **three** correct conclusions.

With a very low income, women are certain to get heart disease. ☐

In women, each time income is halved, the risk of heart disease is doubled. ☐

Men are more at risk of heart disease than women. ☐

With a high income, women are more at risk of heart disease than men. ☐

There are other risk factors for heart disease apart from income. ☐

No one with a high income gets heart disease. ☐

For men, the lower the income the greater the risk of heart disease. ☐

From middle to high income, the risk for women remains unchanged. ☐

[3]

(b) Which **beginning**, **A**, **B**, **C** or **D**, and which **end**, **1**, **2**, **3** or **4**, of a sentence, when put together, gives the best conclusion?

beginning			end	
A	An outcome exists between a factor and a correlation …	**1**	… and proves the factor is a causal link.
B	The study needs to be repeated …	**2**	… and this needs to be peer reviewed by other scientists.
C	Low income increases the risk of heart disease …	**3**	… and includes the greatest number of people involved.
D	The right decision is the one that leads to the best outcome …	**4**	… but does not always lead to it.

answer .... and ....**[2]**

(c) Scientists need to consider different factors when designing a study.

When designing this study on heart disease, they decided on three factors to make sure the data collected was valid.

Put ticks (✓) in the boxes next to the **three** correct factors.

All the men should be the same height. ☐

Both men and women should be chosen at random. ☐

The sample size should be as large as possible. ☐

The women should all have a high income. ☐

Only people with a history of heart disease should be included. ☐

The two groups should be checked that they match on as many factors as possible. ☐

The study should be a double blind trial. ☐

[3]

[Total: 8]

5 Jake accidentally cuts himself.

The cut becomes infected with bacteria.

Jake begins to feel ill. He has septicaemia (blood poisoning).

Septicaemia can kill.

(a) Complete the sentences to explain what the bacteria are doing to make Jake feel ill.

Choose only words from this list.

| antibiotics | damage | help | oxygen | stimulate | toxins |

The bacteria in Jake's cut multiply rapidly. They spread into his blood stream.

The bacteria .... Jake's cells and release

.... into his blood stream. **[2]**

(b) For the first few hours, the bacteria divide into two every twenty minutes.

100 bacteria entered Jake's wound when he cut himself.

How many bacteria are in Jake's wound after 2 hours?

Show your working.

number of bacteria in Jake's wound after two hours. .... **[2]**

(c) It is important for Jake to produce antibodies against these bacteria as quickly as possible.

Use the information from parts **(a)** and **(b)** to explain why.

....

....

.... **[3]**

[Total: 7]

6   Penicillin was the first antibiotic used by doctors.

Streptomycin is also an antibiotic. It was developed in 1947.

Describe how streptomycin should be used by doctors to treat their patients, including why it is important to regularly discover new antibiotics.

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

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.... **[6]**

[Total: 6]

Turn over

7   Some farmers spray their crops with insecticides.

Insecticides kill insect pests.

Pests can develop resistance to insecticides.

(a) Each year a farmer sprays his wheat crop with the same insecticide to kill a particular insect pest.

Each year a scientist catches all the insect pests in a $20\,m^2$ area of the crop before it is sprayed.

He tests the pests to see how many are resistant to the insecticide.

These are his results.

Year	Pests with no resistance	Pests with resistance
2008	1000	1
2009	223	14
2010	87	65
2011	21	392
2012	3	965
2013	0	2458

(i) What percentage of pests were resistant to the insecticide in 2008?

Show your working.

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

(ii) What percentage of pests were resistant in 2013?

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

(iii) Suggest how the farmer should use this information when spraying his crops with insecticide.

....

....

.... **[2]**

(iv) Suggest why the data collected by the scientist may not be sufficient to draw a valid conclusion.

....

....

....

.... **[2]**

(b) Another way to control insect pests is to use biological control.

Biological control is when a farmer releases a new predator that kills the insect pest.

Describe **three** possible ways that releasing a new predator to kill the pests could affect the food web.

....

....

....

.... **[3]**

[Total: 9]

8   The process of evolution has produced many new species.

(a) Explain how evolution produces new species.

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

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.... **[6]**

(b) A team of scientists are looking for new species in the Amazon jungle.

They discover an unusual beetle.

Explain what would prove that it was a new species.

....

....

.... **[2]**

(c) Organisms can be classified into different groups such as **kingdoms** and **species**.

A scientist collected many plants.

She writes the following information in her note book.

> 1. Today we collected many organisms.
>
> 2. We placed each organism in a separate plastic bag and labelled each bag with a reference number.
>
> 3. We then sorted the bags into different boxes.
>
> 4. Each box only contained organisms that had many characteristics in common.
>
> 5. Another box had organisms we were unsure about. They had fewer characteristics in common but still showed some similarities.

(i) Which statement, **1**, **2**, **3**, **4** or **5**, best refers to a **species**?

.... **[1]**

(ii) Which statement, **1**, **2**, **3**, **4** or **5**, best refers to a **kingdom**?

.... **[1]**

(d) Classification of living organisms can be very useful to scientists.

Put ticks (✓) in the boxes next to the **two** best reasons why.

Classification helps to …

… make sense of the enormous diversity of organisms on Earth. ☐

… increase biodiversity. ☐

… improve sustainability. ☐

… reduce the number of disease causing predators. ☐

… show the evolutionary relationships between organisms. ☐

[2]

[Total: 12]

END OF QUESTION PAPER

16

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