

Tuesday 17 May 2016 – Afternoon

**GCSE TWENTY FIRST CENTURY SCIENCE
BIOLOGY A/SCIENCE A**

A161/01 Modules B1 B2 B3 (Foundation 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

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. If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The 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.

2

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3

Answer **all** the questions.

1 Our genes control how we develop and function.

(a) Draw a ring around the correct word to complete each of the sentences about genes.

Genes are **cells** / **instructions** / **nuclei** that describe how to make proteins.

Genes are sections of DNA molecules that make up **chromosomes** / **enzymes** / **proteins**.

Different versions of the same gene are called **alleles** / **chromosomes** / **proteins**. **[2]**

(b) Which cells in a human usually contain **pairs** of chromosomes?

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

all human cells

☐

human body cells

☐

human egg cells

☐

human sperm cells

☐

[1]

[Total: 3]

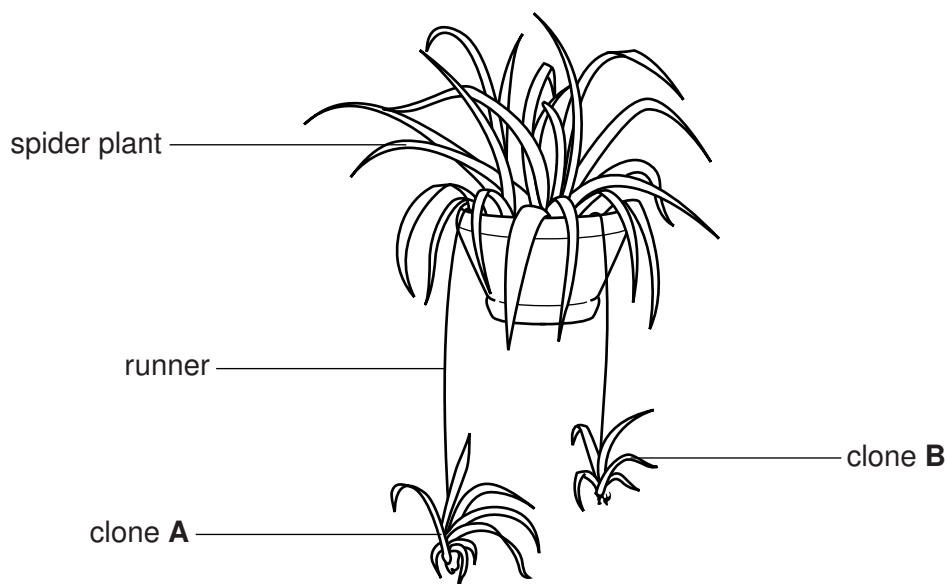
4

2 Some plants and animals can make clones.

(a) Sunita has a spider plant.

The plant grows special stems called runners.

Each runner makes a new plant. The new plants are clones of the spider plant.



Put ticks (✓) in the boxes next to the **two** correct statements about the clones.

Clone **A** and clone **B** have identical genes.

☐

Clone **A** and the spider plant have different genes.

☐

Clone **B** has only half of the genes from the spider plant.

☐

The clones were made using asexual reproduction.

☐

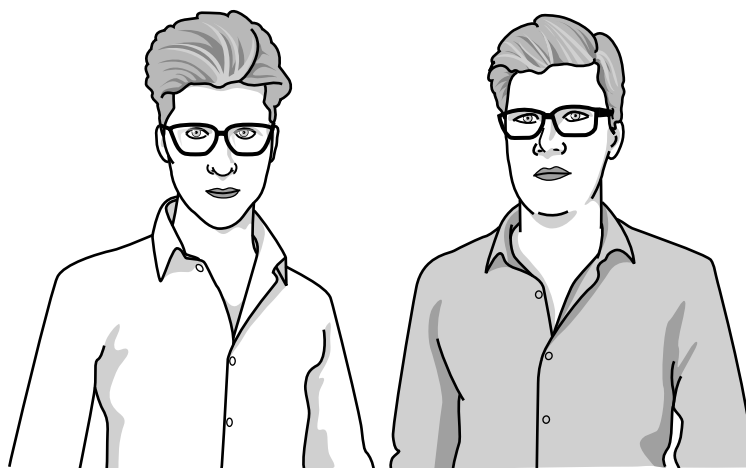
[2]

(b) Write down one **other** way in which plants can make clones.

..... [1]

5

(c) Jack and Ted are identical twins.



Explain why Jack and Ted look very similar but will not always look exactly the same.



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

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..... [6]

[Total: 9]

6

- 3 Jane goes to her doctor to have a genetic test.



The doctor finds that Jane has a faulty allele.

Women with this faulty allele are at greater risk of cancer.

- (a) The doctor tells Jane there is an 87% chance she will develop breast cancer.

- (i) What is the **probability** that Jane will develop breast cancer?

Draw a ring around the correct answer.

1 in 87

0.13

0.87

87

[1]

- (ii) What would it mean for Jane if her probability of developing breast cancer was 1?

..... [1]

- (b) Jane could have major surgery to reduce her risk of developing breast cancer.

The surgery would remove tissue from Jane's body.

What must she consider when deciding whether or not to have the surgery?

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..... [3]

7

- (c) Jane can never be free from the risk of cancer.

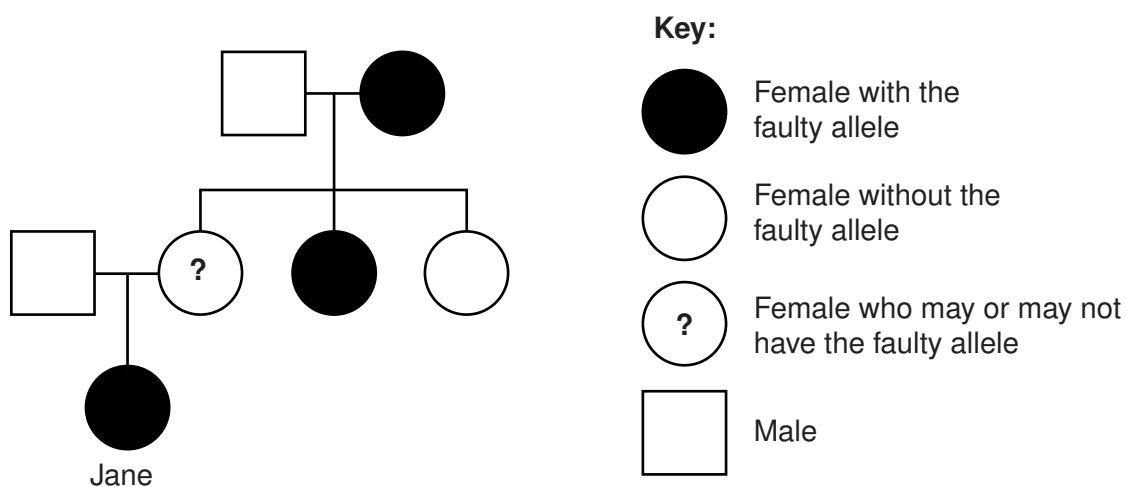
Suggest why.

.....
 [1]

- (d) Jane's doctor looks at information about the allele and at part of Jane's family tree.

Information about the allele:

The normal allele can become faulty during a person's life. This happens in one person out of every 1000.



The doctor concludes that Jane's mother probably has the faulty allele.

What evidence supports this conclusion?

Your answer should include evidence from the family tree and from the information about the allele.

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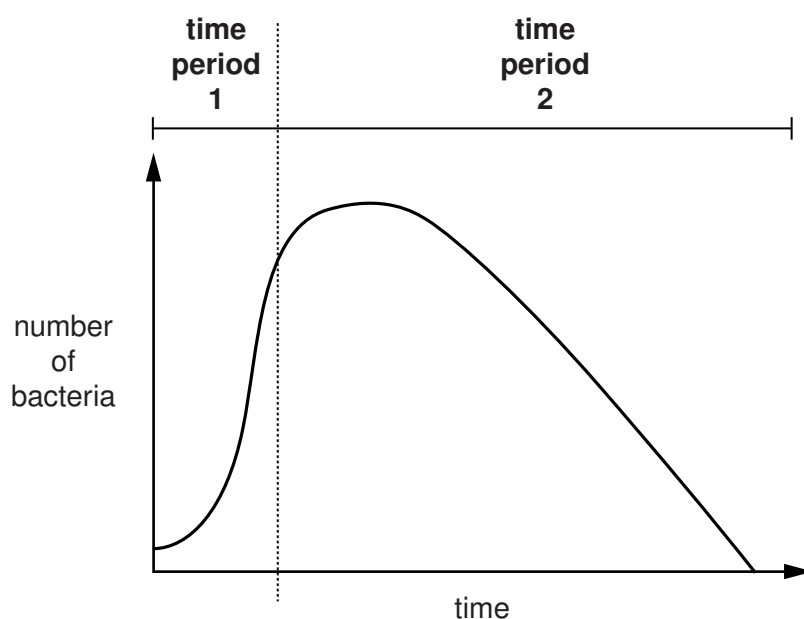
 [2]

[Total: 8]

- 4 Dan works in his garden. He cuts his leg.

Some bacteria enter the cut. The bacteria start to reproduce.

The graph shows how the number of bacteria in the cut changes over time.



- (a) During **time period 1**, the bacteria are reproducing quickly.

Each bacterium divides to produce two bacteria. This happens once every 20 minutes.

- (i) At the start of **time period 1** there are 50 bacteria.

Calculate how many bacteria there will be after 2 hours if all bacteria survive.

number of bacteria = [1]

- (ii) Dan will show symptoms of infection when there are more than 20 000 bacteria in the cut.

Dan thinks this will take days.

Look again at your answer to part (i).

Explain why Dan is wrong.

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..... [2]

9

- (iii) Write down **two** ways in which bacteria can cause symptoms of infection in the body.

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..... [2]

- (b) Look at **time period 2** on the graph.

Some of the bacteria are dying.

- (i) Draw an **X** on the graph to show a time when the number of new bacteria being produced is equal to the number of bacteria dying. [1]

- (ii) What actions take place inside Dan's body to cause the shape of the graph in **time period 2**?

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..... [2]

[Total: 8]

10

- 5 An outbreak of Ebola virus disease started in West Africa in 2013.

When the outbreak started, no drugs were known to cure the disease.

- (a) The table shows data from several countries.

The case fatality rate is calculated using the formula:

$$\text{case fatality rate} = \frac{\text{number of deaths}}{\text{number of cases}} \times 100$$

Country	Number of cases of Ebola	Number of deaths caused by Ebola	Case fatality rate (%)
Guinea	3000	2000	66.7
Liberia	8000	4000	
Mali	8	6	75.0
Sierra Leone	10 000	3000	30.0

- (i) What is the case fatality rate in Liberia?

Show your working, and give your answer to 1 decimal place.

case fatality rate = % [2]

- (ii) Look at this news headline:

Ebola kills 75% of infected people

Explain why the headline is **not** a good summary of the data.

.....

 [2]

- (iii) Rewrite the headline to better represent the data.

.....
 [1]

11

(b) Scientists have developed a drug that could be used to treat Ebola.

- (i) Which of the statements can be used to complete the sentence about testing a new drug?

Put ticks (✓) in the boxes next to the **two** correct statements.

The first stages of testing a new drug include tests on ...

animals

☐

healthy human volunteers

☐

human cells grown in a laboratory

☐

humans with the disease

☐

[1]

12

- (ii) The scientists plan to test the new drug in humans.

The table shows groups that they could include in their plan.

Group	People in group	Treatment the people receive
A	healthy volunteers	the drug
B	people with Ebola	the drug
C	people with Ebola	a placebo

Explain the benefits of including each group and the ethical issues raised by including Group **C**.



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

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..... [6]

[Total: 12]

6 Neanderthals are an extinct species of humans.



Fossils of Neanderthals help us investigate the evolution of humans.

(a) Two scientists talk about fossils of Neanderthal teeth.



Doctor Rowe

There are pieces of vegetables and herbs stuck to the teeth. I conclude that Neanderthals ate those plants as part of a balanced diet.

Doctor Wilson

I disagree. Neanderthals probably ate the stomach contents of deer that had eaten the vegetables and herbs.



Complete the table.

Put **one** tick (✓) in each row to answer the questions.

	Only Doctor Rowe	Only Doctor Wilson	Both scientists	Neither scientist
Who describes data?				
Who suggests an explanation for the data?				
Who has used creative thinking to develop an explanation?				

[3]

14

(b) Neanderthals and modern humans are different species.

Both species evolved from the same ancestor.

Statements **A** to **E** show steps in the process of evolution.

The statements are in the wrong order.

- A** The groups lived in isolation in different conditions.
- B** Some individuals were better able to survive to reproduce.
- C** The ancestor population split into two groups.
- D** The groups evolved to become two different species.
- E** Mutations caused genetic variation in each group.

Write the letters in the boxes to show the correct order.

One has been done for you.

	A			
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[3]

(c) Complete the sentence about organisms and their environment.

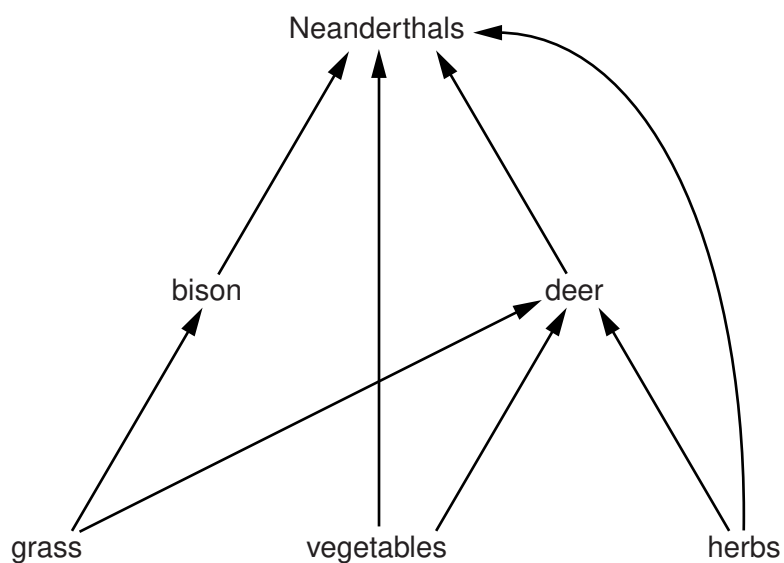
An organism is more likely to survive to reproduce when it is

well to its environment.

[1]

15

(d) The diagram shows part of the Neanderthals' food web.



The size of the deer population increases rapidly.

Explain what effect this could have on the size of the Neanderthal population.

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..... [3]

16

(e) The Neanderthal species is now extinct.

Explain what could have caused the Neanderthals to become extinct.



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

[6]

[Total: 16]

17

- 7 Scientists have collected an animal from deep in the ocean.

This species of animal has never been seen before.

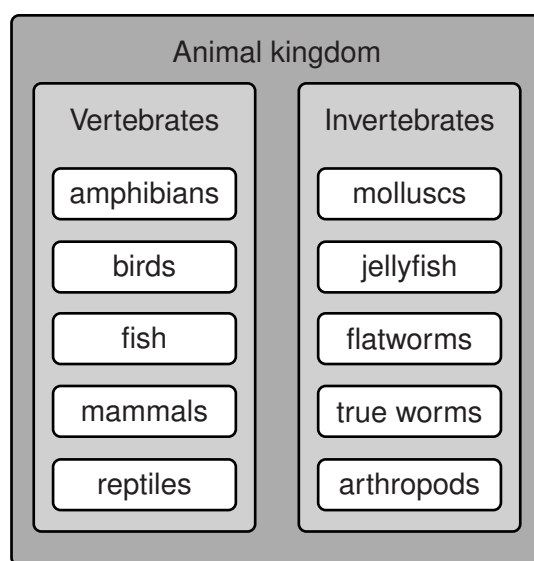
It will have to be classified into a group in the animal kingdom.

- (a) What is meant by the word *species*?

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

18

(b) The diagram shows some groups of animals in the animal kingdom.



The animal discovered in the deep ocean is an invertebrate. It is similar to a jellyfish.

Put a tick (✓) in the correct box next to each statement to show whether it is **true** or **false**.

Use the diagram to help you.

	True	False
All jellyfish are invertebrates.	☐	☐
Jellyfish are a type of fish.	☐	☐
The newly discovered animal could be a mammal.	☐	☐
All animals are vertebrates.	☐	☐

[2]

[Total: 4]

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).

This image shows a full page of primary-ruled paper. It features a vertical solid line on the left side, creating a narrow margin. The rest of the page is filled with horizontal dashed lines, providing a guide for handwriting practice. There are no markings or text on the page.

