



General Certificate of Secondary Education
2013–2014

Science: Single Award

Unit 1 (Biology)

Higher Tier

[GSS12]

ML

MONDAY 24 FEBRUARY 2014, MORNING

TIME

1 hour 15 minutes, plus your additional time allowance.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.
Answer **all nine** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 75.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in question **4(b)** and **8(b)**.

Centre Number

71

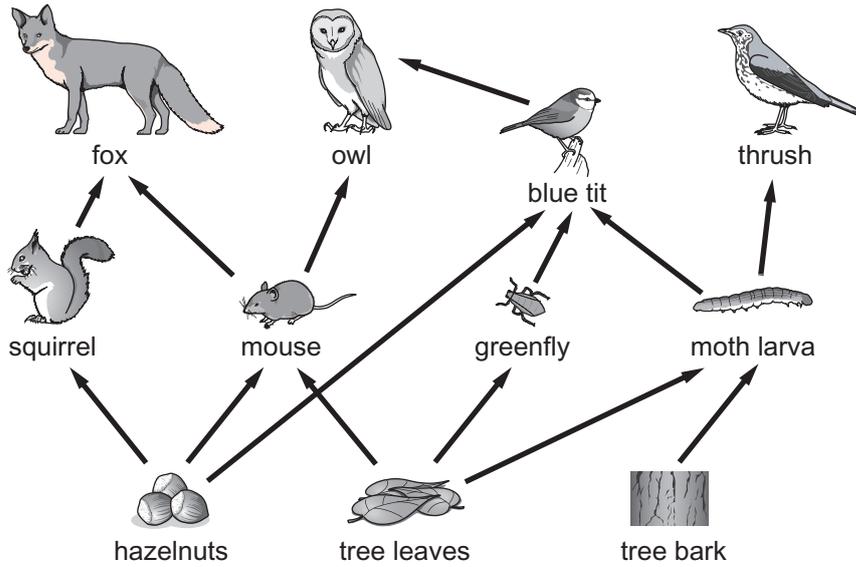
Candidate Number

| For Examiner's use only | |
|-------------------------|-------|
| Question Number | Marks |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |

Total
Marks

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1 (a) Look at the diagram below. It shows a food web.



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(i) Use the diagram to complete a food chain containing **four** organisms in the boxes below.

→ → →

[2]

(ii) What is the name of **one** primary consumer from this food web?

[1]

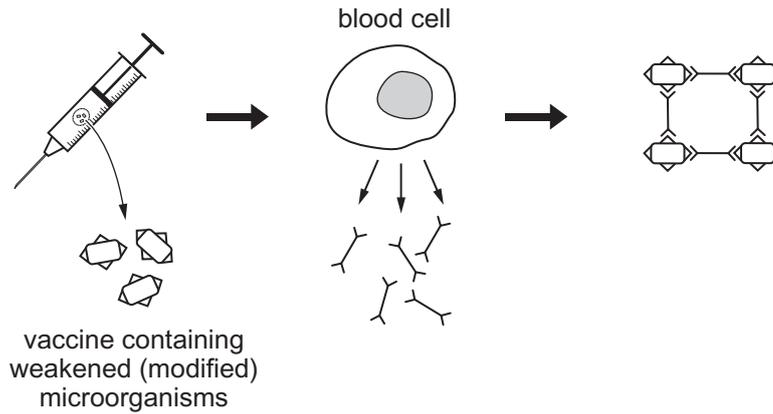
(b) Write down what might happen to the number of squirrels if the fox numbers go down. Explain your answer.

[2]

| Examiner Only | |
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| Marks | Remark |
| | |

| | |
|--|--|
| | |
|--|--|

2 Look at the diagram below. It summarises how a vaccine works.



(a) Use the diagram and your knowledge to describe how vaccinations protect against disease.

[3]

(b) Before a vaccination is licensed for use it goes through a number of trials (in vitro, animal and clinical).

(i) Clinical trials test the drug on human volunteers. Write down **two** reasons why it is necessary to carry out testing on humans.

1. _____

2. _____

[2]

(ii) Write down **one** reason why many people are against testing on animals.

_____ [1]

| Examiner Only | |
|---------------|--------|
| Marks | Remark |
| | |

Look at the table below. It shows information about the development and production of different drugs by a company.

| | Antibiotics | Painkillers | Other medical drugs |
|---------------------------------------|-------------|-------------|---------------------|
| Cost of producing drug/million pounds | 7.4 | 7.5 | 4.9 |
| Time to produce drug/years | 9.5 | 6.5 | 6.5 |
| Profit per drug/million pounds | 2.1 | 2.9 | 4.2 |
| Number of drugs in development | 2 | 4 | 7 |

(c) Use the information provided to suggest **two** reasons why this company is more interested in developing 'other medical drugs' rather than antibiotics and painkillers.

1. _____

2. _____

_____ [2]

(d) Explain fully why some antibiotics have become less effective in recent years.

_____ [2]

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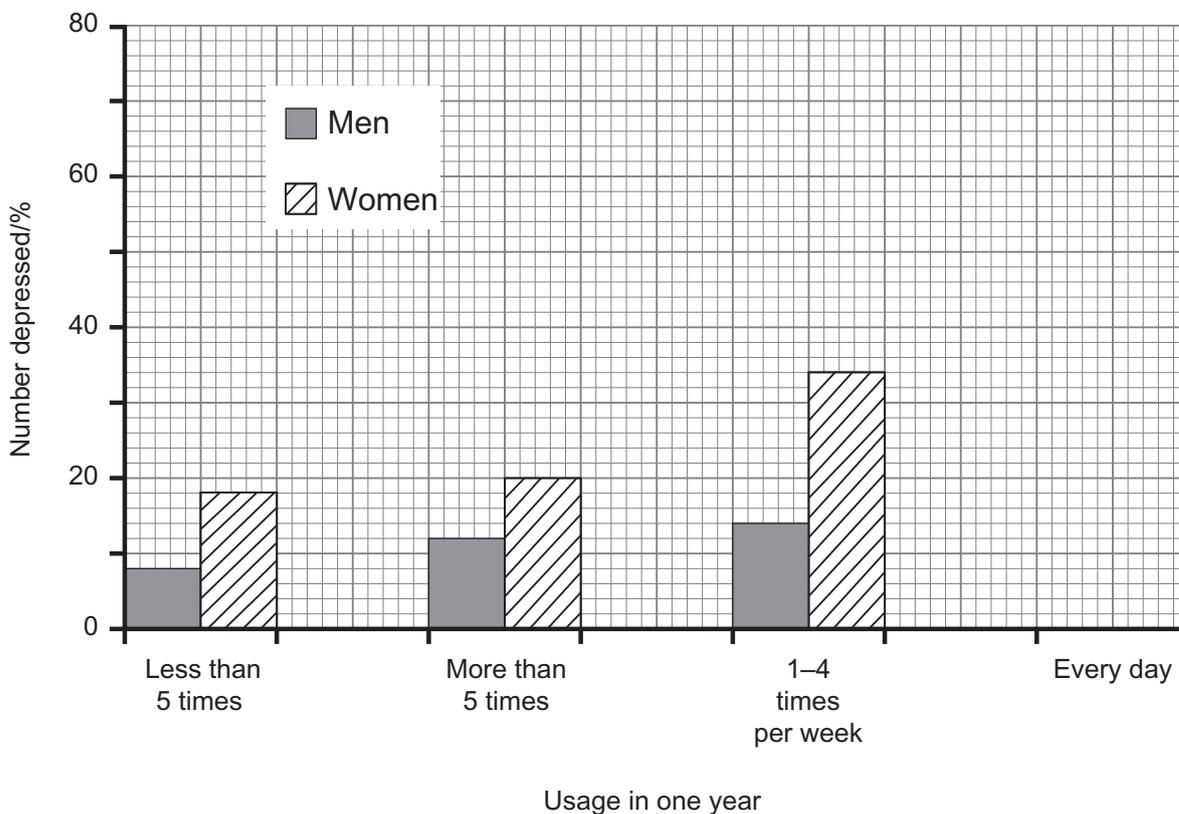
Marks Remark

- 3 Cannabis is the most widely used illegal drug in Britain. Some doctors think that taking cannabis can lead to depression.

Doctors investigated the use of cannabis by 800 males and 800 females. The results are shown in the table below.

| Usage in one year | Men who became depressed/% | Women who became depressed/% |
|--------------------|----------------------------|------------------------------|
| Less than 5 times | 8 | 18 |
| More than 5 times | 12 | 20 |
| 1–4 times per week | 14 | 34 |
| Every day | 20 | 67 |

- (a) Use the information in the table to complete the bar chart below.



[1]

Examiner Only

Marks Remark

- (b) A quarter ($\frac{1}{4}$) of the males in the investigation used cannabis **every day** of the year. Calculate the **number** of men who became depressed.

Show your working out.

_____ [2]

- (c) How do the results show that doctors are correct in linking depression to cannabis use?

_____ [1]

- (d) Alcohol is a legal drug. Alcohol can have an effect on a person's health. Write down **one** harmful effect alcohol can have on a person and **one** harmful effect it can have on society.

Person _____

Society _____

_____ [2]

Examiner Only

Marks Remark

4 (a) Abiotic factors can be used to measure the rate at which global warming is occurring.

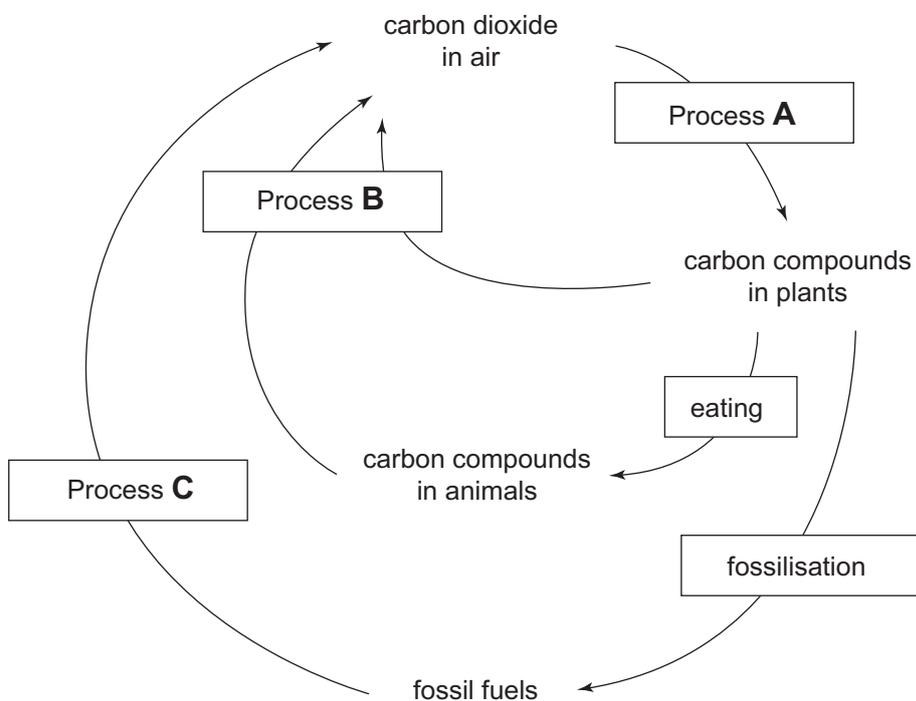
(i) What is meant by abiotic?

_____ [1]

(ii) Apart from temperature, name **one** abiotic factor that could be used to measure the rate of global warming.

_____ [1]

(b) Look at the diagram below. It shows a simple carbon cycle.



Use the diagram and your knowledge to explain the carbon cycle on page 9 (opposite).

Your answer should include:

- the names of the processes labelled **A**, **B** and **C**,
- and how the carbon cycle has become unbalanced, causing increased levels of carbon dioxide.

| Examiner Only | |
|---------------|--------|
| Marks | Remark |
| | |

- 5 (a) Complete the table below about food groups and their function in the body.

| Food group | Function in the body |
|--------------|--|
| | growth and repair |
| carbohydrate | |
| | to give us energy and for insulation (reduce heat loss) |

[3]

- (b) (i) Describe fully how you would carry out a food test for sugar.

_____ [2]

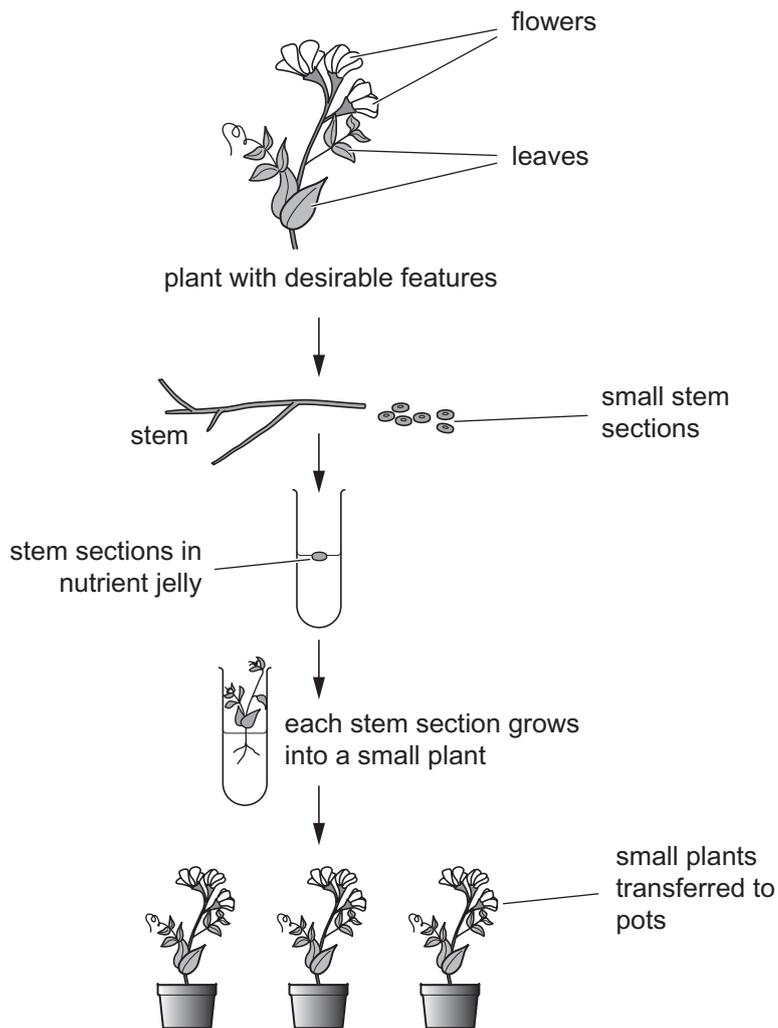
- (ii) Describe the colour change there would be if the food contains sugar.

_____ to _____ [1]

| Examiner Only | |
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| Marks | Remark |
| | |

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(Questions continue overleaf)

- 6 Plants with desirable features can be grown asexually. This is done using the method of tissue culture described in the diagram below.



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- (a) Write down **one** desirable feature the plant could have.

_____ [1]

| Examiner Only | |
|---------------|--------|
| Marks | Remark |
| | |

(b) Use the diagram and your knowledge to answer parts (i) and (ii) below.

(i) What is the evidence that tissue culture involves asexual reproduction?

_____ [1]

(ii) Write down **two** advantages of using the process of tissue culture to grow plants asexually.

1. _____

2. _____

_____ [2]

(c) The hormone oestrogen has an important function in the human female menstrual cycle.

(i) Describe fully what a hormone is.

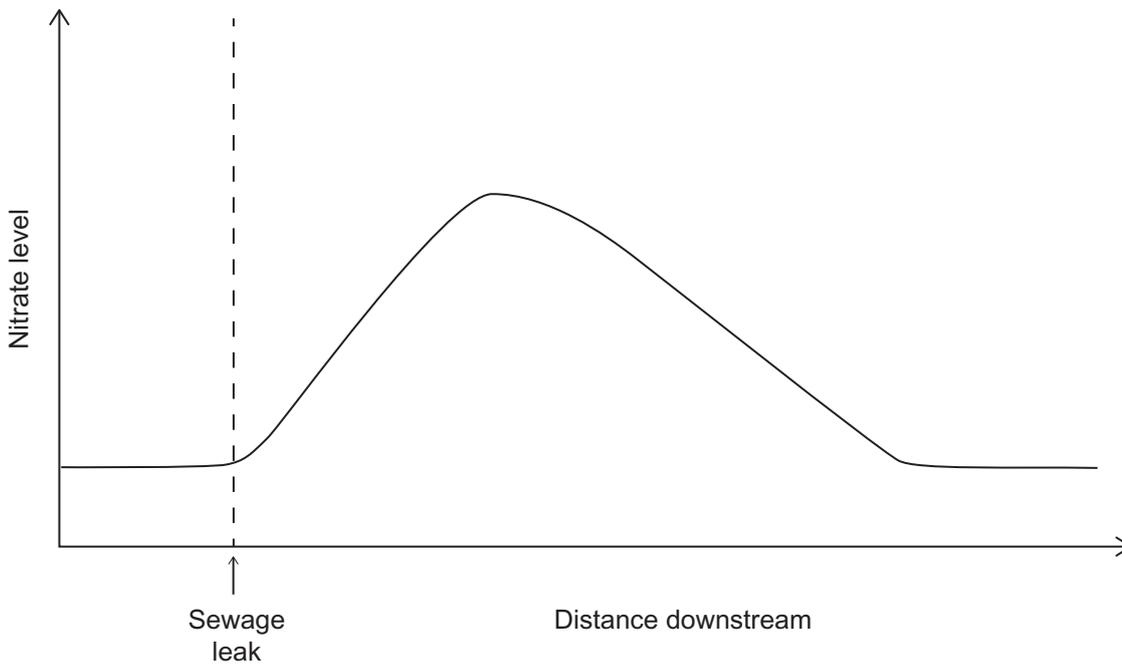
_____ [2]

(ii) Describe and explain the role of oestrogen in the female menstrual cycle.

_____ [2]

| Examiner Only | |
|---------------|--------|
| Marks | Remark |
| | |

7 (a) Look at the graph below. It shows how a sewage leak affected the level of nitrate in a section of river.



(i) In terms of the nitrogen cycle, explain fully why the nitrate level rises after the sewage leak.

_____ [3]

(ii) Write down **two** reasons why the nitrate level in the water eventually returns to normal.

1. _____

2. _____ [2]

| Examiner Only | |
|---------------|--------|
| Marks | Remark |
| | |

- (b) Acid rain is another example of pollution. The table below shows the percentage of a Scottish forest damaged by acid rain over the last 50 years.

| Year | Area of forest damaged/% |
|------|--------------------------|
| 1960 | 20 |
| 1970 | 27 |
| 1980 | 30 |
| 1990 | 25 |
| 2000 | 15 |
| 2010 | 15 |

- (i) Describe how the percentage area of forest that was damaged changed over time.

[2]

- (ii) Explain fully the reason for the change in percentage of forest damaged between the years 1980–2000.

[2]

- (iii) What is the evidence from the table that acid rain is still produced?

[1]

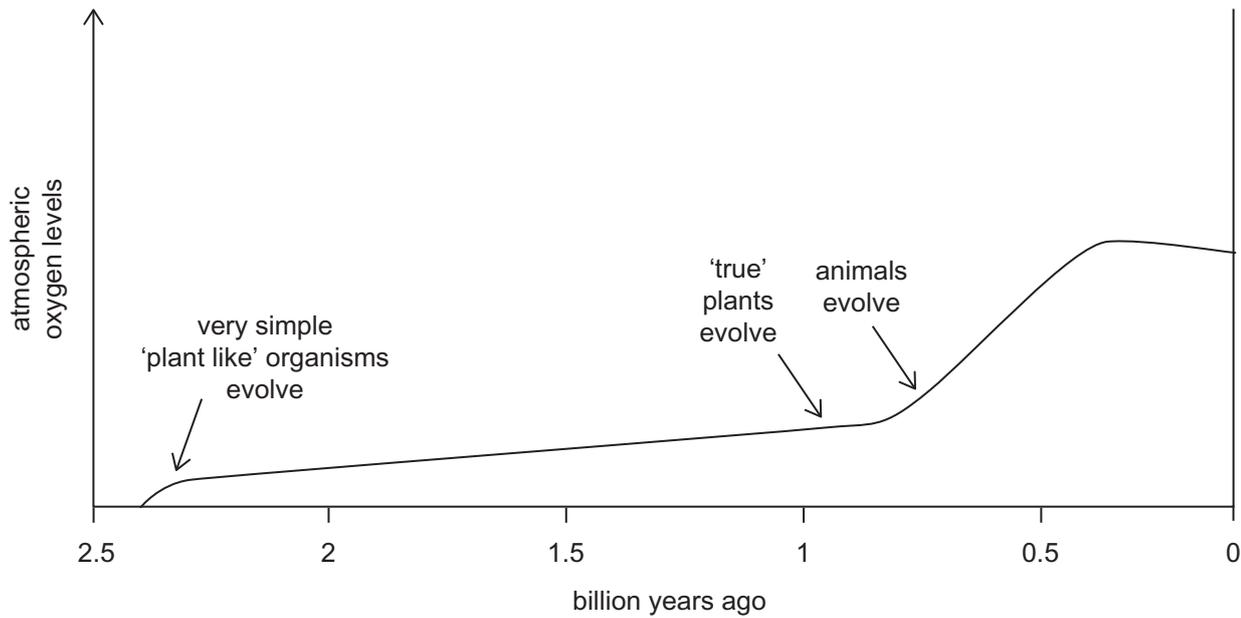
- (c) Acid rain causes trees to lose their leaves. Write down **one** reason why the leaves are the main part of a tree affected by acid rain.

[1]

Examiner Only

Marks Remark

- 8 (a) Look at the diagram below. It shows how the levels of atmospheric oxygen have changed throughout the last 2.5 billion years.



- (i) Write down the name of the process that caused the rise in oxygen levels around 2.4 billion years ago.

[1]

- (ii) Use the information provided and your knowledge to explain why animals evolved around 0.75 billion years ago.

[2]

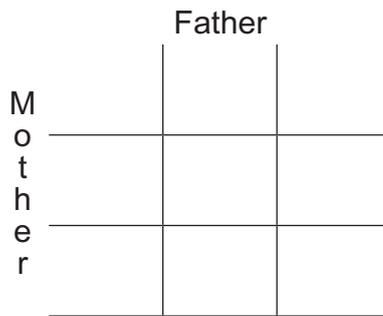
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| Marks | Remark |
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9 Huntington's disease is caused by the presence of a dominant allele in a particular gene.

(a) Complete the Punnett square below and the offspring genotypes and phenotypes for:

- a father who is heterozygous for Huntington's disease
- a mother who does not have the Huntington allele.

Use the symbols: H = Huntington allele; h = normal allele

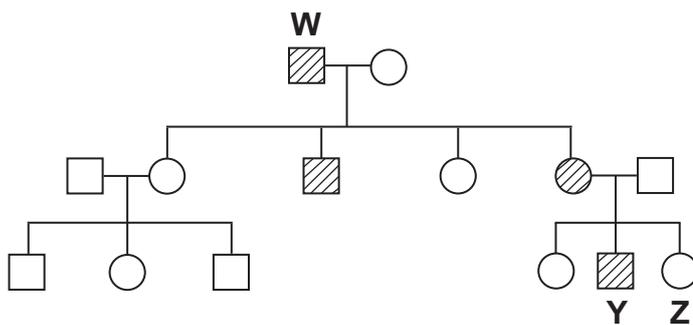


Offspring genotypes _____

Offspring phenotypes _____

[4]

(b) The pedigree diagram below shows the inheritance of Huntington's disease in a particular family.



Key

- normal male
- normal female
- male with Huntington's disease
- female with Huntington's disease

(i) What is the relationship of individual Y to W?

[1]

(ii) What is the genotype of individual Z? Explain your answer.

Genotype _____

Explanation _____

_____ [2]

(c) Huntington's disease leads to a gradual breakdown of the nervous system in middle age. There is no cure at present. It is possible to have a test to show if an individual will develop the disease.

(i) What general name is given to the process of testing for the possibility of developing inherited diseases?

_____ [1]

(ii) Write down **one** reason why an 18 year old male, whose mother is starting to develop Huntington's disease, would decide **not** to have the test to show if he will develop the disease.

_____ [1]

(d) Some genetic diseases (e.g. cystic fibrosis) can be treated by gene therapy. Describe what gene therapy is and write down **one** reason why its effect as a treatment is limited.

_____ [3]

THIS IS THE END OF THE QUESTION PAPER

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| Marks | Remark |
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