



General Certificate of Secondary Education  
2016–2017

Centre Number

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Candidate Number

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# Science: Single Award

Unit 1 (Biology)  
Higher Tier



[GSS12]

**WEDNESDAY 9 NOVEMBER 2016, MORNING**

## TIME

1 hour 15 minutes.

## 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 ten** 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 Questions **2** and **9**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
<b>Total Marks</b>	

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1 (a) Fiona wanted to compare the amount of sugar in chocolate and an onion. Both chocolate and onion contain a lot of sugar. She added equal amounts of white chocolate and onion to separate boiling tubes containing Benedict's reagent. Fiona then placed the boiling tubes in a beaker containing very hot water and waited for the blue Benedict's reagent to turn red.

(i) Suggest why Fiona used white chocolate rather than dark brown chocolate, when testing with Benedict's reagent.

\_\_\_\_\_  
\_\_\_\_\_ [1]

(ii) To find out which had the most sugar, Fiona had to constantly check the colour in the boiling tubes. Suggest why she had to continually check the colour change rather than wait until they had both reached their final colour.

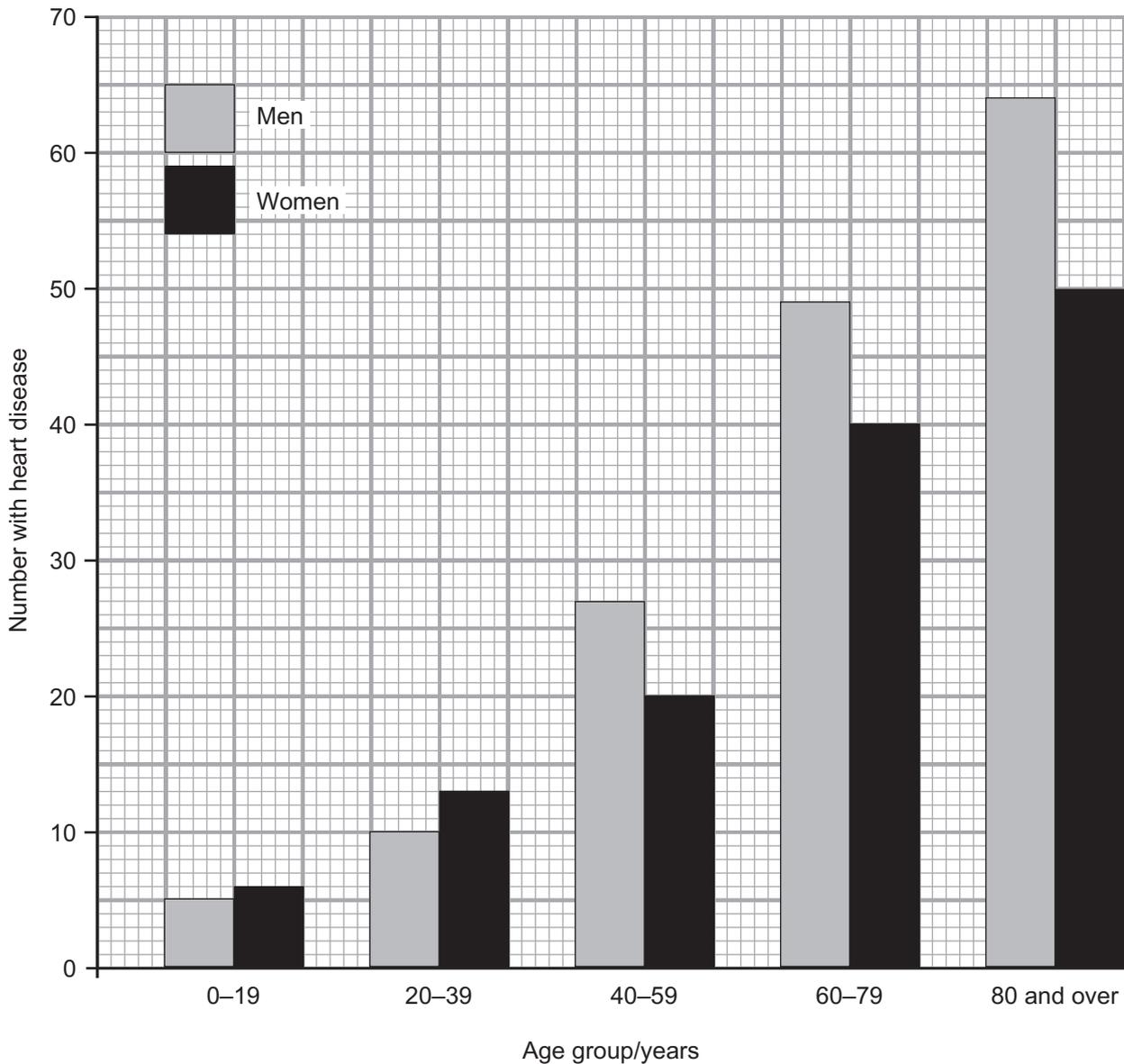
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

(iii) Suggest **one** reason why Fiona placed the two boiling tubes in the same beaker rather than using two separate beakers.

\_\_\_\_\_  
\_\_\_\_\_ [1]

Examiner Only	
Marks	Remark

- (b) Taking too much sugar in the diet can lead to obesity and eventually heart disease. The bar chart below shows the number of men and women with heart disease in different age groups in one hospital.



- (i) Give **one** trend shown by this information.

\_\_\_\_\_

\_\_\_\_\_ [1]

Examiner Only	
Marks	Remark

(ii) Apart from smoking and obesity, give **two** other risk factors for heart disease.

1. \_\_\_\_\_

2. \_\_\_\_\_ [2]

(iii) Complete the sentence below.

These risk factors may also lead to a blockage of blood vessels in

the brain resulting in a \_\_\_\_\_. [1]

Examiner Only	
Marks	Remark



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**(Questions continue overleaf)**

- 3 (a) The growing of willow as a biofuel is encouraged by many conservation groups. It can take four years for willow to grow to a suitable size before it can be used.

The table below shows some information about the growth of willow plants over the four year cycle.

Year	Average mass of each plant/kg	Average carbon dioxide taken in per plant/ arbitrary units	Average carbon dioxide given out per plant/ arbitrary units
1	4.4	5	2
2	12.7	20	9
3	20.4	37	16
4	28.3	55	24
		<b>Total 117</b>	<b>Total 51</b>

Two processes in plants involve the exchange of carbon dioxide. One process takes in and uses carbon dioxide; the other produces carbon dioxide which is given out by the plant.

- (i) Name the process in plants that:

1. uses carbon dioxide

\_\_\_\_\_

2. produces carbon dioxide

\_\_\_\_\_

[2]

Examiner Only

Marks Remark



- (b) One effect of global warming is that the Arctic icecap is decreasing in area. It is now less than 15 million km<sup>2</sup> which is the lowest since satellite records began in 1979. The ice is also up to 60% thinner than it was in 1979.



© Thomas Nilsen / Science Photo Library

Adult polar bears are large, heavy animals with white fur. They are good swimmers but hunt seals on the ice. The seals are at risk when they come out of the water onto the ice.

Using **only** the information provided, answer parts (i) and (ii) below.

- (i) Describe and explain **one** way in which polar bears are adapted for their environment.

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[2]

- (ii) Suggest **one** way in which global warming is harming the polar bears.

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[1]

Examiner Only

Marks Remark

(c) (i) Suggest **one** way in which satellite imaging has increased the reliability of data about the effects of global warming on the Arctic icecap.

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[1]

(ii) Suggest why it is important to have reliable data about the effects of global warming.

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[1]

Examiner Only	
Marks	Remark

4 Infectious diseases can result in epidemics.

(a) Define the term 'epidemic'.

\_\_\_\_\_ [1]  
\_\_\_\_\_

(b) Epidemics are most likely to occur when a certain set of circumstances are in place.

**Circle** the statements below that could lead to an epidemic.

**there is an effective vaccination programme for the disease**

**the bacteria causing the disease are resistant to antibiotics**

**the countries involved have good medical and healthcare systems**

**the bacteria causing the disease are not resistant to antibiotics**

**there is no vaccination for the disease**

[2]

(c) One way the body can defend itself against bacteria is the process of phagocytosis. Describe this process.

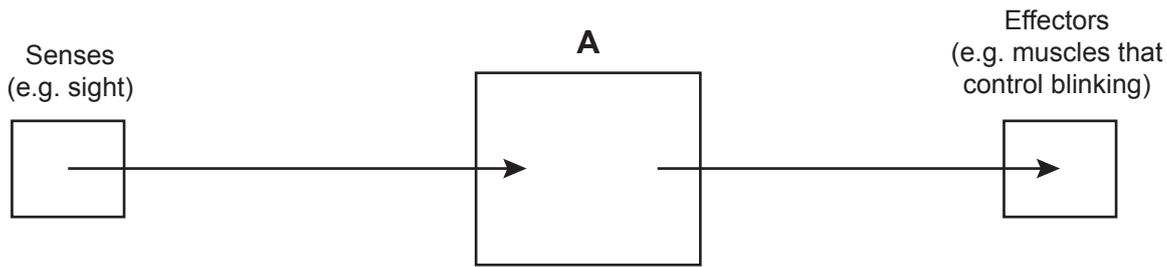
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

Examiner Only

Marks Remark

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- 5 (a) The diagram below represents the pathway of reflex actions in the body.



Use the information and your knowledge to answer the following questions.

- (i) Name the part of the body represented by **A** in the diagram.

\_\_\_\_\_ [1]

- (ii) Suggest what the arrows in the diagram represent.

\_\_\_\_\_  
 \_\_\_\_\_ [1]

- (b) Describe and explain **one** difference between reflex and voluntary actions.

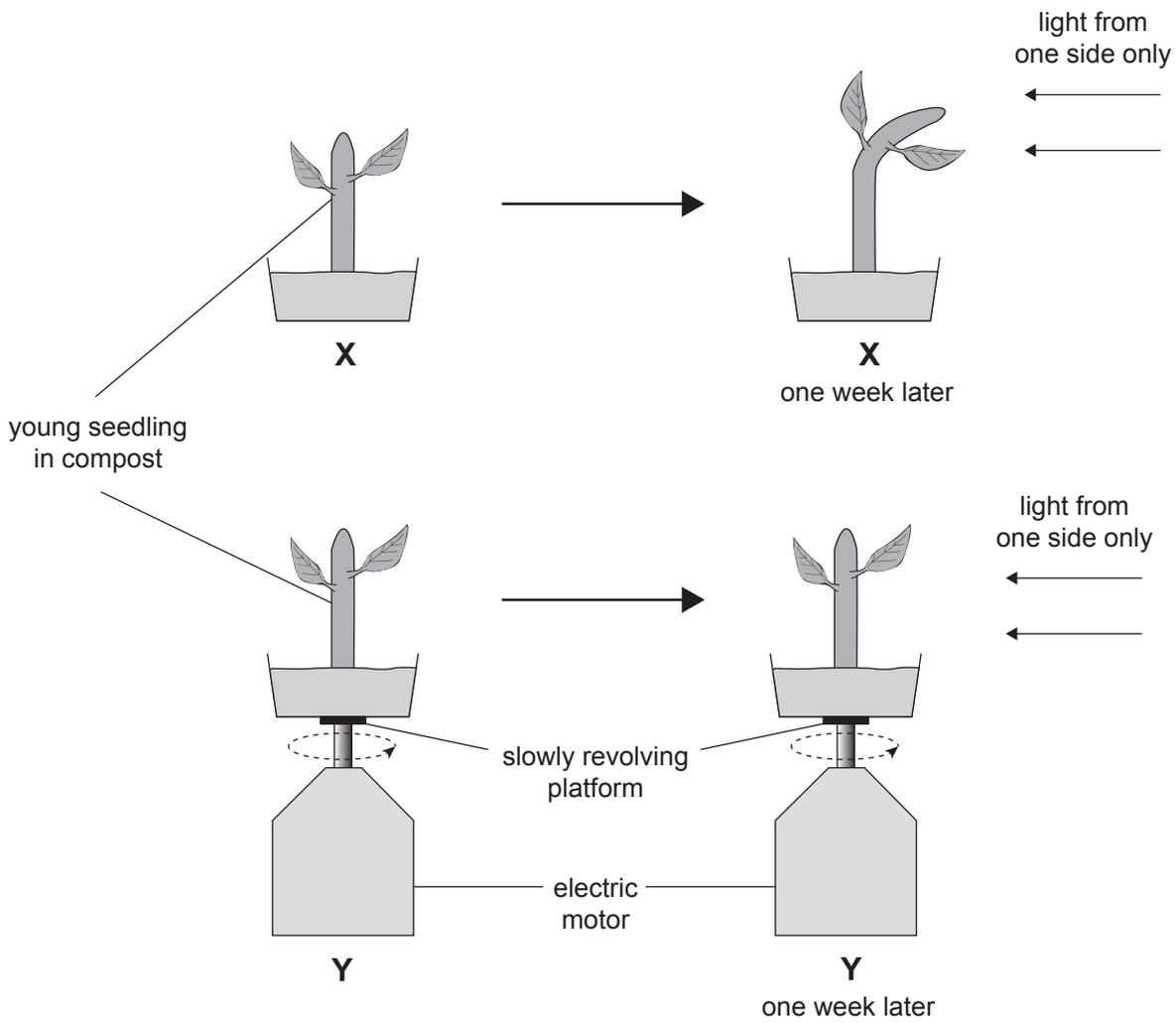
Difference \_\_\_\_\_

Explanation \_\_\_\_\_

\_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

(c) Phototropism in plants is a response to environmental change. The diagram below shows an investigation into phototropism.



© Chief Examiner

Explain the results for seedling Y.

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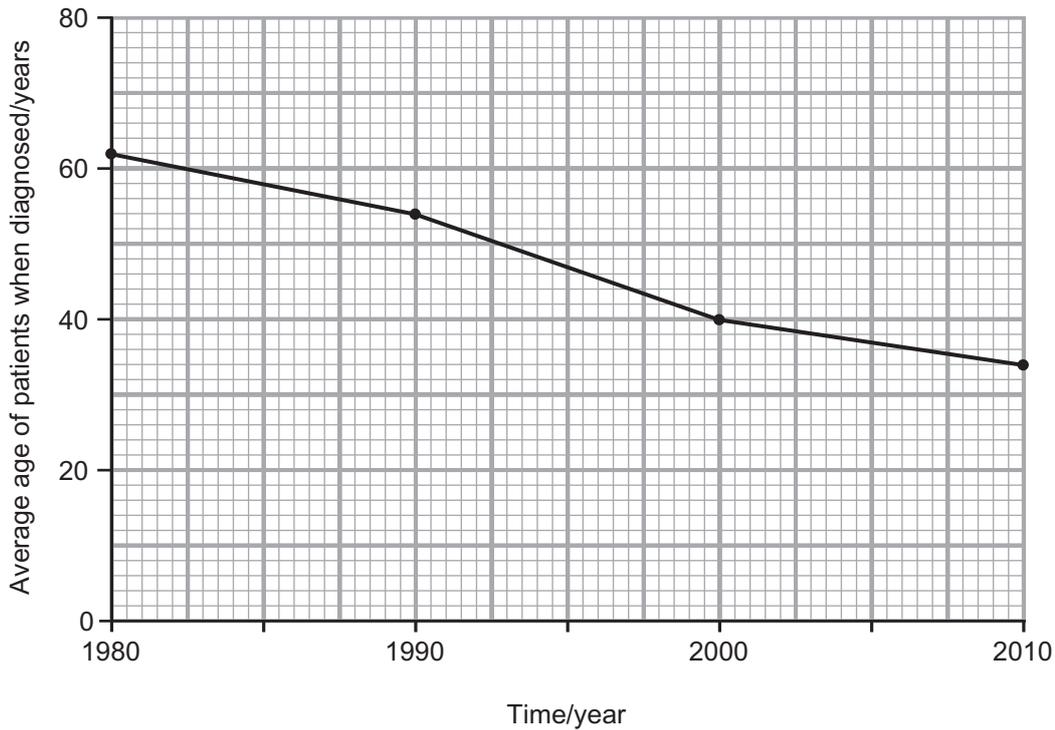


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[2]

Examiner Only	
Marks	Remark

- 6 (a) The graph below shows the average age when patients were diagnosed with Type 2 diabetes between 1980 and 2010.



- (i) Describe the trend shown by this information.

\_\_\_\_\_ [1]  
\_\_\_\_\_

- (ii) Suggest **two** reasons that could account for this trend.

1. \_\_\_\_\_  
\_\_\_\_\_  
2. \_\_\_\_\_  
\_\_\_\_\_ [2]

Examiner Only	
Marks	Remark



- 7 (a) The diagram below shows how energy flows through a food chain in a garden.

garden plant → slug → thrush → bird of prey

- (i) Name the primary consumer in this food chain.

\_\_\_\_\_ [1]

- (ii) The gardener placed slug pellets around the plants. The pellets kill the slugs.  
Explain fully the effects this will have on the numbers of the other organisms in the food chain.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

- (b) Parts of plants not eaten by slugs naturally die and decay. When they decay their protein is converted into ammonia. Using your understanding of the nitrogen cycle, describe how the ammonia is converted back into a form of nitrogen that the plants can use.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

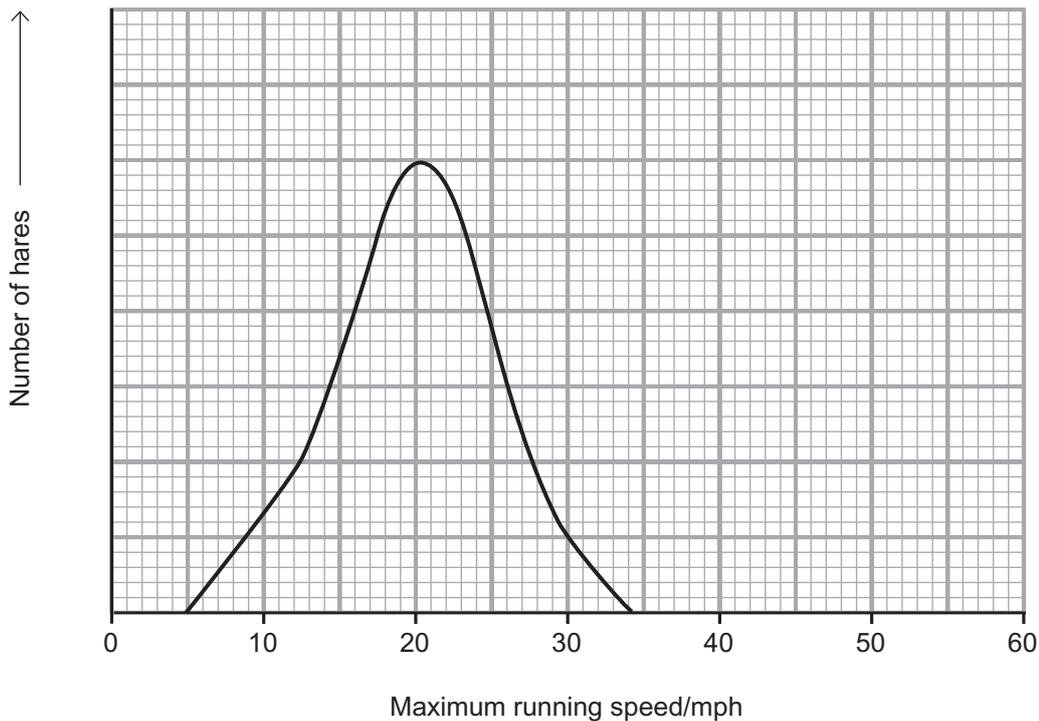
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Marks	Remark

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- 8 A small island off the coast of Northern Ireland has a large population of hares. Hares can live up to four or five years in the wild.

Hares can run very fast and this is important when helping them escape from predators.

In the year 2000 scientists recorded the maximum running speed of a large number of hares. This showed a wide range of values as shown in the graph below.



- (a) Name the type of variation shown by the graph. Explain your answer.

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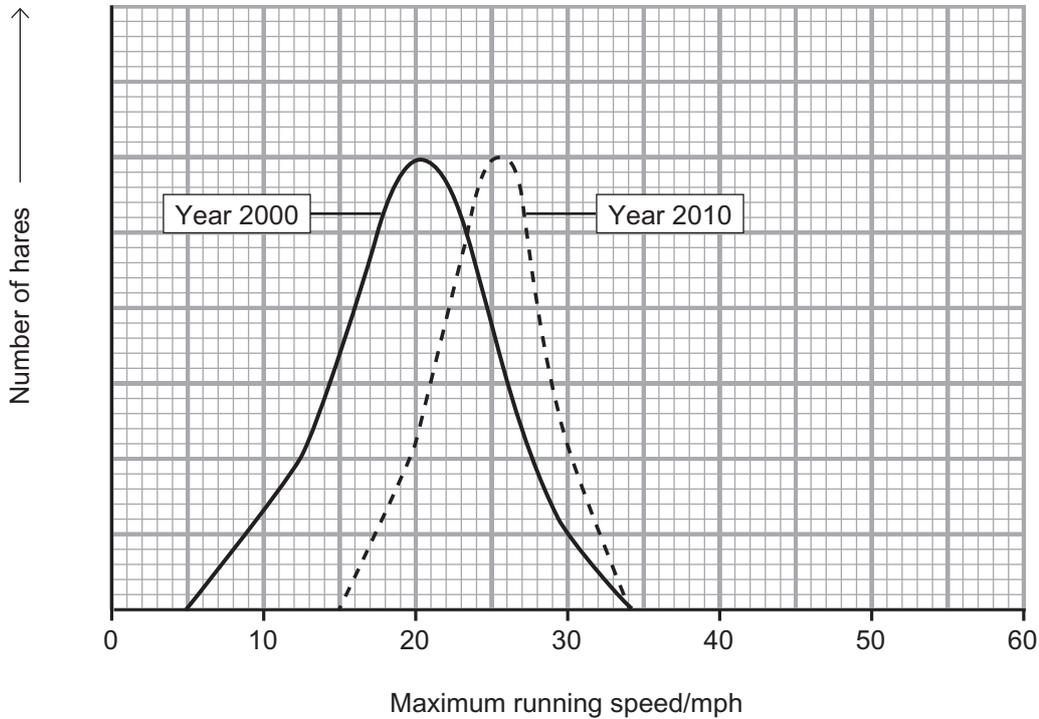
[2]

Examiner Only

Marks Remark

- (b) In 2001 some foxes got on to the island and they have remained there ever since. Foxes are one of the main predators of hares. The graph below shows how the maximum running speed of the hares changed in the ten years from 2000 to 2010. (The year 2000 values are also included.)

Examiner Only	
Marks	Remark



- (i) Describe the change in the maximum running speed of the hares between the years 2000 and 2010.

\_\_\_\_\_

\_\_\_\_\_ [1]

- (ii) Using your knowledge of natural selection, explain fully the change in the maximum running speed of the hares.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

(c) (i) Define the term 'evolution'.

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 [2]

(ii) Apart from religious reasons, give **one** reason why some people do not believe that the theory of evolution is true.

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 [1]

(d) Describe the process of 'peer review'.

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 [2]

Examiner Only	
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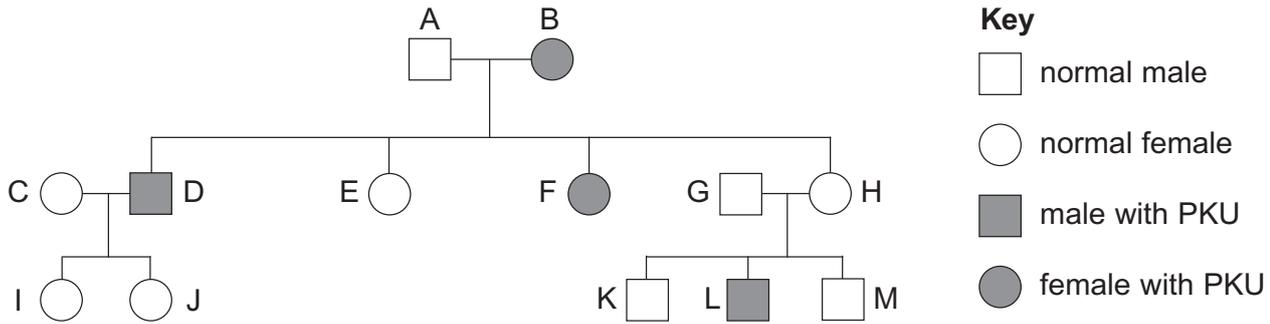
**10** Phenylketonuria (PKU) is an inherited condition that affects a small number of people. It is caused by a recessive allele. People with PKU are unable to reduce excess levels of a particular amino acid in the body.

**(a)** Name the food group which is broken down into amino acids.

\_\_\_\_\_

[1]

**(b)** The diagram below shows how PKU is inherited in a family.



**(i)** What is the relationship of person **G** to person **A**?

\_\_\_\_\_

[1]

**(ii)** How many daughters do **G** and **H** have?

\_\_\_\_\_

[1]

Examiner Only	
Marks	Remark

- (iii) Complete the Punnett square below to show how it is possible for person **G** and person **H** to have a child with PKU.

K = normal allele and k = PKU allele (recessive)


[3]

- (iv) What is the probability of **G** and **H** having a child with PKU?

\_\_\_\_\_

[1]

- (c) Other inherited diseases such as cystic fibrosis can be identified in the foetus.

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

\_\_\_\_\_

[1]

- (ii) Give **one** reason why not every parent is in favour of this type of testing.

\_\_\_\_\_

\_\_\_\_\_ [1]

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**THIS IS THE END OF THE QUESTION PAPER**

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