Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2017–2018

Science: Single Award

Unit 1 (Biology)

Higher Tier

ML

[GSS12]

TUESDAY 15 MAY 2018, AFTERNOON

TIME

1 hour 15 minutes, plus your additional time allowance.

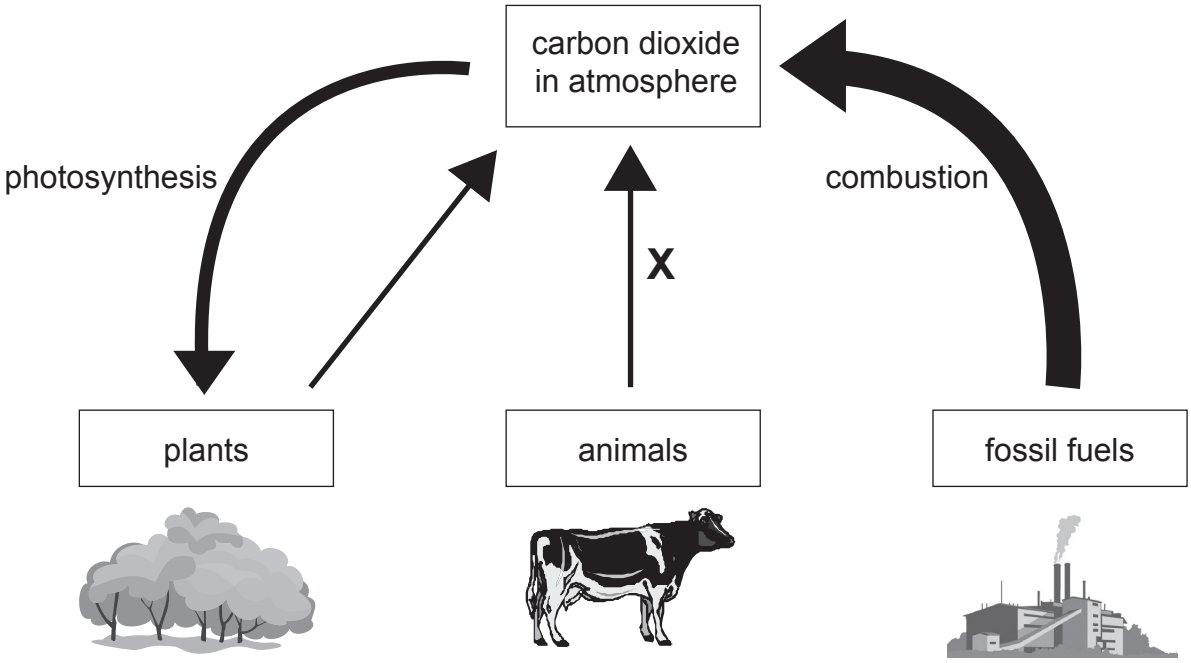
INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in black ink only. **Do not write with a gel pen.**
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 **4** and **10**.

1 Look at the diagram below. It shows how carbon dioxide enters and leaves the atmosphere. The arrows show the movement of carbon dioxide. The thicker the arrow the more carbon dioxide.



Source: CCEA

(a) Write down the name of the process labelled **X** on the diagram.

_____ [1]

(b) Write about and explain why the amount of carbon dioxide in the atmosphere is increasing.
Use the diagram to help you.

_____

_____

_____

_____ [2]

(c) The increasing amount of carbon dioxide in the atmosphere is leading to global warming.

(i) Write about and explain what **global warming** means.

_____

_____ [1]

(ii) Write down **one** effect of global warming.

_____ [1]

(d) When the Earth was first formed approximately 4.5 billion years ago, its atmosphere contained more carbon dioxide and less oxygen than today.

However, when green plants evolved the composition of the atmosphere began to change.

(i) What process takes place in green plants that helped change the amount of carbon dioxide and oxygen in the atmosphere and promoted the evolution of animals?

_____ [1]

(ii) How have the levels of carbon dioxide and oxygen in the atmosphere changed from the time green plants first evolved?

_____

_____

_____ [2]

[Turn over

2 Bees are important in the life cycle of plants. When a bee lands on a flower to feed on nectar, the pollen will stick to its body and the bee can carry the pollen to another flower. The pollen helps plants to produce seeds which will grow into new plants. This ensures good biodiversity.

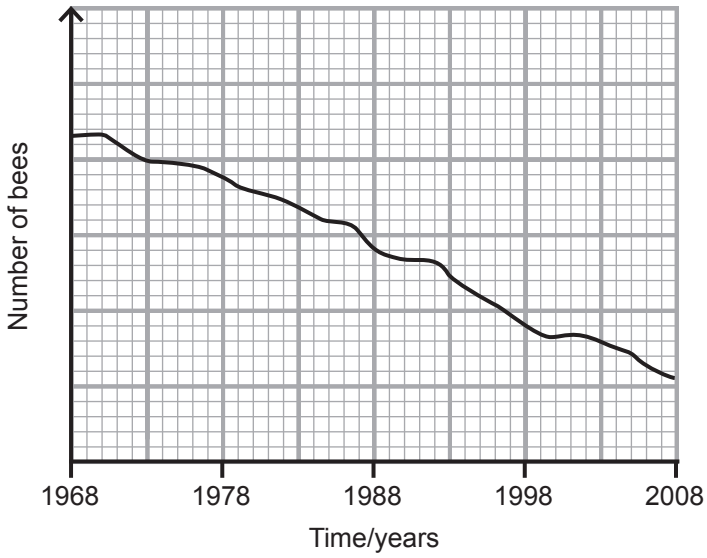
(a) What does **biodiversity** mean?

_____

_____ [1]

Graph **A** shows how the number of bees in Ireland has changed over a 40-year period.

Graph A



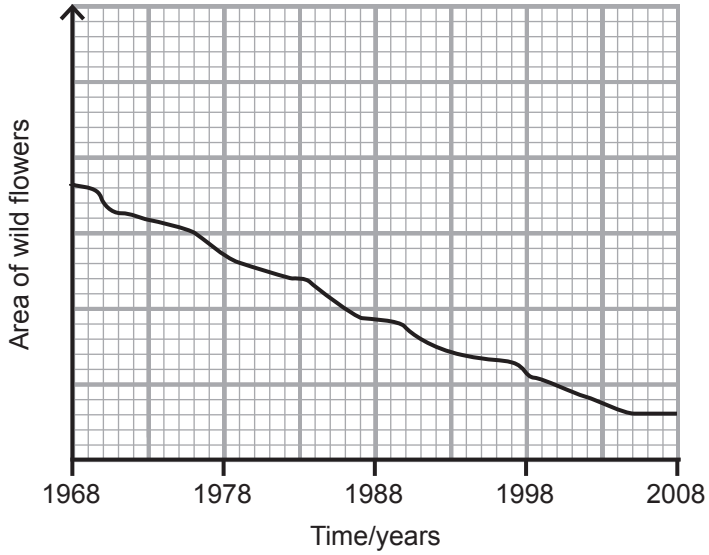
(b) Write about and describe the trend shown in this graph.

_____

_____ [1]

Graph **B** shows the area of wild flowers in Ireland over the same 40 year period.

Graph B



(c) Write about and explain the trend in the number of bees in Ireland.
Use information from the graphs (**A** and **B**) to help you.

_____

_____

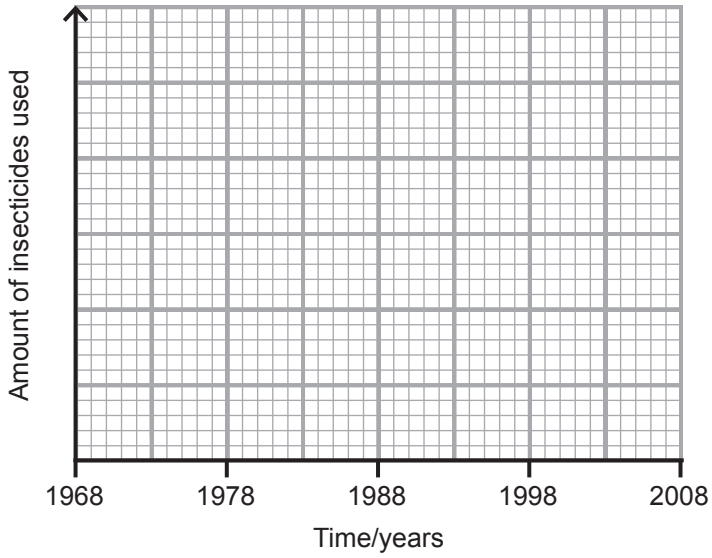
_____

_____ [2]

[Turn over

(d) Another reason for the trend shown in Graph **A** is the use of insecticides on plants. Insecticides will kill bees.

Use this information to draw a line on the grid below to show how the amount of insecticide used may have changed during the same 40-year period. [1]



(e) Write down **two** actions that could help increase the number of bees.

1. _____

_____

2. _____

_____ [2]

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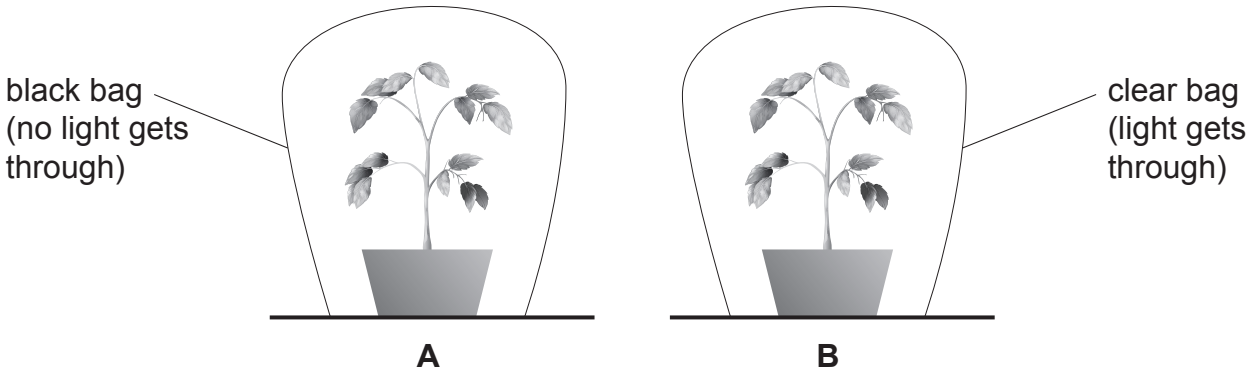
(Questions continue overleaf)

3 Photosynthesis is the process by which green plants use sunlight to make food which is stored as starch.

(a) The diagram below shows how an experiment to investigate if light is needed for photosynthesis could be set up.



Source: CCEA

Before the investigation was set up, both plant **A** and plant **B** were de-starched.

(i) Write about and describe how the plants could have been de-starched.

_____

_____ [1]

(ii) What does de-starching do to the plants in this experiment?

_____

_____ [1]

(iii) Write down **two** things needed to make the investigation a fair test.

1. _____

2. _____ [2]

(b) One leaf was taken from plant **A** and one leaf from plant **B**. Both leaves were tested for starch using iodine.

Describe and explain the results you would expect for leaf **B**.

_____

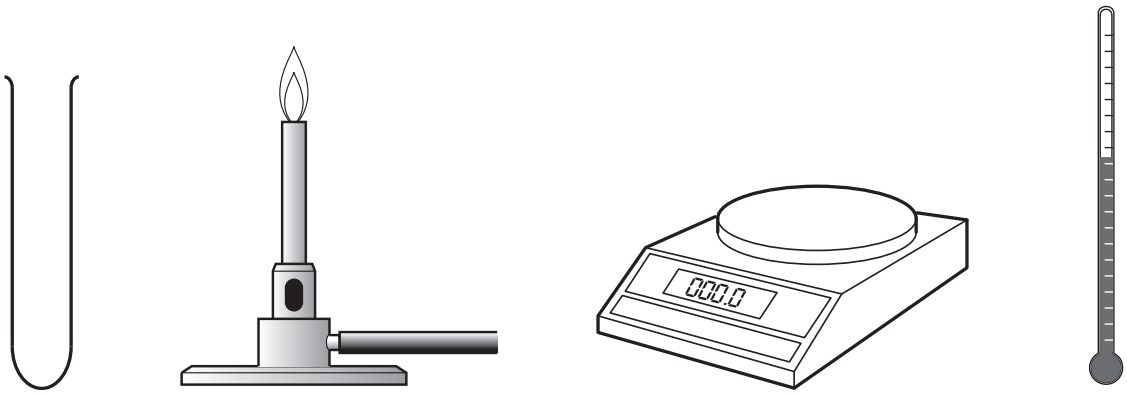
_____ [2]

[Turn over

4 Mary wants to find out whether pasta or potato has more energy.

Write about and describe an experiment to compare the amount of energy in these foods.

Some of the equipment Mary could use is shown below.



Source: CCEA

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

[Turn over

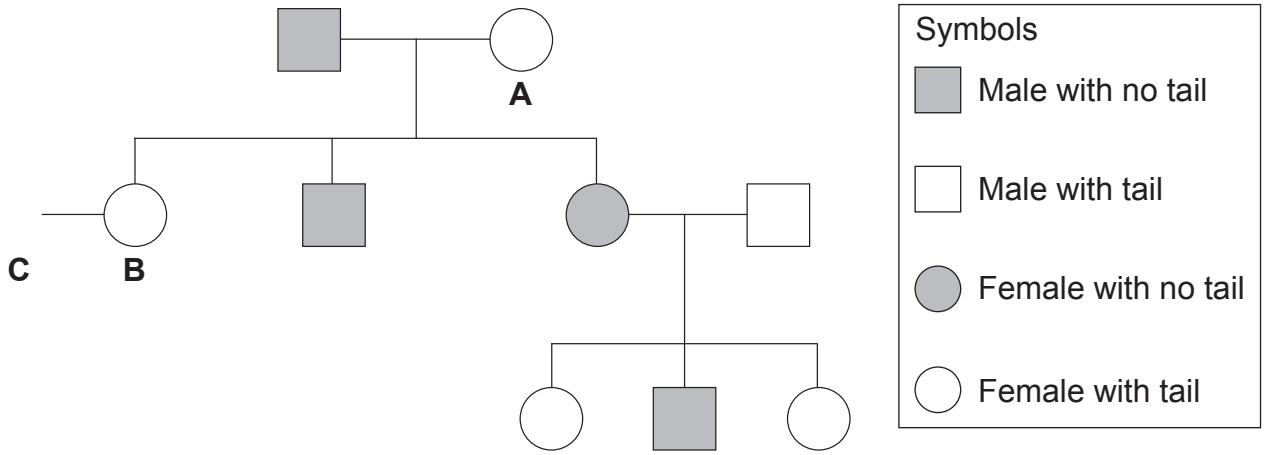
5 Shown below is a Manx cat. Some Manx cats have no tail.

© Aletakae / iStock / Thinkstock

The allele for no tail (T) is dominant to the allele for having a tail (t).
Manx cats with no tail have the genotype Tt.
Kittens with the genotype TT die in the uterus so there cannot be an adult cat with the genotype TT.

The following pedigree diagram shows inheritance of the tail/no tail trait in a family of cats.

The symbol for cat **C** is not shown.



(a) What relation is cat **A** to cat **B**?

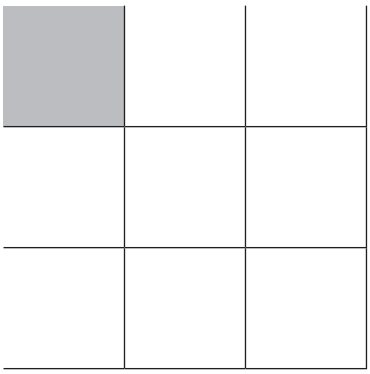
_____ [1]

(b) A cat breeder wants only cats with tails so breeds cat **B** with cat **C**.

In the space below, draw the symbol that must be used to represent cat **C**.

[1]

(c) Complete the Punnett square below to show the cross between cat **B** and cat **C**.



[2]

[Turn over

6 Every year over 41 000 people are diagnosed with bowel cancer in the UK.
A healthy diet and regular exercise are important in helping to prevent this disease.

(a) Write down the name of the food **type** that helps prevent bowel cancer.

_____ [1]

(b) The heart also benefits from regular exercise.

Describe and explain how exercise benefits the heart.

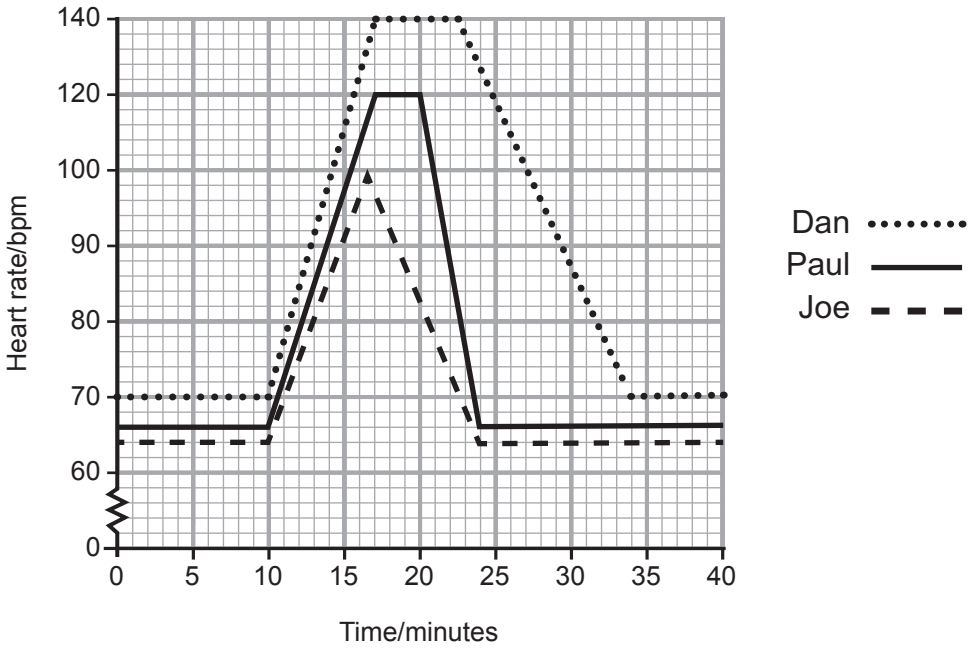
_____

_____

_____

_____ [3]

(c) Look at the graph below. It shows the heart rates for three boys before, during and after exercise.



(i) Calculate the maximum percentage increase in Dan's heart rate.

(Show your working out.)

Answer _____ % [2]

(ii) At what time do you think exercise stopped?

Answer _____ minutes [1]

(iii) Using the graph, name the boy who is fittest. Write down **one** piece of evidence to support your choice.

Name _____

Evidence _____

_____ [2]

[Turn over

7 The hormone system helps our body respond to the world around us.

(a) Write down and explain what the word hormone means.

_____

_____ [2]

(b) Insulin is an example of a hormone. Write about and describe the function of insulin in the body.

_____

_____

_____

_____ [3]

(c) People who do not produce insulin suffer from Type 1 diabetes.
The table below shows possible blood glucose levels for people with Type 1 diabetes and people without diabetes.

	Blood glucose levels m mol/L	
	Before meal	**90 mins after meal**
Without diabetes	4.0 to 5.9	Under 7.8
With Type 1 diabetes	4.0 to 7.0	5.0 to 9.0

Mary and Jane both have Type 1 diabetes and are worried about their blood glucose levels.

(i) Mary and Jane checked their blood glucose levels before eating lunch. Mary's was 4.0 and Jane's was 4.1. In what way, if any, could these readings change immediately after eating lunch?

_____ [1]

(ii) Ninety minutes after eating lunch, Jane's blood glucose level was 15.0 and Mary's was 6.2. Write about why the readings were so different.

_____

_____

_____

_____ [2]

[Turn over

8 Farmers add fertilisers rich in nitrates to their land to increase the crop yield. In 1991 the Nitrate Directive was introduced to try to reduce water pollution caused by nitrates.

(a) Write down **two** ways a farmer can reduce the risk of nitrates entering water.

1. _____

2. _____ [2]

Once nitrates get into a lake there is an increase in the growth of water plants. Eventually, due to competition for light and space, many of these plants will die.

(b) Describe and explain what effect, if any, this has on animals in the lake. Refer to the nitrogen cycle in your answer.

_____

_____

_____

_____

_____ [3]

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(Questions continue overleaf)

(c) Pollution levels in rivers are classified into three groups: unpolluted, moderately polluted or seriously polluted.
Some rivers in the South-East region of Ireland were sampled to test water pollution levels.
The table below shows the percentage (%) of water samples from rivers in each of the three groups over a period of thirty years.

Year	Unpolluted/%	Moderately polluted/%	Seriously polluted/%
1980	77.0	11.2	11.8
1985	77.5	15.0	7.5
1990	72.0	17.8	10.2
1995	69.0	22.7	8.3
2000	68.0	23.2	8.8
2005	72.0	21.5	6.5
2010	68.5	25.1	6.4

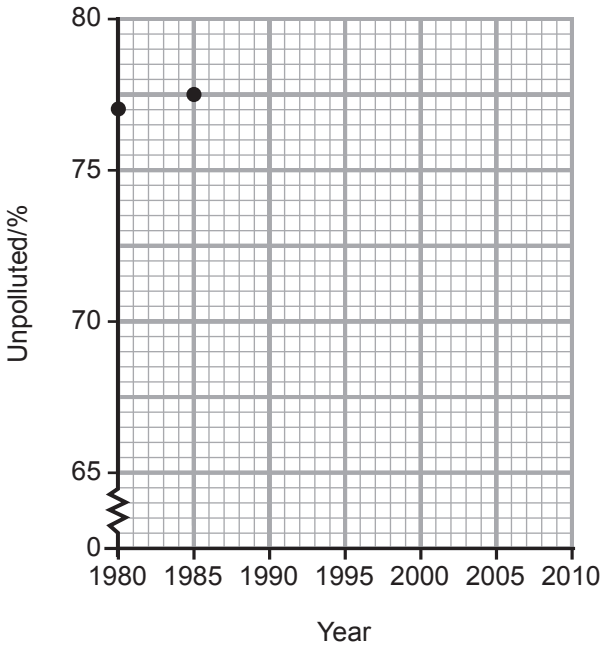
Integrated Water Quality Report 2011 – South East Ireland – Appendices.
Published 2012. © Environmental Protection Agency

(i) State the **overall** trend in the number of seriously polluted rivers.

_____

_____ [1]

(ii) Complete the **line** graph below to show the results for the unpolluted samples.



[3]

(iii) Scientists disagree about the effectiveness of the Nitrate Directive that was introduced in 1991.
Using evidence from the table, write down **one** argument that shows the Nitrate Directive is effective and **one** argument that shows the Nitrate Directive is not effective.

Effective: _____

_____

Not effective: _____

_____ [3]

[Turn over

9 **(a)** Cancer in humans is caused by mutations in cells.

(i) Write about and explain what the word mutation means.

_____

_____

_____ [2]

(ii) Write down and describe why too much sun-bathing can cause skin cancer.

_____

_____ [2]

(b) Mutations can also cause new beneficial features that make an organism better adapted to its environment. For example, succulent plants, such as a cactus, can absorb and store large quantities of water. This enables them to survive in very dry conditions when other plants would die.

(i) Write about and explain why there are large numbers of succulent plant species in very dry desert areas.
Use the theory of **natural selection** in your answer.

_____

_____

_____

_____

_____ [3]

(ii) Over millions of years of natural selection, species can change.
Write the name of the theory that describes changes in species over time and the scientist who developed this theory.

Theory: _____

Scientist: _____ [2]

10 Describe how DNA can code for protein, and explain why so many different proteins can be made and found in a cell.

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

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For Examiner's use only	
Question Number	Marks
1	
2	
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Total Marks	

Examiner Number