



General Certificate of Secondary Education  
2015–2016

Centre Number

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Candidate Number

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# Science: Single Award

Unit 1 (Biology)  
Higher Tier



[GSS12]

**WEDNESDAY 11 NOVEMBER 2015, 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 eleven** 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 **11**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
<b>Total Marks</b>	



A red flowered plant and a white flowered plant were bred together. There were four offspring produced; two that produced red flowers and two that produced white flowers.

- (ii) Complete the Punnett square to show the gametes of the parent plants and the genotypes of the offspring plants.

		red flowered plant	
		R	
white flowered plant		Rr	
	r		

[3]

- (c) Another type of plant can produce many different colours of flower between red and white. For example, dark red, light red, pink and white.

Name this type of variation. Explain your answer.

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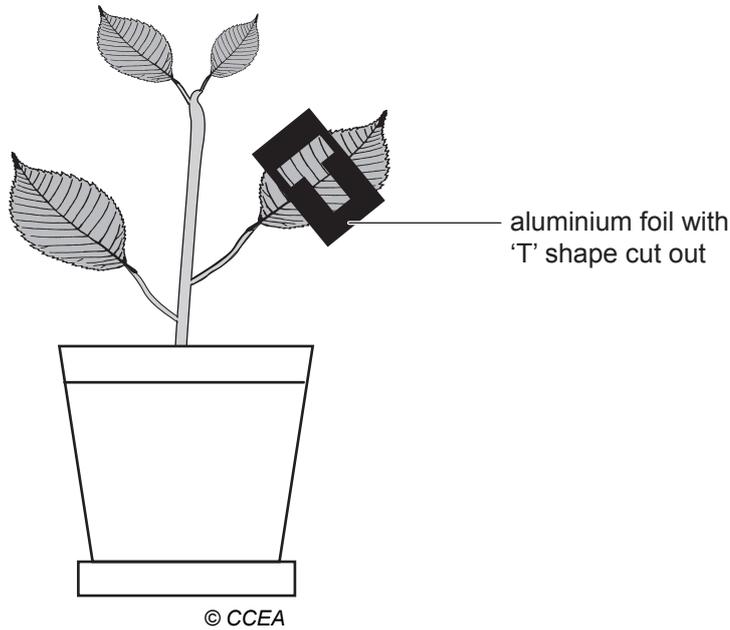
[2]

Examiner Only	
Marks	Remark



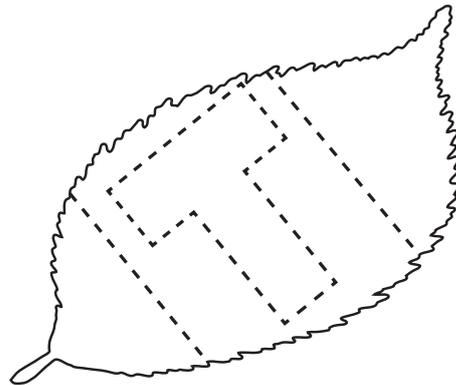
3 Photosynthesis is a light-requiring process that takes place in plants.

In a photosynthesis investigation a leaf of a plant was partly covered with aluminium foil and placed in bright light.



After five days in bright light the aluminium foil was removed and the leaf tested for starch.

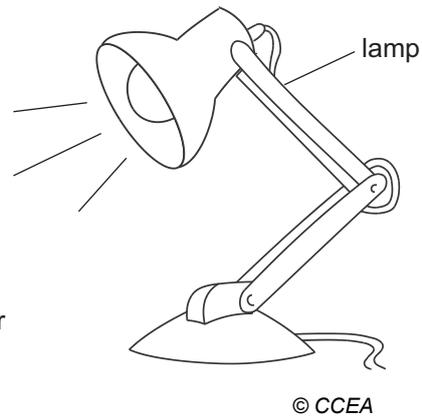
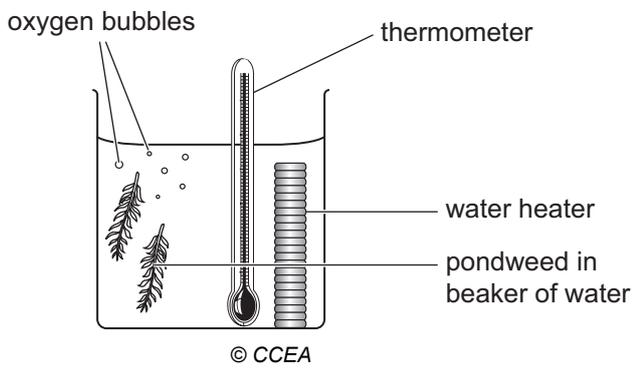
(a) Using the outline of the leaf below, shade **all** the parts where you would expect to find starch.



[1]

Examiner Only	
Marks	Remark

- (b) In another investigation, the effects of light intensity and temperature on photosynthesis were analysed. The apparatus used is shown in the diagram below.



- (i) Suggest **one** way the light intensity could be changed.

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

- (ii) Suggest why it is important to have a thermometer in the beaker when investigating the effect of light intensity.

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

Examiner Only	
Marks	Remark

The results of the investigation are shown in the table below.

Temperature/°C \ Light intensity	Number of oxygen bubbles per minute		
	Low	Medium	High
10	3	5	12
15	5	10	22
20	8	12	30

(iii) Describe and explain the effect of **light intensity** on the number of oxygen bubbles produced.

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[3]

(iv) Apart from the effect of light intensity, state **one** other trend shown by these results.

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[1]

(c) Palisade cells form a layer of leaf cells, highly adapted for photosynthesis. Each cell contains chloroplasts rich in chlorophyll (the pigment that traps light).

Describe and explain how the palisade layer benefits the plant's ability to photosynthesise.

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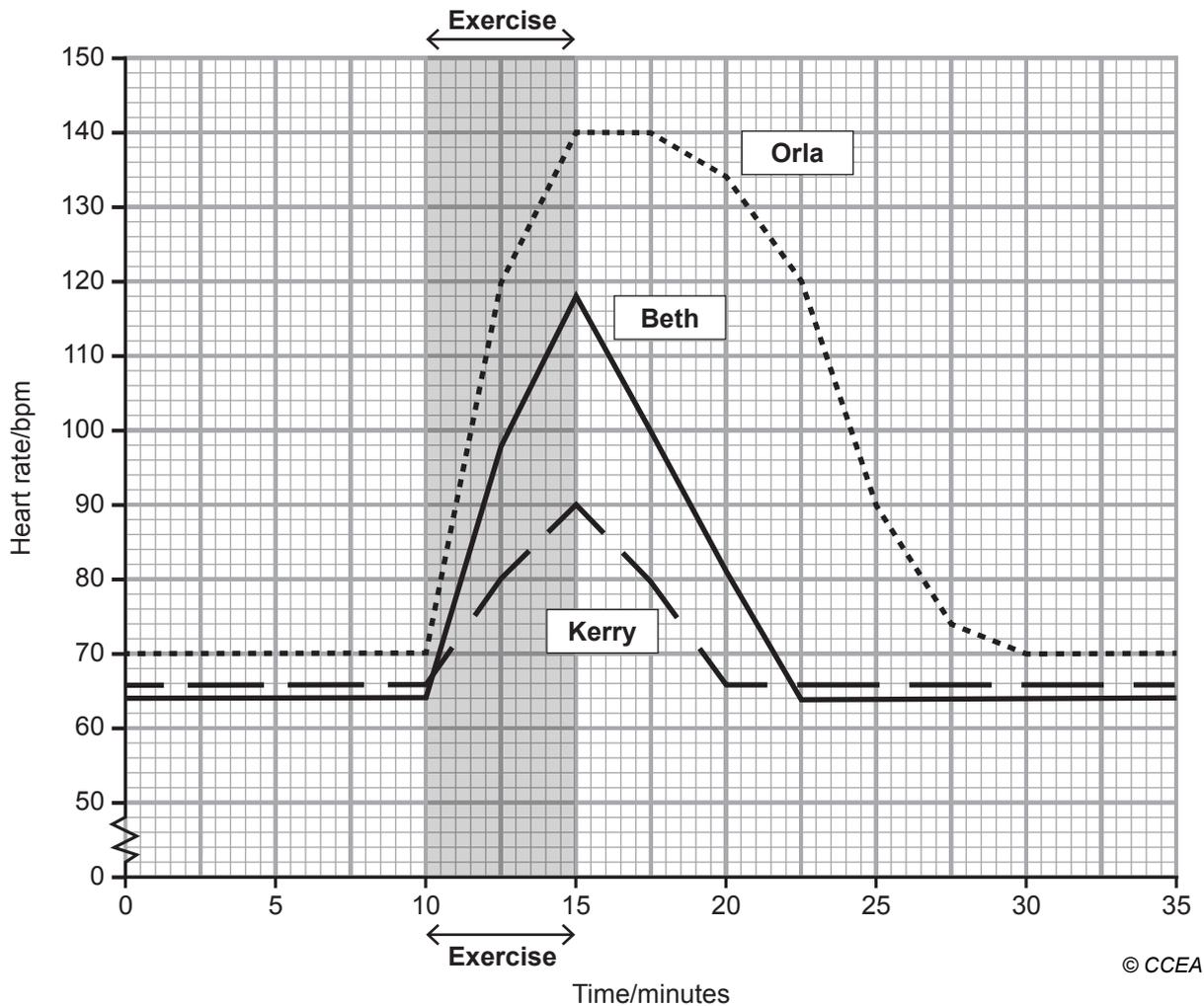
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[2]

Examiner Only

Marks Remark

4 (a) The graph below shows the effect of exercise on the heart rates of three girls.



© CCEA

(i) Calculate the maximum increase in **Orla's** heart rate during exercise.

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

(ii) Calculate the percentage increase in **Orla's** heart rate during exercise.

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

(iii) Using the graph, name the girl who is the fittest. Explain your answer giving **one** piece of evidence.

Name \_\_\_\_\_

Explanation \_\_\_\_\_

\_\_\_\_\_

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

Examiner Only	
Marks	Remark

(b) Exercise helps prevent heart disease.  
Describe and explain how heart disease can affect the wider family.

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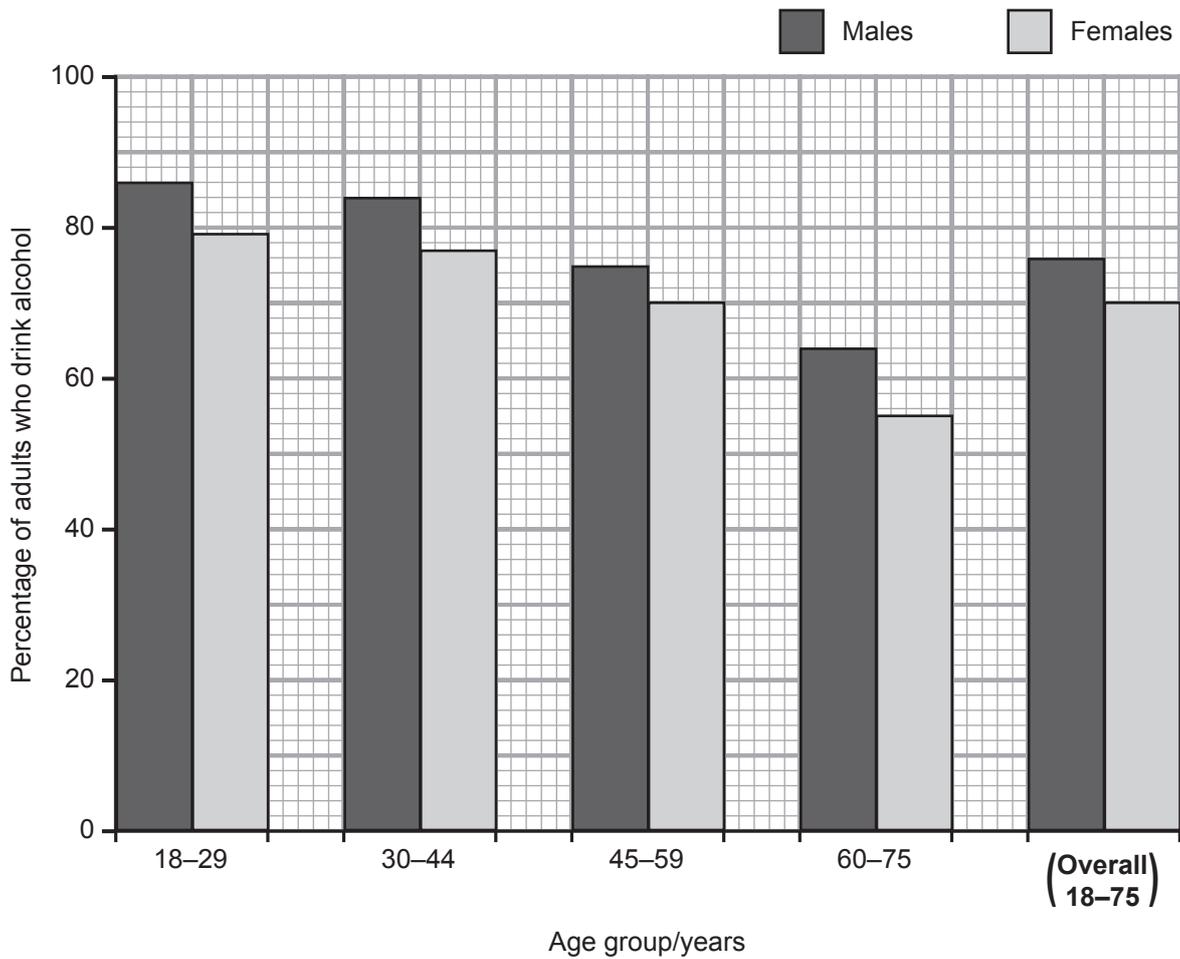
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[2]

Examiner Only	
Marks	Remark

- 5 (a) The graph below shows the percentage of adults who drink alcohol in different age groups in Northern Ireland. The data was collected in 2013.



© Crown Copyright 2010/ Adapted from Adult drinking patterns survey in Northern Ireland 2013

Give **two** trends shown by this data.

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

\_\_\_\_\_

2. \_\_\_\_\_

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

Examiner Only	
Marks	Remark



6 (a) New medicines and medical drugs in development have to pass through a number of stages before they can be prescribed to the public. These stages are *in vitro* testing, animal testing, clinical trials and licensing.

(i) Suggest **two** reasons why *in vitro* testing is very expensive.

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

\_\_\_\_\_

2. \_\_\_\_\_

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

(ii) Give **two** reasons for using animals in drug testing.

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

\_\_\_\_\_

2. \_\_\_\_\_

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

(iii) Explain the term 'clinical trial' and give **one** reason for carrying out clinical trials.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

Examiner Only

Marks

Remark

(b) The growing of genetically modified (GM) crops is also subject to licensing.

(i) Describe fully the term 'genetically modified'.

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

(ii) Give **two** advantages of growing GM crops.

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

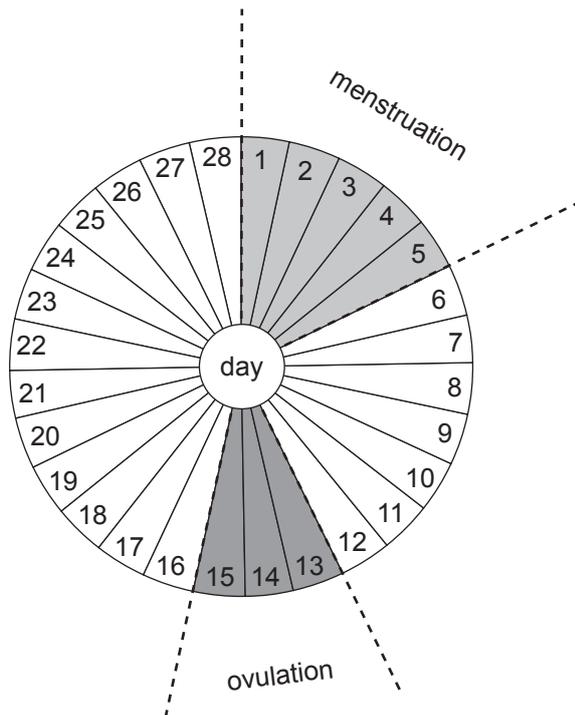
(iii) Give **one** reason why many people are opposed to growing GM crops.

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

Examiner Only

Marks Remark

7 (a) The diagram below shows the menstrual cycle.



© GCSE Science Single Award for CCEA Foundation and Higher Tier by James Napier, Alyn McFarland and Roy White. Hodder Education (2013). ISBN: 9781444195729. Reproduced by permission of Hodder Education.

(i) Name **one** hormone important in stimulating ovulation.

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

(ii) Describe **one** change that would happen in the uterus between day six and day twelve.

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

(iii) Name, in order, the four parts of the female reproductive system that sperm must pass through to fertilise an egg.

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

(b) Explain what causes menstruation to occur after twenty-eight days.

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

Examiner Only

Marks Remark

8 DNA is the core component of genes and chromosomes.

(a) In terms of bases, explain what is meant by the 'unique nature of an individual's DNA'.

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

(b) Explain what is meant by the 'base triplet hypothesis.'

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

(c) Complete the table below describing how the structure of DNA was worked out.

Scientist(s)	Discovery
	Quantitative analysis of bases
Franklin and Wilkins	
Watson and Crick	

[3]

Examiner Only	
Marks	Remark

- 9 Wild garlic is a common plant in many of our woodlands. It is native to Britain and Ireland and is a successful competitor as shown in the photograph below.



Wild garlic covering woodland floor

Source: Chief Examiner

Wild garlic is able to reproduce both sexually and asexually.

- (a) Use the information provided and your knowledge to answer the questions below.

- (i) Explain why wild garlic is **not** described as a 'competitive invasive species'.

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

- (ii) Suggest **one** reason why wild garlic is a successful competitor.

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

- (iii) Suggest the effect, if any, wild garlic has on woodland biodiversity.

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

Examiner Only	
Marks	Remark

Wild garlic plants contain high levels of protein. In woodland habitats it is important that this protein is recycled and converted back to nitrates in the soil.

**(b)** Using your knowledge of the nitrogen cycle, describe how the protein in wild garlic eventually becomes nitrate in soil.

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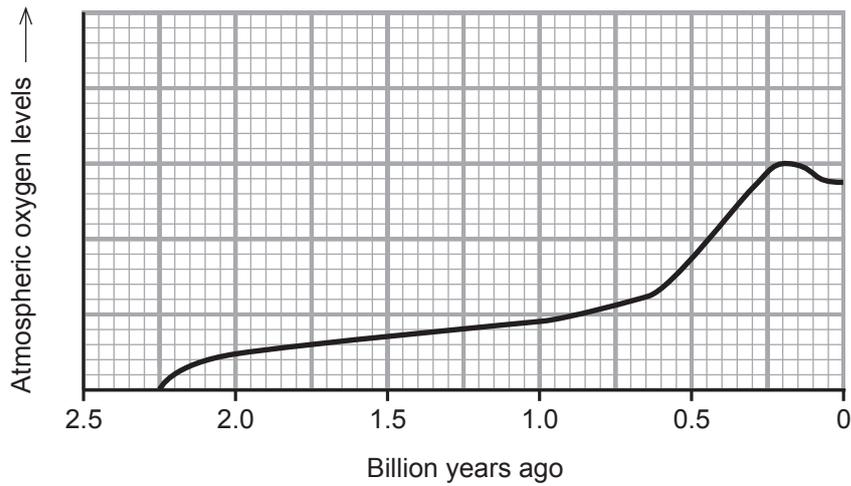
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[3]

Examiner Only	
Marks	Remark



- (c) The graph below shows how the atmospheric oxygen levels have changed over time.



Winged insects have high energy requirements when in flight. Using the information provided, suggest why the number of species of winged insects rapidly increased around about 0.3 billion years ago.

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[2]

Examiner Only	
Marks	Remark



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

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