



Rewarding Learning

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 24 FEBRUARY 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 **4** and **10(c)**.

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

- 1 (a) The table below shows information about different sources used to produce electricity in the United Kingdom.

	Electricity produced/%	Cost to customer per unit of electricity/pence	Carbon dioxide produced
coal	22.2	2.5	Yes
gas	23.8	3.1	Yes
wind	5.2	5.5	No
wave	1.2	6.8	No

Electricity produced - © Crown Copyright <https://www.gov.uk/government/statistics/electricity-section-5-energy-trends>.  
 Cost - Copyright © 2005 The Telegraph & The Royal Academy of Engineering, 26 March 2005.

Carbon dioxide is a greenhouse gas. Increasing levels of carbon dioxide are being linked to global warming.

- (i) Suggest why the UK government wants to produce more electricity from wind and wave sources. Explain why customers might disagree.

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\_\_\_\_\_

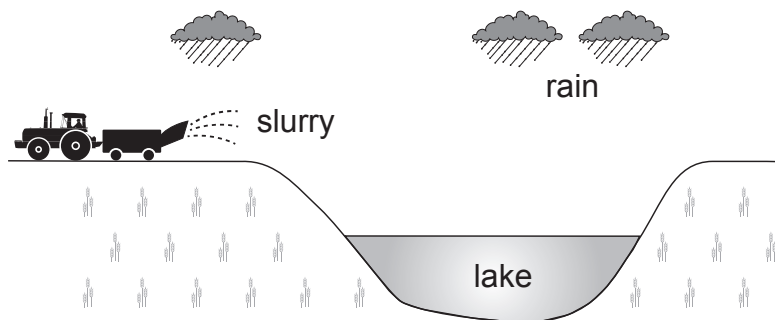
\_\_\_\_\_ [2]

- (ii) Apart from a rise in temperature, state **one** effect of global warming.

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

Examiner Only	
Marks	Remark

(b) The diagram below shows slurry being spread onto farmland.



Source: CCEA

(i) Using the diagram and your knowledge give **two** reasons why the lake is at risk of pollution due to the slurry.

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

The table below gives some information about this lake from 2006 to 2010.

	2006	2007	2008	2009	2010
<b>level of nitrates</b>	very high	high	moderate	low	very low
<b>oxygen in water/mg/l</b>	3	5	8	10	12
<b>number of species of fish in the lake</b>	6	8	10	20	26
<b>level of bacteria</b>	very high	high	moderate	low	very low

Use the information in the table to answer the questions below.

(ii) Explain why the oxygen level has increased between 2006 and 2010.

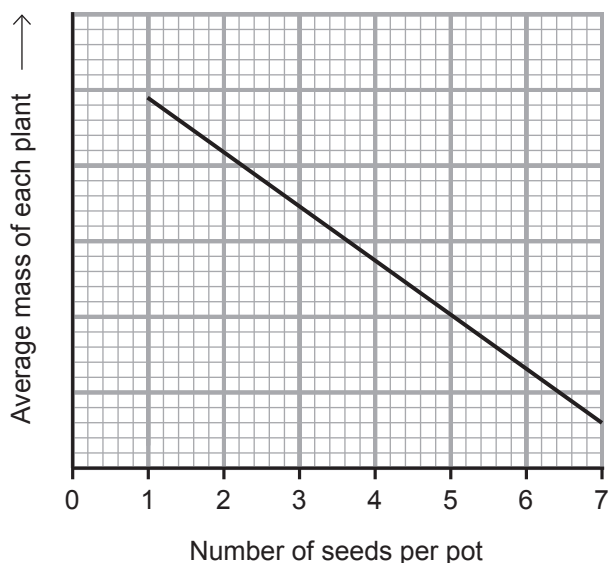
- \_\_\_\_\_
- \_\_\_\_\_ [1]

(iii) Give **one** effect of this increase in oxygen.

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

Examiner Only	
Marks	Remark

- 2 The graph below shows the results of an investigation into the effect of the number of seeds per pot on the average mass of each plant.



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- (a) Describe and explain these results.

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[2]

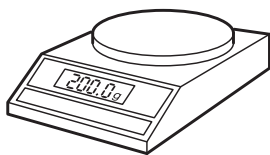
Examiner Only	
Marks	Remark

(b) The equipment used to obtain these results is shown below.



plant pot(s)  
with compost

© Chimpinski / iStock / Thinkstock



balance

© CCEA



flower seeds

© cole matt / iStock / Thinkstock



watering can

© Creative\_Outlet / iStock / Thinkstock

Examiner Only	
Marks	Remark

(i) Describe fully how this equipment could be used to carry out the investigation.

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[3]

(ii) Give **two** things that need to be done to give valid results (fair test) in this investigation.

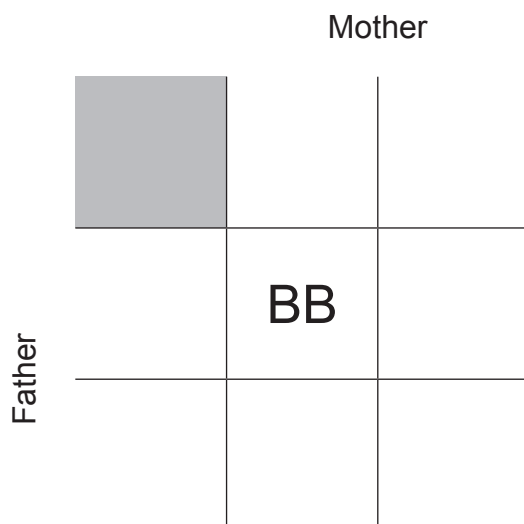
1. \_\_\_\_\_

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

3 (a) Cystic fibrosis is an inherited disease.  
It is possible for two heterozygous parents without cystic fibrosis to have a child with cystic fibrosis.

(i) Complete the Punnett square to show how two heterozygous parents could have a child with cystic fibrosis.

B = dominant allele  
b = recessive allele



[2]

(ii) In the Punnett square above circle the genotype for cystic fibrosis.

[1]

(iii) How many different genotypes are shown in the Punnett square?

\_\_\_\_\_

[1]

(b) Explain the term 'homozygous'.

\_\_\_\_\_

\_\_\_\_\_

[1]

Examiner Only	
Marks	Remark

(c) Explain the genetic terms dominant and recessive.

dominant

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recessive

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[2]

Examiner Only	
Marks	Remark





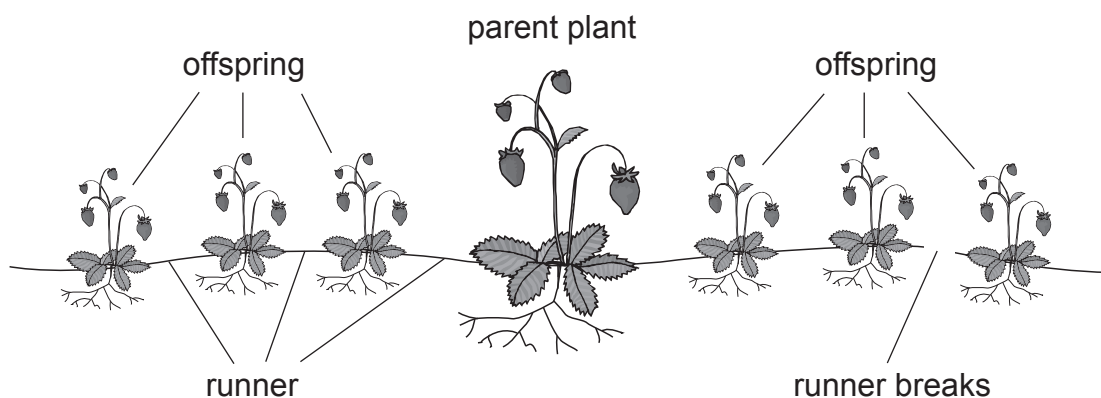
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**(Questions continue overleaf)**





- 6 The diagram below shows how a strawberry plant reproduces. The parent plant produces runners and from the runners offspring develop at intervals. Once the offspring are established the runners break.



Source: CCEA

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

- (a) Give **two** pieces of evidence that suggest the reproduction is asexual.

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

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

- (b) (i) George grows and sells strawberry plants. Give **one** advantage and **one** disadvantage of producing the plants asexually.

advantage \_\_\_\_\_

\_\_\_\_\_

disadvantage \_\_\_\_\_

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

- (ii) George also sells strawberries to a local shop. Suggest **two** features these strawberries might have to help boost sales and make more money.

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

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

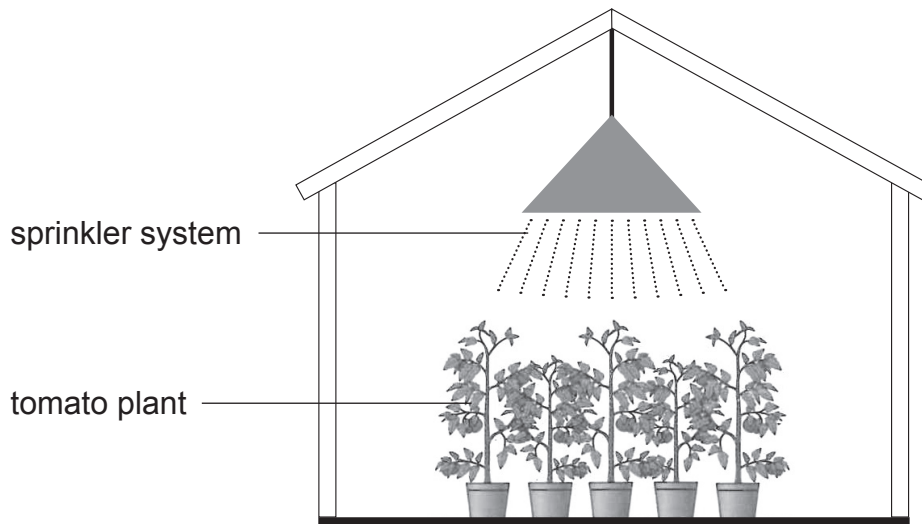
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Marks Remark

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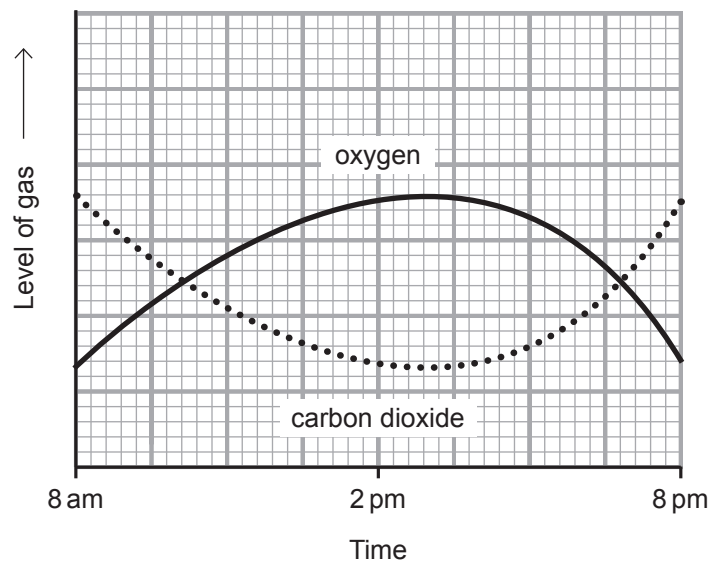
**(Questions continue overleaf)**

7 (a) A scientist investigated gas exchange in tomato plants in a glasshouse.

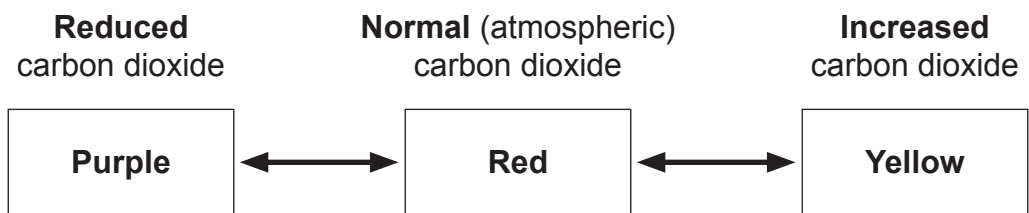


Source: CCEA

The graph below shows how the levels of oxygen and carbon dioxide change over a number of hours in the glasshouse.



The scientist placed test tubes of hydrogencarbonate indicator in the glasshouse.  
 The hydrogencarbonate indicator shows the level of carbon dioxide by changing colour as shown below:



He recorded the colour of the indicator at certain times.

- (i) Complete the table below to give the colour of the indicator at 8 am and 2 pm.

	Colour of indicator at start	Colour of indicator at set time
8 am	Red	
2 pm	Red	

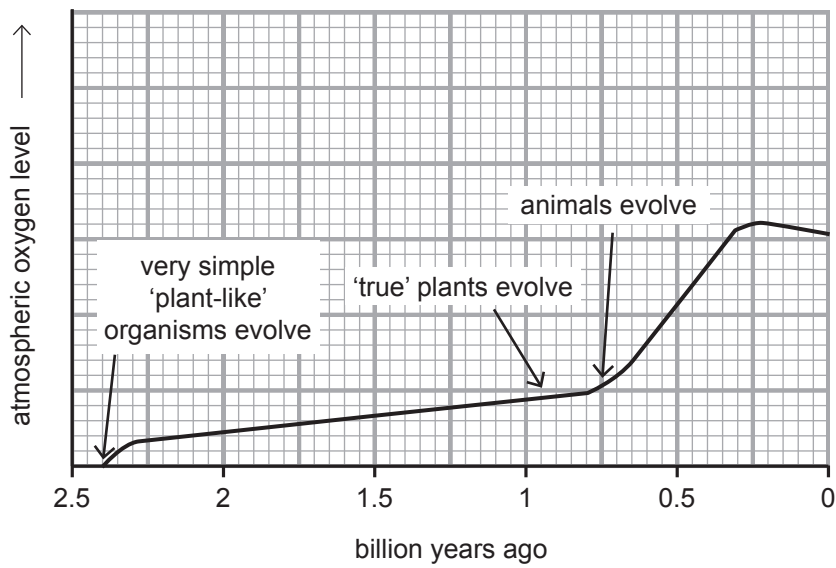
[2]

- (ii) Suggest **one** reason why gardeners often choose to grow their tomato plants inside a glasshouse as opposed to outside on open ground.

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

Examiner Only	
Marks	Remark

(b) The following diagram shows how the level of atmospheric oxygen has changed throughout the last 2.5 billion years.



(i) Using the information provided and your knowledge, explain why it was necessary that plants evolved before animals.

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[2]

(ii) Name the process that caused the rise in oxygen level around 2.4 billion years ago.

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[1]

Examiner Only	
Marks	Remark



(c) Purple tomatoes have been produced by scientists in Norfolk that contain two genes from another plant species called snapdragon. These genes 'switch on' another set of genes in the tomato causing the tomato to be purple rather than red.

(i) Using this information explain why the purple tomato is described as a 'genetically modified' tomato.

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

(ii) Give **two** reasons why there is opposition to growing genetically modified crops.

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

Examiner Only	
Marks	Remark

8 The table below shows the percentage of DNA bases in a human.

Bases	Adenine	Guanine	Cytosine	Thymine
%	31.2	18.8	18.8	31.2

(a) Using this information and your knowledge explain how the bases in DNA are arranged.

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

(b) Describe fully how DNA codes for protein.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [3]

(c) State what Franklin and Wilkins discovered about the structure of DNA and name the procedure they used.

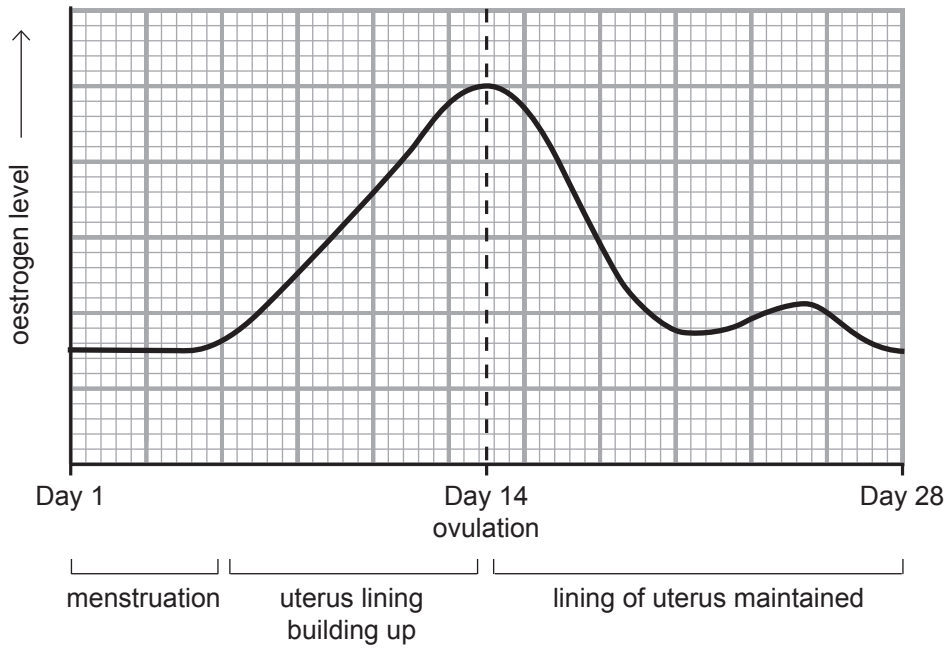
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Marks	Remark

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**(Questions continue overleaf)**

9 The graph below shows the changes in the oestrogen (female hormone) level during the menstrual cycle.



(a) Describe the changes in the oestrogen level over the first 14 days. Explain the effects of these changes.

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[3]

(b) Name another important female hormone in the menstrual cycle. Explain its function.

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[2]

(c) Name the method of contraception which changes a woman's hormone levels.

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[1]

Examiner Only	
Marks	Remark



**10** Louis Pasteur carried out an experiment to show that microorganisms caused food to go bad.

**(a)** Describe how Pasteur set up his experiment and the results he obtained.

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[3]

**(b)** Microorganisms also cause the disease rubella. Explain fully why a doctor would not prescribe antibiotics for someone who has rubella.

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[2]

Examiner Only	
Marks	Remark



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