



General Certificate of Secondary Education
2012–2013

Science: Single Award

Unit 1 (Biology)

Higher Tier

[GSS12]

TUESDAY 14 MAY 2013, MORNING



Centre Number

71

Candidate Number

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(a)** and **10(a)**.

For Examiner's
use only

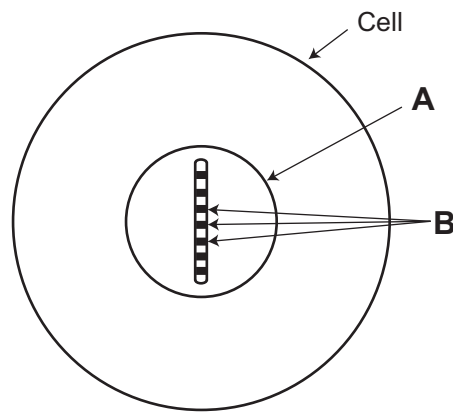
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Total
Marks



BLANK PAGE

- 1 (a) The diagram represents an animal cell. Only one chromosome is shown.



- (i) Name the structure labelled **A**.

_____ [1]

- (ii) Name the structures labelled **B** on the chromosome.

_____ [1]

- (b) Tulip flowers can be red or white. The allele for red colour is dominant to the allele for white colour.

- (i) Complete the genetic diagram below to show the offspring of a cross between a **heterozygous** red tulip and a white tulip.

Use the symbols; R = red r = white

		Red	
		R	
		Rr	
White		r	rr

[2]

- (ii) What percentage of the offspring are white?

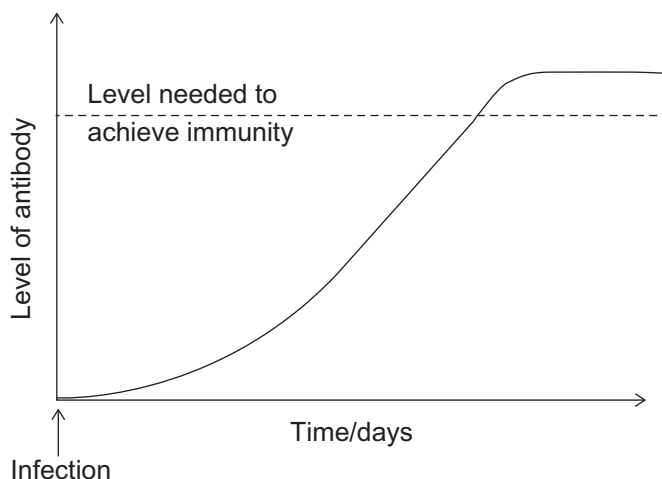
_____ % [1]

- (iii) Give the genotype of a **homozygous** red tulip.

_____ [1]

Examiner Only
Marks Remark

- 2 (a) The following graph shows how our antibody level changes when we have a bacterial infection.



- (i) Suggest why there is a delay between infection and achieving immunity.

_____ [1]

- (ii) Using the graph above, give **two** pieces of evidence that show the immunity achieved is active immunity.

1. _____

2. _____
_____ [2]

- (b) Phagocytosis also helps protect against bacterial infection.

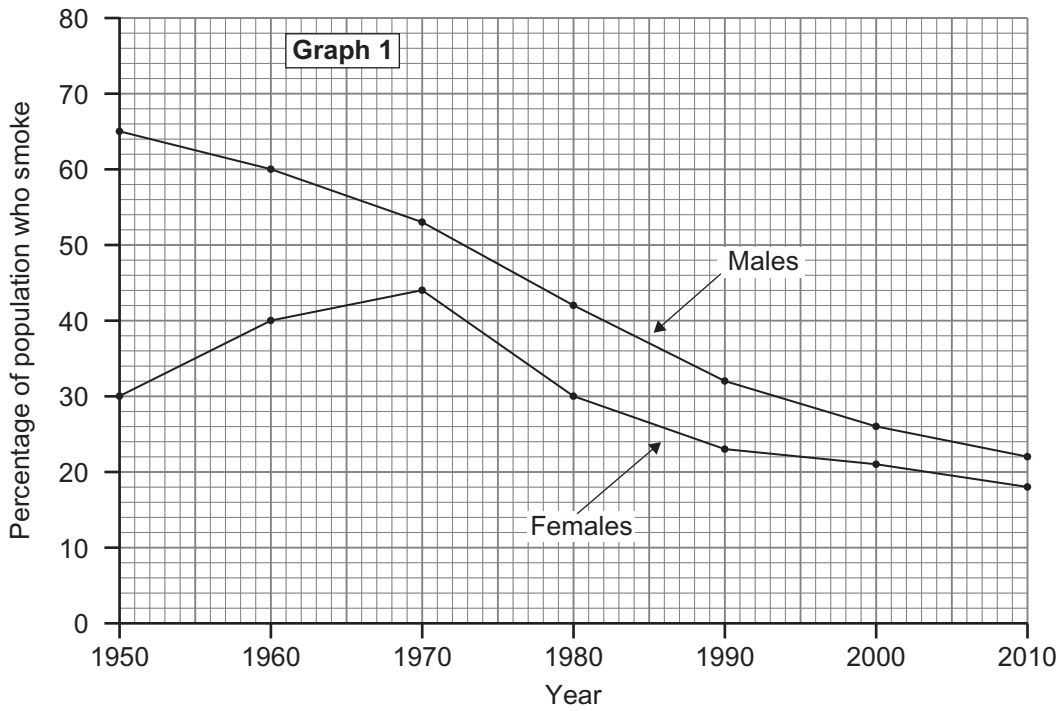
Describe fully the process of phagocytosis.

_____ [2]

Examiner Only	
Marks	Remark

3 **Graph 1** shows the percentage of the population who were smokers between the years 1950–2010.

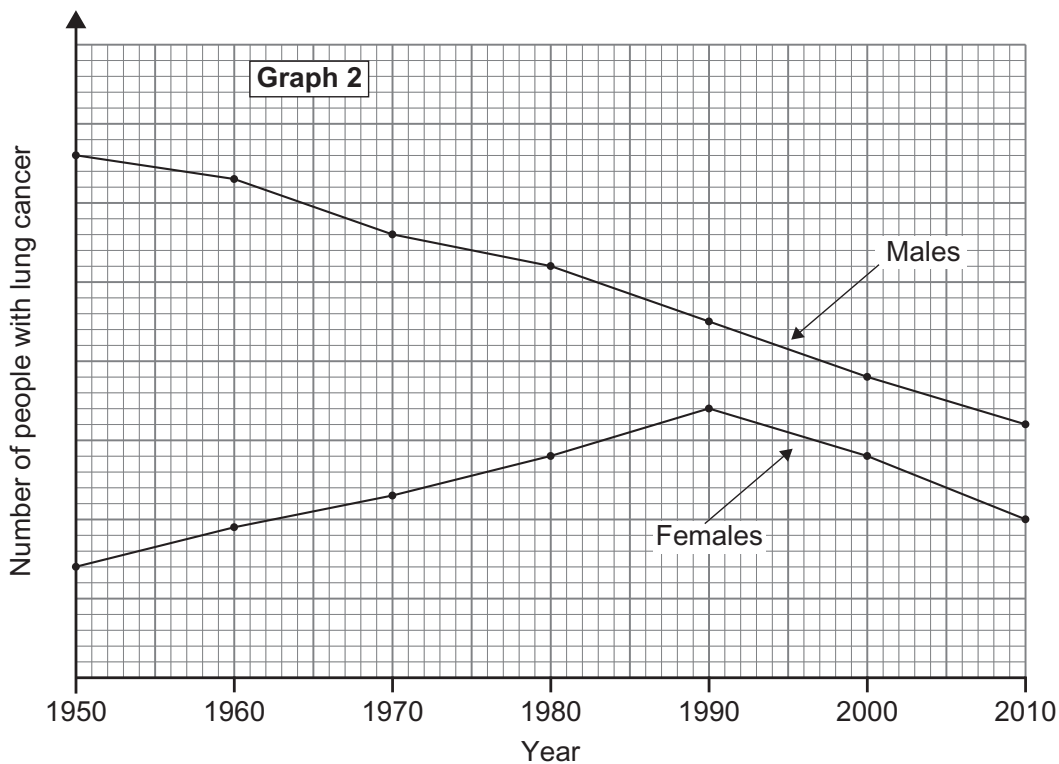
Examiner Only	
Marks	Remark



(a) Which year had the maximum percentage of female smokers?

[1]

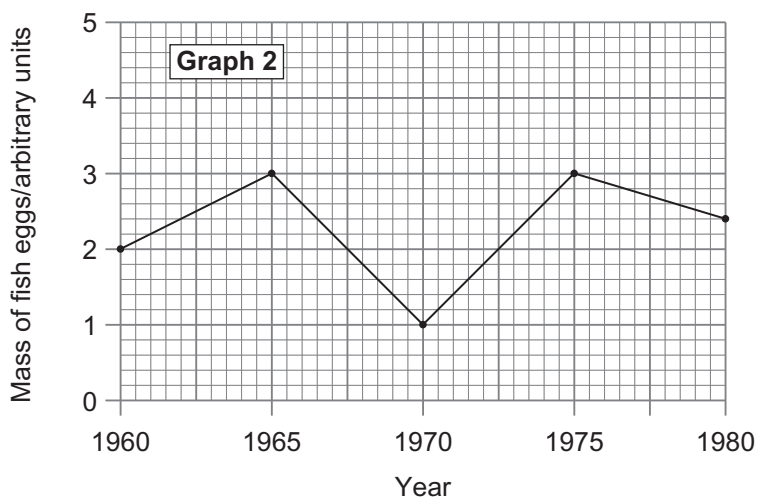
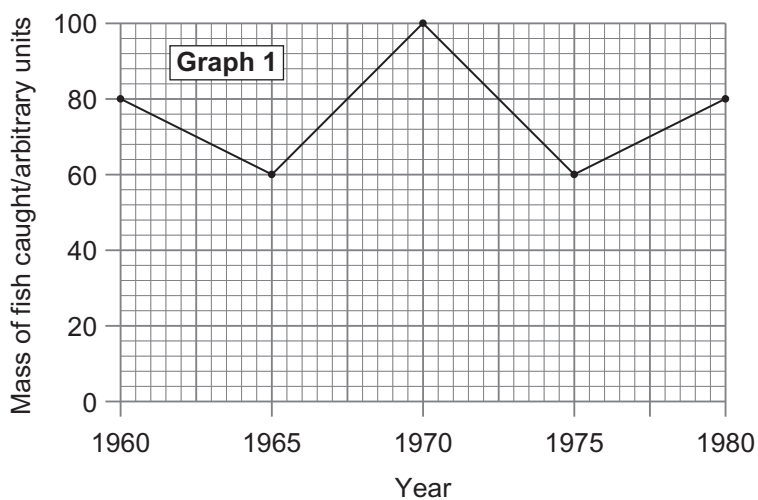
Graph 2 shows how the number of people with lung cancer changed between the years 1950–2010.



BLANK PAGE

(Questions continue overleaf)

- 5 (a) **Graph 1** shows the mass of fish caught in a part of the Irish Sea between 1960–1980. **Graph 2** shows the mass of fish eggs spawned (produced) in the same period.



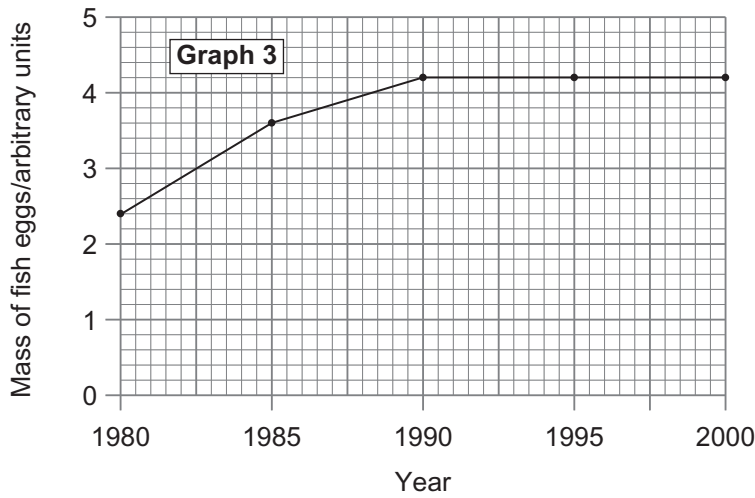
- (i) Describe **and** explain the relationship between **Graph 1** and **Graph 2**.

[2]

Examiner Only

Marks Remark

In 1980 the fishing fleets fishing this area of the Irish Sea started using nets with larger mesh sizes. **Graph 3** shows the mass of fish eggs spawned in the sea in the same period.



(ii) Describe **and** explain the change in the mass of fish eggs spawned between **Graph 3** and **Graph 2**.

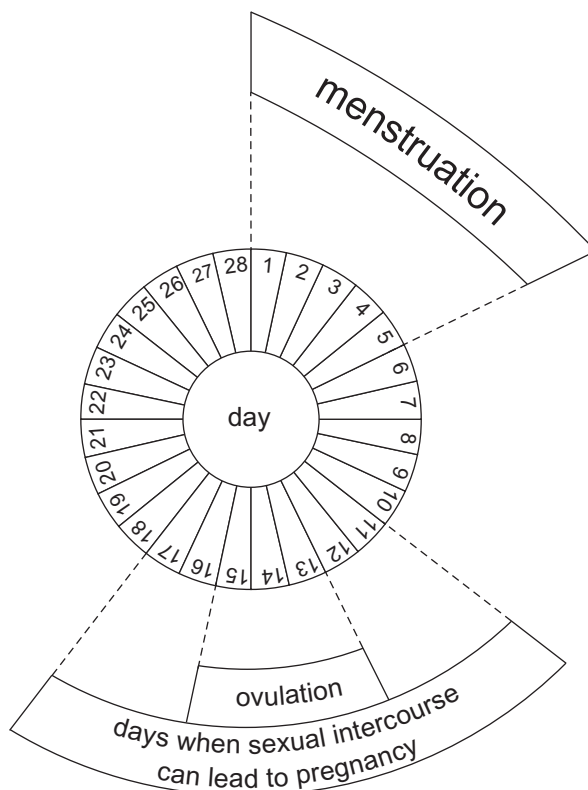
[3]

(b) Nitrate pollution of waterways is caused by 'run-off' from farming. Explain fully how nitrate pollution could reduce fish stocks in a river.

[3]

Examiner Only	
Marks	Remark

6 The diagram below shows the menstrual cycle.



Adapted from: © GCSE Single Award Science for CCEA by T Laverty, J Napier & R White, published by Hodder Murray, 2006 ISBN 0340926007. "Reproduced by permission of Hodder Education"

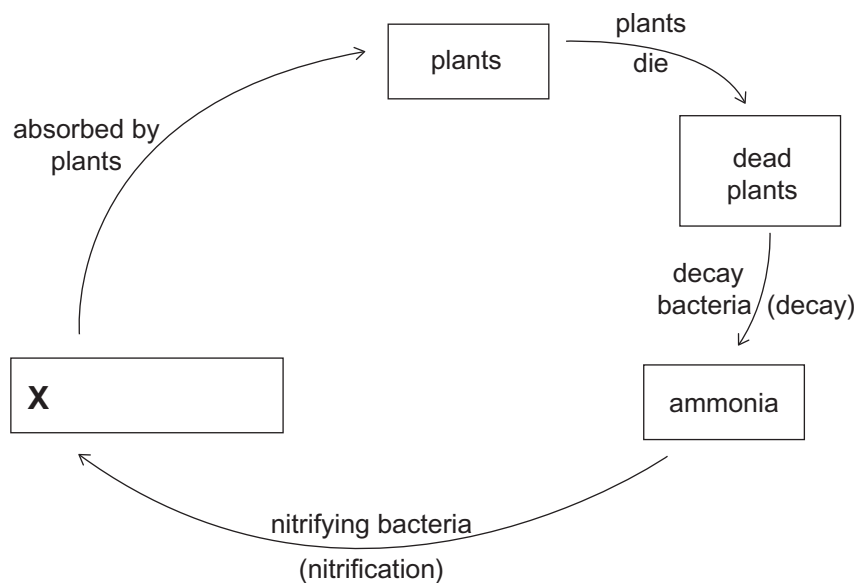
(a) Use this information to calculate the percentage of days in the cycle that can lead to pregnancy.

(Show your working out.)

_____ % [2]

Examiner Only	
Marks	Remark

7 (a) The following diagram shows part of the nitrogen cycle.



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

(i) On the diagram, complete the label for box **X**. [1]

(ii) Explain why the harvesting of plants for food will cause a decrease in soil nitrogen levels.

[3]

Examiner Only	
Marks	Remark

- (b) The following table shows the activity of decay and nitrifying bacteria in a compost bin filled with grass cuttings. It also shows the temperature in the middle of the compost heap.

Note: 10 = maximum bacterial activity; 1 = minimum bacterial activity

Day	Bacterial activity		Temperature/°C
	Decay bacteria	Nitrifying bacteria	
1	1	1	16
2	4	1	18
3	8	2	24
4	10	5	28
5	9	7	31
6	6	10	32
7	4	8	28
8	1	5	21
9	1	3	19
10	1	1	17

- (i) What is the evidence from the table that the process of decay comes before nitrification?

_____ [1]

- (ii) Suggest on which day the process of **decay** was completed.

Day _____ [1]

- (iii) Name the process that produced the heat energy in the bacteria to cause the temperature of the compost heap to rise.

_____ [1]

- (iv) Suggest **one** environmental advantage of using garden waste to make compost.

_____ [1]

Examiner Only

Marks Remark

8 Attacks by insect pests result in a loss of up to 30% of the world's crops each year leading to food shortages in many developing countries. Chemical pesticides can kill the pests but they will also harm or kill the natural predators of the pests, e.g. birds. Chemical pesticides also pollute the soil.

Genetically modified (GM) maize contains a bacterial gene (the *Bt* gene) that produces a protein that makes the maize poisonous to insect pests.

Some people are concerned about the use of GM crops. They claim that the long term effect of eating genetically modified maize is unknown and that the GM genes will transfer to native species forming 'super-weeds'. However, these claims are not supported by scientific evidence.

(a) Using GM maize as an example, describe what is meant by genetic engineering.

[2]

(b) Name the secondary consumer listed in the passage.

[1]

(c) Using the information provided, give **three** benefits of using genetically modified maize.

1. _____

2. _____

3. _____ [3]

(d) Many scientists claim that opposition to GM crops is based on public misunderstanding rather than being scientific.

What is the evidence in the passage that supports the scientists' claim?

[1]

Examiner Only	
Marks	Remark

9 (a) Most British fields of grass have a small number of grass plants (usually <1%) that have a mutation that makes them tolerant to copper-rich soils. However, the mutation that provides copper-tolerance also makes the copper-tolerant plants grow much more slowly.

(i) Using your understanding of natural selection, explain why the proportion of copper-tolerant plants is so low in a typical British field.

[3]

(ii) In some areas of south west England where the soils contain high levels of copper, the proportion of copper-tolerant plants reaches almost 100%.

Explain this observation.

[2]

(b) Cancer in humans is caused by mutation.

Describe how excessive sunbathing can result in the presence of cancer in an individual's skin.

[2]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

Permission to reproduce all copyright material has been applied for.
In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA
will be happy to rectify any omissions of acknowledgement in future if notified.