Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2017–2018

Science: Single Award

Unit 1 (Biology)
Higher Tier

GSS12

[GSS12]
WEDNESDAY 8 NOVEMBER 2017, 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 eight** questions.

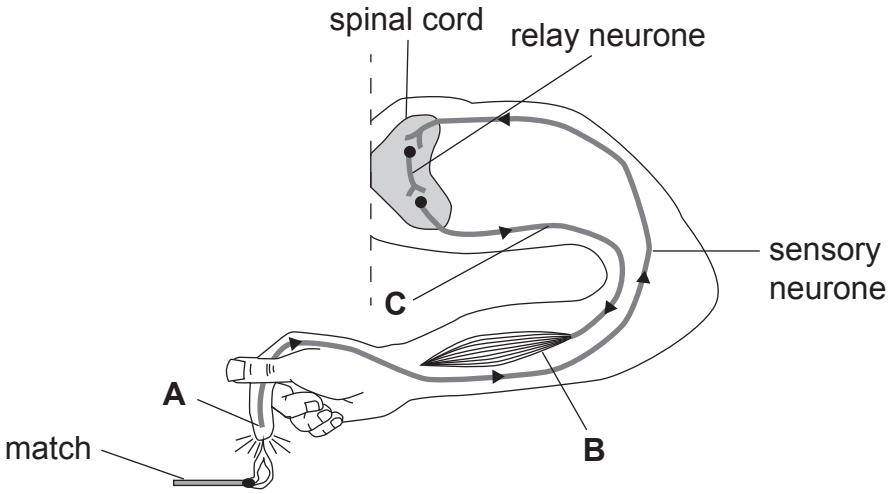
INFORMATION FOR CANDIDATES

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 **3(b)** and **8(d)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

Examiner Only	
Marks	Remark

1 **(a)** The diagram shows the path of a nerve impulse along the nervous system.



(i) Which part (**A, B, C**) in the nervous system is the:

receptor? _____

effector? _____ [2]

(ii) The action shown above is an example of a reflex action.
Our nervous system also carries out voluntary actions.
Give **one** example of a voluntary action.

_____ [1]

(iii) Give **two** differences between reflex and voluntary actions.

1. _____

_____

2. _____

_____ [2]

(iv) What is the main function of reflex actions in the body?

_____ [1]

Examiner Only	
Marks	Remark

(b) Our hormonal system also helps coordination within the body. Insulin is a hormone produced in our body.

(i) Name the organ that produces insulin.

_____ [1]

(ii) Explain the role of insulin in controlling blood glucose levels in the body.

_____

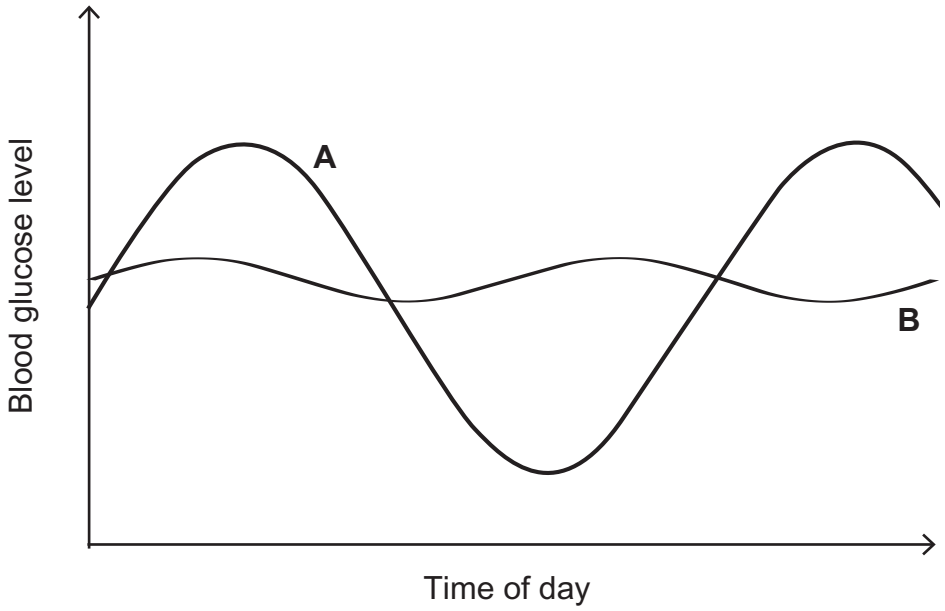
_____

_____

_____

_____ [3]

The graph below shows the blood glucose levels of two people (**A** and **B**), over a 24 hour period. One has diabetes and the other does not.



(c) Which person (**A** or **B**) has diabetes? Explain your answer.

_____

_____ [1]

Examiner Only	
Marks	Remark

2 **(a)** Shown below are photographs of the grey and the red squirrel.

Grey squirrel

© Donyanedomam / iStock / Thinkstock

Red squirrel

© Ronant_63 / iStock / Thinkstock

Grey squirrels were brought to Ireland from North America about 150 years ago and their numbers increased quickly.

Grey squirrels destroy woodland by stripping the bark from trees and they outcompete the red squirrels for food. They have a more varied diet and they spend more time on the ground looking for food. They also carry a virus that kills native red squirrels.

(i) Grey squirrels are an example of a competitive invasive species. Name **one** other competitive invasive species in Ireland.

_____ [1]

(ii) Using the information given, suggest **two** reasons why the numbers of red squirrels have decreased since the grey squirrels were brought to Ireland.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

(b) The photograph below shows a pine marten which is a native Irish animal that hunts squirrels on the ground.

© GlobalP / iStock / Thinkstock

Suggest and explain the effect that pine martens will have on the number of **red** squirrels in a woodland.

_____

_____

_____

_____ [3]

Examiner Only	
Marks	Remark

3 **(a)** Twin brothers, Paul and John, are ill and go to their doctor. Paul has a sore throat and John has the flu.
The doctor gives Paul antibiotics but does not give any to John.

(i) Explain why John is **not** given antibiotics.

_____

_____

_____ [2]

(ii) Explain fully why some antibiotics have become less effective in recent years.

_____

_____

_____ [2]

(b) New drugs have to be continually developed and licensed before they can be used by doctors. There are three steps involved in drug development before they are licensed. The first step is in vitro.

Explain the process of drug development.

Your answer should include:
- a description of in vitro testing and why it is done
- the other two stages and why they are done

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

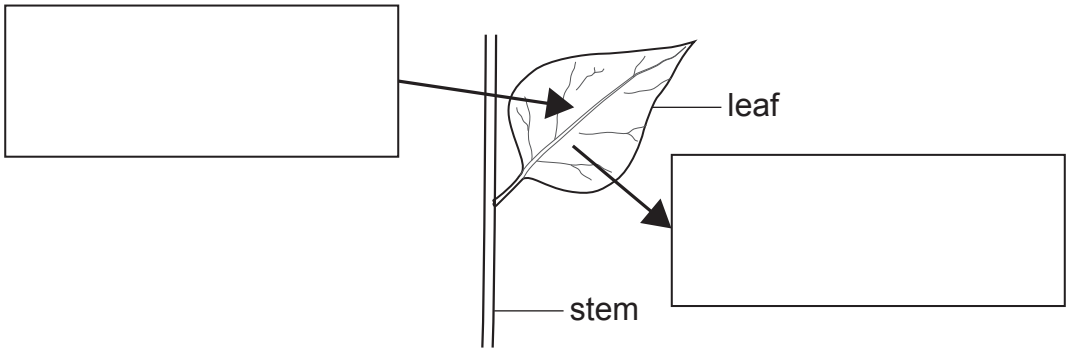
[6]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

4 **(a)** During the day a green plant uses sunlight to produce food.

(i) Complete the diagram by naming the gases that enter and leave the leaf during this process.



[2]

(ii) Name this process.

_____ [1]

(iii) As the day moves into night and the light dims, what happens to the rate of this process?

Circle the correct answer.

gets faster : **gets slower** : **stays the same**

[1]

(b) The photograph below shows a plant's response to light shining from one side only.

© Martin Shields / Science Photo Library

(i) What name is given to this response?

_____ [1]

(ii) Explain why the plant bends towards the light.

_____

_____

_____ [2]

(iii) What can be done to make the plant grow straight again?

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

5 Human activity can lead to pollution of the air.

(a) Name **one** gas that contributes to air pollution.

_____ [1]

(b) Lichen is a plant that grows on exposed walls and tree bark. It is a biotic pollution indicator.

© Principal Examiner

(i) What is meant by the term 'biotic'?

_____ [1]

(ii) A large town has introduced a 'smokeless fuel' policy to try to reduce air pollution. Only fuels that do not produce visible smoke can be burned in the town.

Describe how you could use lichen to investigate if the policy has made a difference to pollution.

_____

_____

_____

_____

_____

_____ [3]

(c) Human activity can also lead to water pollution. Rivers can become polluted when slurry enters them.
Suggest **two** ways this pollution can be prevented.

1. _____

_____

2. _____

_____ [2]

(d) If sewage leaks into a river the nitrate level will rise.
In terms of the nitrogen cycle, explain fully why the nitrate level rises after the sewage leak.

_____

_____

_____

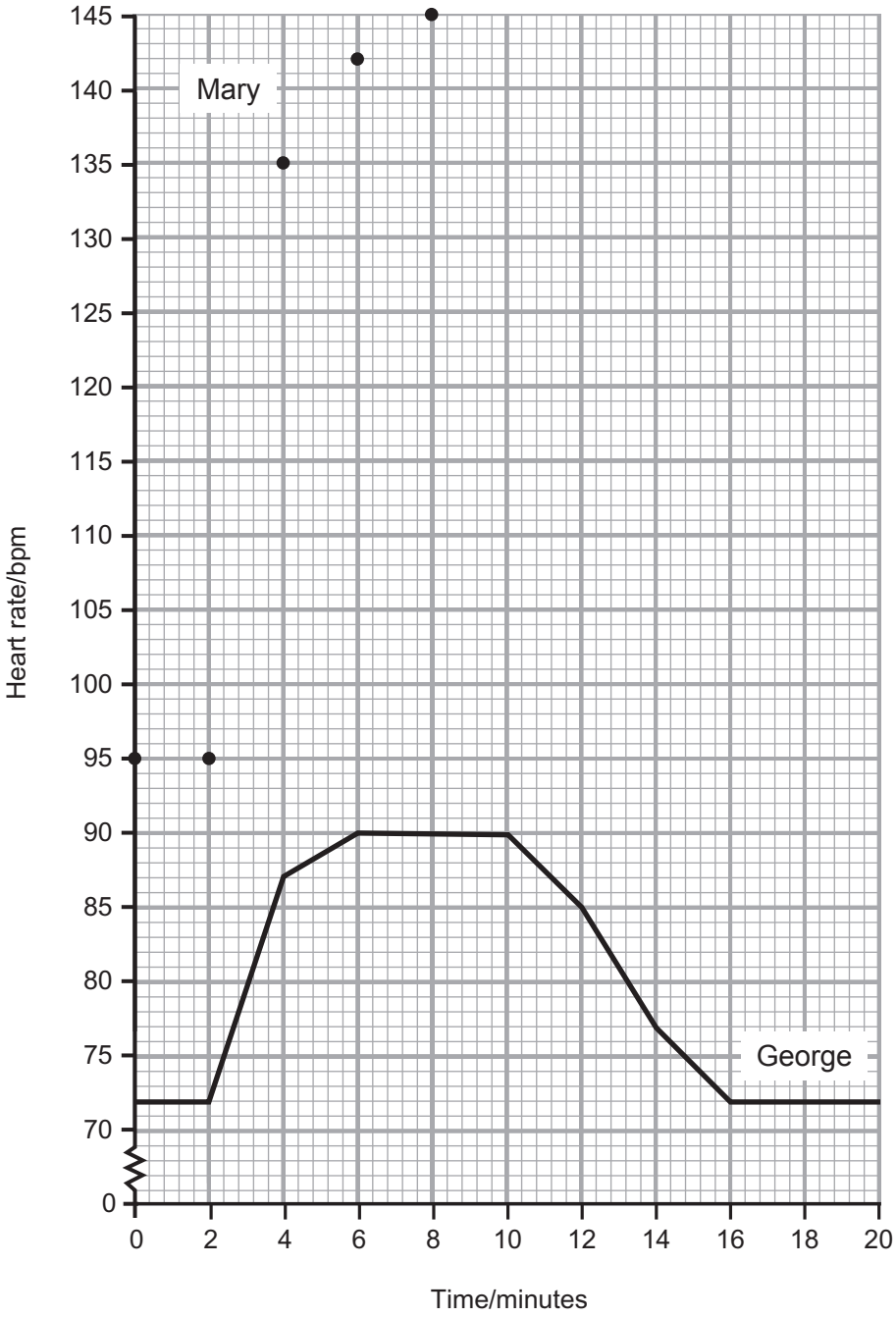
_____

_____ [3]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

6 **(a)** George's heart rate is monitored for twenty minutes. During that time he exercised for ten minutes. His results are shown in the line graph below.



(i) Use the graph to suggest when George started exercising.

_____ mins [1]

(ii) How long did it take for George's heart rate to return to its resting rate, once he has stopped exercising?

_____ mins [1]

Examiner Only

Marks	Remark

(b) Mary's heart rate is also monitored for twenty minutes. She also exercised for ten minutes starting at the same time as George. Her results are shown below.

Time/ minutes	0	2	4	6	8	10	12	14	16	18	20
Heart rate/ bpm	95	95	135	142	145	141	135	130	120	118	115

(i) Complete the line graph for Mary by plotting the remaining points. [3]

(ii) Using the information provided, give **two** pieces of evidence that suggest that George is fitter than Mary.

1. _____

_____

2. _____

_____ [2]

(c) Name **one** disease that exercise can help prevent.

_____ [1]

Examiner Only	
Marks	Remark

7 **(a)** Cystic fibrosis and sickle cell anaemia are recessive inherited conditions.

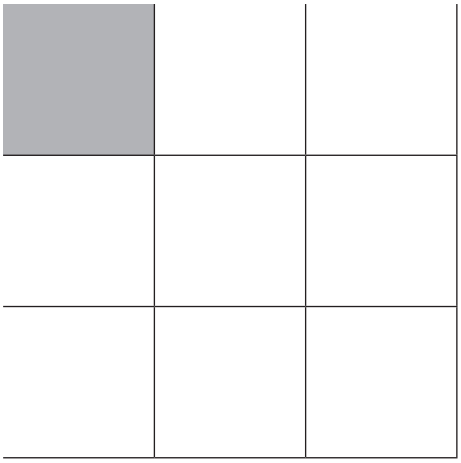
(i) Explain what is meant by the term 'inherited'.

_____

_____ [1]

(ii) Complete the Punnett square to show how two parents who do **not** suffer from sickle cell anaemia could have a child who suffers from sickle cell anaemia.

A = normal allele
a = sickle cell anaemia allele



[2]

(iii) State the genotype of any offspring who will develop sickle cell anaemia.

_____ [1]

(b) The NHS (National Health Service) can offer screening to parents to determine if they are carriers of sickle cell anaemia.

The mother is screened first. The father is only screened if the mother is a carrier (has one allele of sickle cell anaemia).

(i) Explain why the father is screened only if the mother is a carrier of sickle cell anaemia.

_____

_____ [1]

(ii) Suggest **two** reasons why some parents may wish to be screened for the sickle cell anaemia allele before becoming pregnant.

1. _____

_____

2. _____

_____ [2]

(c) Life insurance companies have a financial interest in a person's health. Explain fully how and why someone with an inherited disease may be disadvantaged by these companies.

_____

_____

_____

_____

_____ [3]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

8 A short section of DNA is shown in the diagram.

(a) Describe the structure of DNA.

_____

_____

_____

_____ [2]

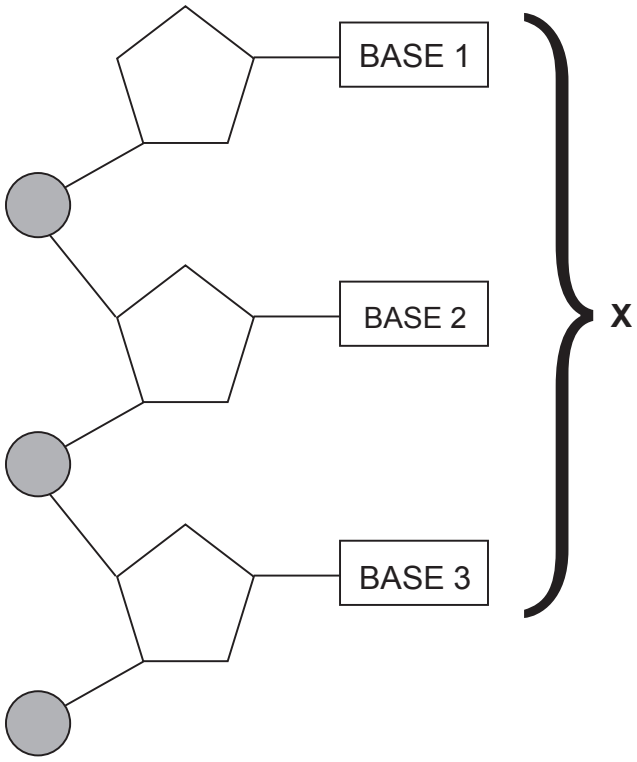
(b) Complete the boxes below to show the correct base pairs in DNA.

Adenine – – – – | |

Guanine – – – – | |

[1]

(c) The diagram shows part of a single strand of DNA.



(i) Name the product **X** coded for by the three bases in the diagram.

_____ [1]

(ii) Name the term used to describe three bases coding for product **X**.

_____ [1]

(iii) Name the structures formed by the joining of a large number of products labelled **X**.

_____ [1]

Examiner Only	
Marks	Remark

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Marks	Remark

(d) The 3D structure of DNA was worked out during the 1950s. It was discovered as a result of research carried out by different scientists.

Name the scientists involved and outline the contribution of each to our understanding of the structure of DNA.

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

[6]

THIS IS THE END OF THE QUESTION PAPER

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