Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2019–2020

Single Award Science: Biology

Unit 1

Higher Tier

[GSA12]

GSA12

WEDNESDAY 6 NOVEMBER 2019, MORNING

TIME

1 hour.

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 60.
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 Question **3(b)**.

12636

20GSA1201

1 **(a)** Respiration and photosynthesis are processes which can occur in living organisms.

(i) Complete the word equation below for **respiration**.

oxygen + [ ] → [ ] + water + energy

[2]

(ii) Complete the sentence below.

Respiration releases energy, this means it can be described as

an _____ reaction. [1]

(iii) Complete **all** the boxes in the table below to show which process(es) can happen in plants and animals.

Use a ✓ if the process happens or an ✗ if the process does **not** happen.

Process	Plants	Animals
photosynthesis		
respiration		

[2]

(b) **(i)** Name the structure in a cell where photosynthesis takes place.

_____ [1]

(ii) Suggest **one** reason why being able to photosynthesise is beneficial to the organism.

_____

_____ [1]

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(Questions continue overleaf)

2 The photograph below shows a typical agricultural field. Almost all the hedgerows have been removed to create a larger field.

© Peter Gudella / Shutterstock

Biodiversity is the term used to describe the range of species in a particular area.

(a) Give **two** reasons why the removal of hedgerows has reduced biodiversity in this field.

1. _____

2. _____ [2]

(b) Apart from replanting hedgerows, describe **one** thing the farmer can do to increase biodiversity in this field.

_____

_____ [1]

(c) Many more houses need to be built in the UK without further reducing biodiversity. State **one** way this can be done without using agricultural land.

_____

_____ [1]

[Turn over

3 In 1928 Alexander Fleming accidently discovered a fungus which produced an impure form of penicillin. It then took almost 20 years for penicillin to become a useful and widely available antibiotic.

(a) **(i)** Name **one** of the scientists who was involved in the development of penicillin as a useful antibiotic.

_____ [1]

(ii) Suggest **one** reason why it took so many years for penicillin to be developed into a useful antibiotic.

_____

_____ [1]

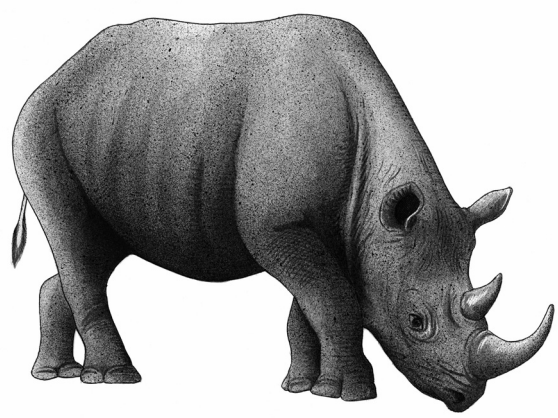
(b) Describe and explain the three main stages that must take place before an antibiotic can be licensed for public use.

Your answer should include:
- the name of each stage
- a description of each stage
- the reason for each stage.

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

[6]

4 The number of Black Rhinos in Africa has decreased due to large scale poaching (hunting) and habitat destruction. As a result the species is threatened with extinction.



Q4 © Alan Baker / Ikon Images / Science Photo Library

(a) What is meant by the term **extinction**?

_____

_____ [1]

(b) The population of Black Rhinos decreased from **70 000** in 1970 to **2850** in 1995. Calculate the percentage decrease in Black Rhino numbers from 1970 to 1995. Give your answer to 1 decimal place.

(Show your working out.)

_____ % [3]

(c) Since 1995 efforts have been made to help increase the number of Black Rhinos.
Suggest **one** measure that may have been put in place to help increase the number of Black Rhinos.

_____

_____ [1]

(d) The Black Rhino eats thorny bushes and fruit. This reduces the amount of woody plants and allows more grasses to grow for the benefit of other animals such as zebra and springbok.
Use this information and your knowledge to answer the following questions.

(i) Explain why the Black Rhino is described as a primary consumer.

_____

_____ [1]

(ii) Explain why reducing the amount of woody plants will allow more grasses to grow.

_____

_____ [1]

5 Tom carried out an investigation in which he burnt different foods to compare the amount of energy they released. His results are shown below.

Food	Mass of food burnt/g	Total temperature rise/°C	Temperature rise per gram of food/°C
Bread	2.0	4.0	2.0
Cheese	4.0	16.0	4.0
Cornflakes	4.0	12.0	
Crackers	2.0	5.0	

(a) Complete the table by calculating the temperature rise per gram of cornflakes and crackers. [2]

(b) Explain why it was necessary for Tom to calculate the temperature rise per gram for each food.

_____ [1]

(c) Cheese has a high fat content which is a source of energy. Respiration is the process that releases energy from food.

(i) Describe how Tom could test for the presence of fat in cheese.

_____

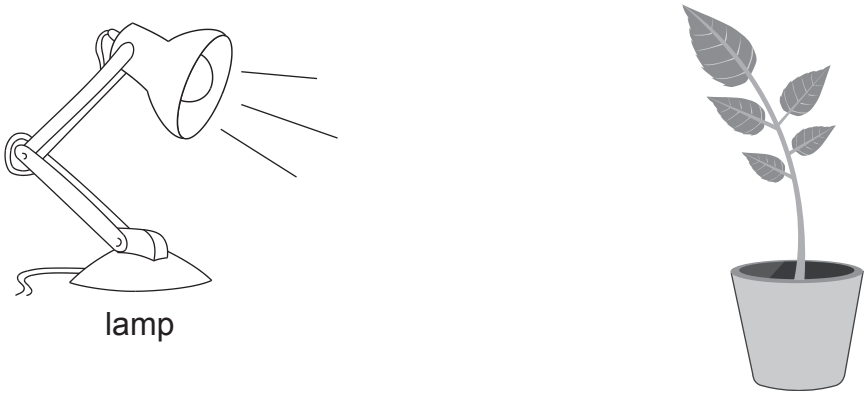
_____ [2]

(ii) Balance the symbol equation shown below for respiration.

$$C_6H_{12}O_6 \quad + \quad O_2 \quad \longrightarrow \quad CO_2 \quad + \quad H_2O \quad + \quad \text{energy}$$

[1]

6 **(a)** A student investigated a plant's response to light shining from one side only. The result after 48 hours is shown below.



Source: Principal Examiner

(i) What term is used to describe this response to light?

_____ [1]

(ii) Name the hormone that controls this response.

_____ [1]

(iii) Explain why the plant bends towards the light after 48 hours.

_____

_____ [2]

(b) Suggest why this response is beneficial to the plant.

_____

_____ [1]

[Turn over

7 **(a)** Microorganisms can be harmful if they enter the body.

(i) Give **one** defence mechanism the body uses to prevent the entry of harmful microorganisms.

_____

_____ [1]

(ii) Lymphocytes and phagocytes are two types of white blood cell that defend the body if microorganisms gain entry. Describe the role of **lymphocytes**.

_____

_____

_____

_____

_____ [3]

Measles is a highly infectious viral disease. The measles vaccine is given to try to prevent the disease from damaging the body. This is a form of active immunity.

(b) Explain fully what is meant by **active immunity**.

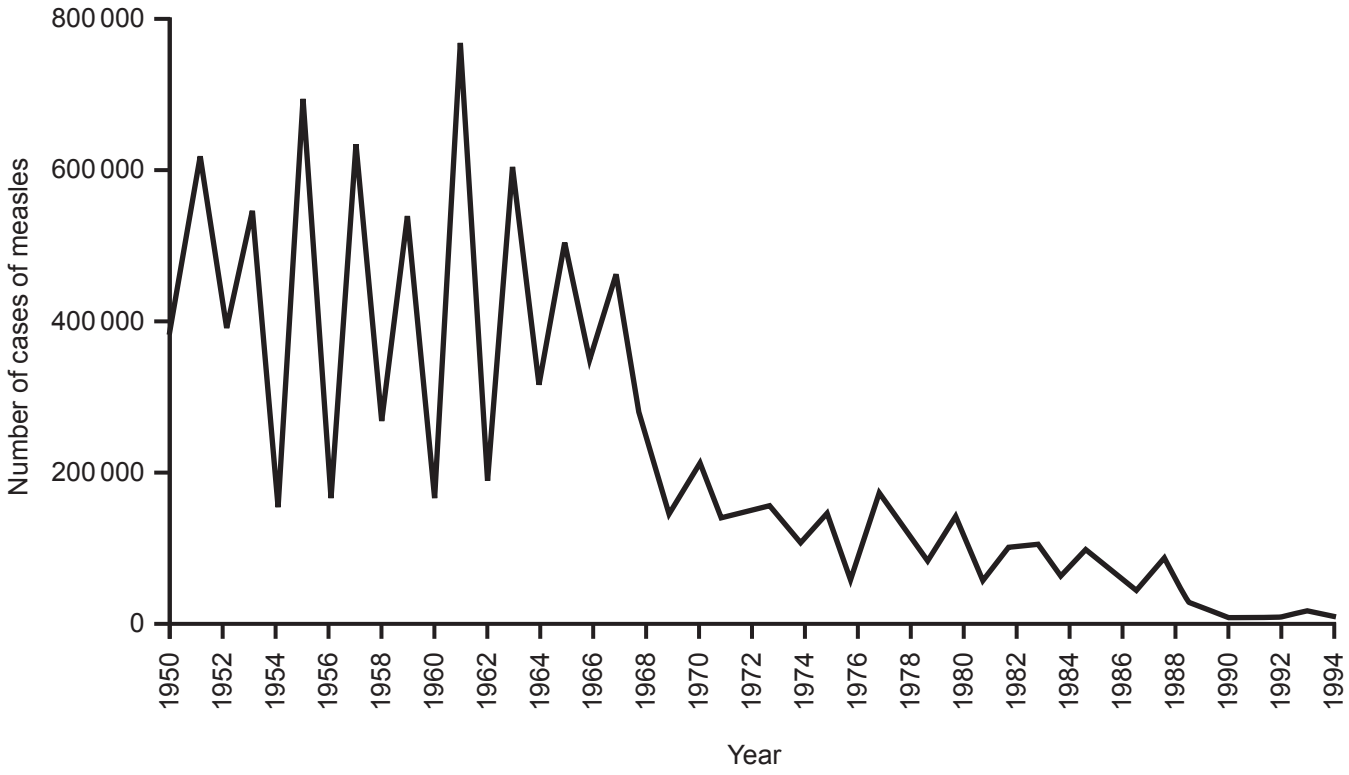
_____

_____

_____

_____ [2]

The graph below shows the number of cases of measles from 1950 to 1994.



(c) Using the graph suggest which year the measles vaccine was introduced. Explain your answer.

Year _____

Explanation _____

_____

_____ [2]

(d) Explain why antibiotics cannot be used to treat the measles virus.

_____ [1]

[Turn over

8 Leaf colour in tomato plants can be either green or purple and is an inherited characteristic. The allele for purple leaf colour is dominant over the allele for green leaf colour.

(a) Explain what is meant by the terms **allele** and **dominant**.

Allele _____

_____

Dominant _____

_____ [2]

(b) **(i)** Complete the Punnett square below to show how two tomato plants with purple leaves can produce a plant with green leaves. Use the symbols shown below.

A = purple leaf allele
a = green leaf allele

[2]

(ii) Calculate the percentage probability of these plants producing a tomato plant with green leaves.

_____ % [1]

9 Genetic engineering can produce useful products including human insulin. Before genetically engineered insulin became available it was obtained from pigs.

(a) Explain what is meant by the term **genetically engineered**.

_____

_____ [1]

(b) Suggest **two** advantages of producing human insulin by genetic engineering.

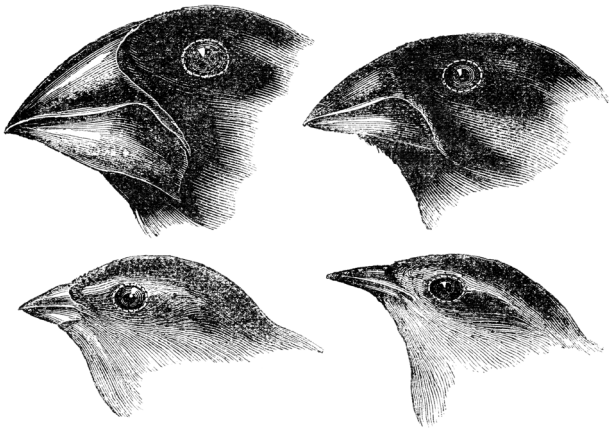
1. _____

2. _____ [2]

(c) Name **one** condition that is treated using insulin.

_____ [1]

10 In 1859 during an expedition to the Galapagos Islands, Charles Darwin observed similarities and differences between finches. Four examples of finches he observed are shown below.



Q10 © The Print Collector / Heritage Images / Science Photo Library

Darwin noticed that the shape of the beak was different depending on the habitat the finch lived in. This observation helped Darwin develop his Theory of Natural Selection.

(a) Explain the process of Natural Selection.

_____

_____

_____

_____ [3]

(b) Explain fully how the continuous process of Natural Selection could lead to the evolution of a new species of finch.

_____

_____

_____ [2]

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

Examiner Number

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