Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science: Biology

Unit 7 Practical Skills
Booklet B
Higher Tier

MV18

[GDW76]

FRIDAY 7 JUNE 2019, MORNING

Time

30 minutes, plus your additional time allowance.

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 on blank pages.
Complete in black ink only.
Answer **all** questions.

Information for Candidates

The total mark for this paper is 35.
Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **1**.

1 Students investigated the distribution of five plant species from a woodland area out into a grassland area.

Describe how the students carried out this investigation. [6 marks]

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

2 Students carried out an investigation into the numbers of earthworms in a field.

They sampled the number of earthworms in a 1 m^2 area at a depth of 15 cm once every two months for one year.

(a) Give the **independent** variable in this investigation. [1 mark]

_____

The students also measured the average air temperature and rainfall for each two month period during their investigation.

(b) Describe how the students would have obtained the **average** air temperature for each two month period. [2 marks]

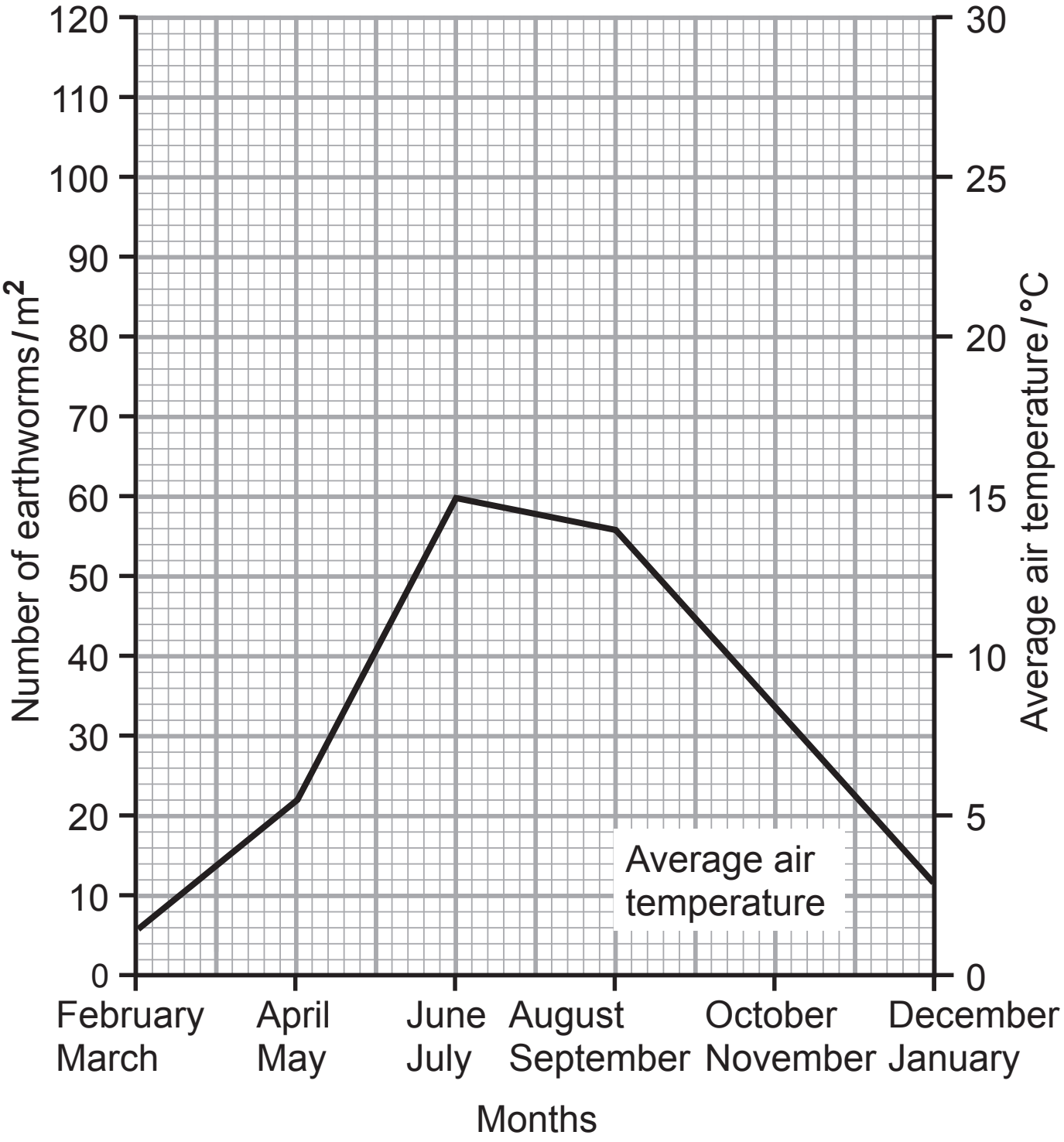
_____

_____

_____

_____

(c) The graph below shows the average air temperature the students obtained for each two month period.



(i) Use the axis on the **right hand side** of the graph to give the highest average air temperature the students obtained. [1 mark]

_____ °C

The students recorded the number of earthworms in each two month period.
The table below shows their results.

Months	**Number of earthworms/m^2**
February and March	22
April and May	104
June and July	12
August and September	50
October and November	118
December and January	76

(ii) Use the data in the table above to draw a line graph of the number of earthworms on the grid.

Use the scale given on the **left hand axis**.
[3 marks]

The students also recorded the average rainfall in each two month period during their investigation.
The table below gives their results.

Months	**Average rainfall/mm^3**
February and March	61
April and May	110
June and July	33
August and September	47
October and November	120
December and January	105

The lowest number of earthworms were recorded in June and July.

(iii) Use the table of average rainfall above and the information in the graph to explain why. [3 marks]

Use **one** piece of data to support your answer.

Explanation _____

_____

_____

_____

Data _____

(d) Suggest **one other** abiotic factor that could affect the number of earthworms in a field. [1 mark]

3 **(a)** An agar plate is a Petri dish containing nutrient agar.

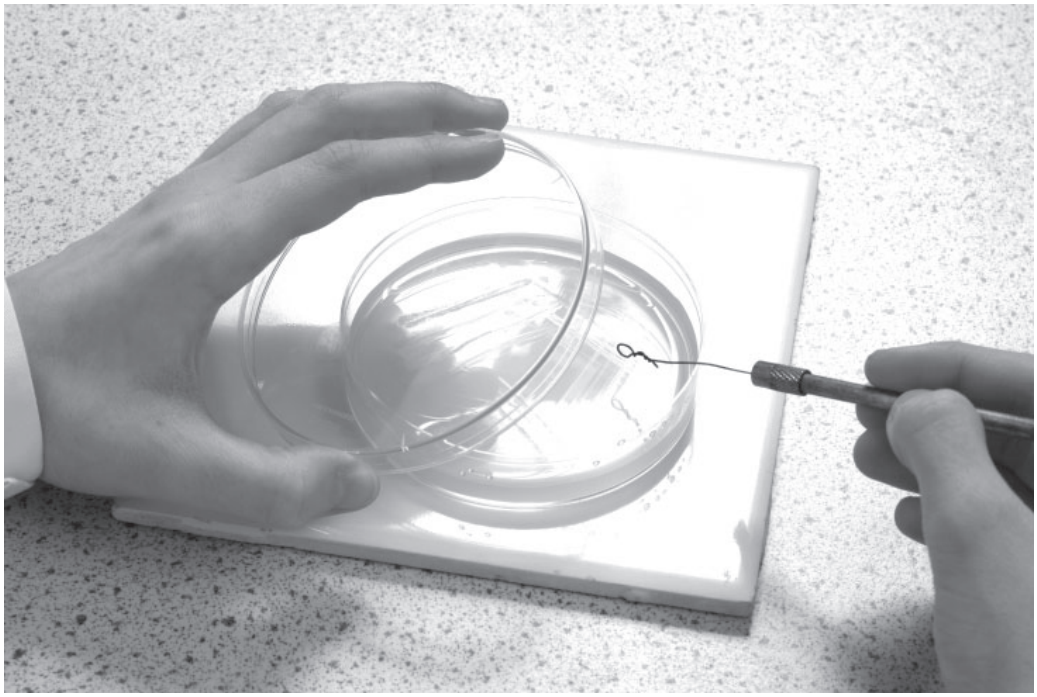
Aseptic techniques are used to grow uncontaminated colonies of bacteria on an agar plate.

(i) How is the bench surface sterilised before agar plates are used? [1 mark]

The photograph below shows one aseptic technique used when growing bacteria on an agar plate.

(ii) Explain why the loop is flamed in the Bunsen burner. [1 mark]

The photograph below shows inoculation of an agar plate with bacteria.



(iii) Explain why the inoculation should be carried out near a lit Bunsen burner. [1 mark]

_____

_____

(iv) At what temperature should the inoculated agar plate be incubated? [1 mark]

_____ °C

(v) How are bacterial cultures grown on agar plates safely disposed of? [1 mark]

_____

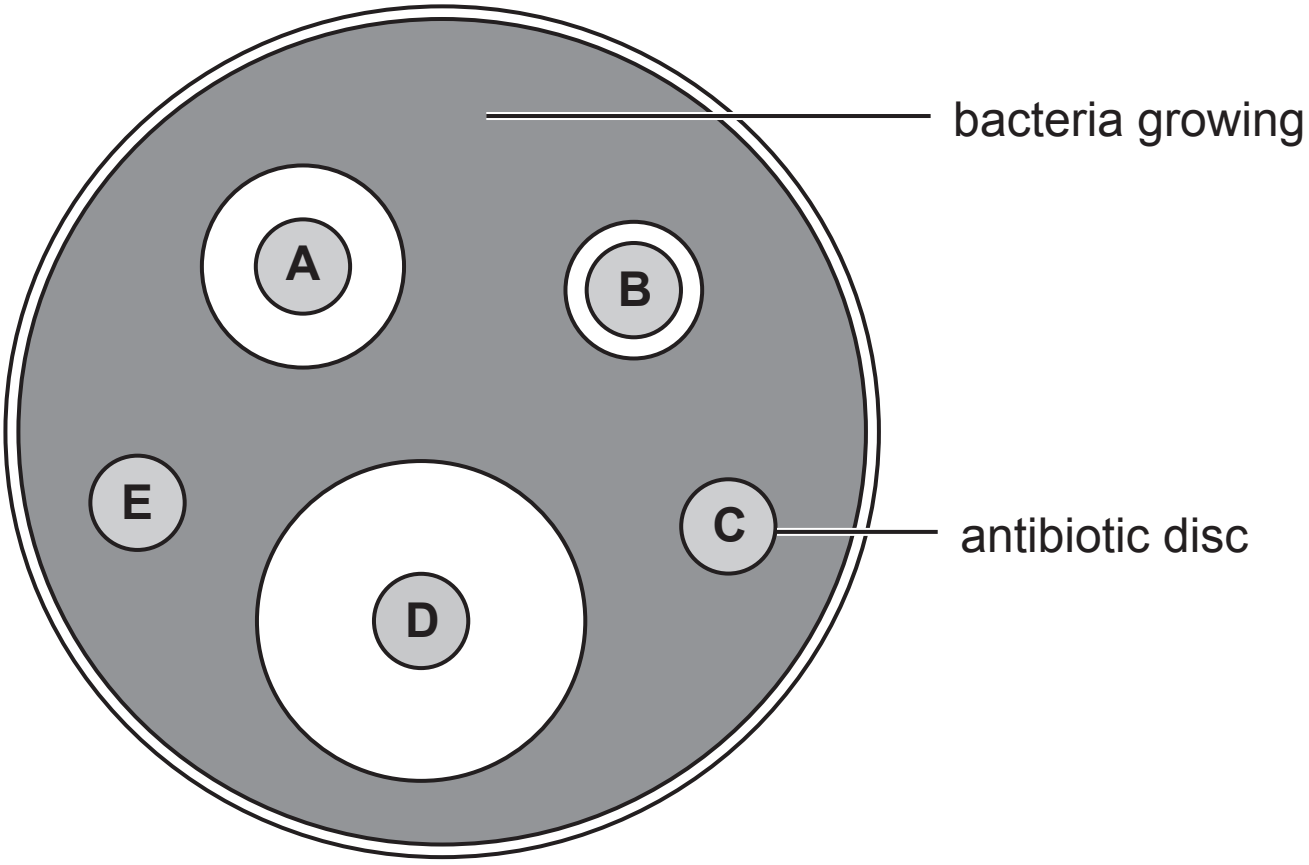
_____

(b) A scientist inoculated an agar plate with one type of bacterium.

She added five antibiotic discs, each with a different antibiotic, **A**, **B**, **C**, **D** and **E**, to the surface of the nutrient agar.

The agar plate was incubated for three days.

The diagram below shows the results she obtained.



Three antibiotics were effective against this type of bacterium.

(i) Which antibiotic of these three was **least** effective? Explain your answer. [3 marks]

Antibiotic: _____

Explanation: _____

_____

_____

_____

(ii) The scientist concluded that this bacterium was a type of MRSA bacterium.
Give evidence from the diagram opposite that supports this conclusion. [2 marks]

_____

_____

_____

_____

4 **(a)** Bread dough is made by mixing flour, yeast and glucose solution.
The dough rises because bubbles of gas are produced and trapped in the dough.

A student investigated the effect of adding two different concentrations of glucose to the flour and yeast.

He added 10 cm^3 of **5% glucose** solution to the flour and yeast.
He mixed it and placed the dough into a measuring cylinder.
He kept the measuring cylinder at a temperature of 20°C for 45 minutes.
He recorded the volume of dough every 15 minutes.

The student repeated the experiment but used the same volume of **10% glucose** solution.

The table below shows his results.

Time/ minutes	**Volume of dough at each concentration of glucose/cm^3**	
	5% glucose	**10% glucose**
0	20	20
15	42	64
30	60	86
45	66	94

(i) Name the reaction carried out by the yeast in the dough. [1 mark]

_____

(ii) Name the gas produced in this reaction. [1 mark]

_____

(iii) Explain why different volumes of dough were produced with 5% and 10% glucose solutions. [1 mark]

_____

_____

After 45 minutes the volume of dough produced with 5% glucose solution would not change.

(iv) Suggest why. [2 marks]

_____

_____

_____

_____

The student repeated his experiment with a 5% glucose solution at a temperature of **5°C**.

(b) Use your knowledge of enzymes to explain why the volume of dough produced after 45 minutes at 5°C was **less than** the volume of dough produced after 45 minutes at 20°C. [3 marks]

This is the end of the question paper

SOURCES

Q3(a)(i) . © *Trevor Clifford Photography / Science Photo Library*
Q3(a)(ii) . © Trevor Clifford Photography / Science Photo Library
Q3(b) . . . Source: *Principal Examiner*

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
Total Marks	

Examiner Number