Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2016–2017

Double Award Science: Biology

MV18

Unit B1
Foundation Tier

[GSD11]

WEDNESDAY 9 NOVEMBER 2016, MORNING

Time

1 hour, 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.
Write your answers in the spaces provided in this question paper.
Answer **all seven** questions.

Information for Candidates

The total mark for this paper is 70.
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 **6(a)**.

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1 Rachel carried out food tests on three types of food.
The table shows some of her results.

Type of food	**Reagent**	**Colour change seen in reagent when there is a positive result**
Vitamin C		
	Biuret	
		blue to brick red

Complete the table by writing the correct words in the empty boxes. [6 marks]

Choose the words from the list below.

Benedict's **ethanol** **iodine** **DCPIP**

protein **sugar/glucose** **fat** **salt**

red to green **blue to colourless** **blue to purple**

blue to black

2 **(a)** A study into the percentage of early deaths caused by certain risk factors was carried out in the USA.

The graph opposite shows the results.

Use the information from the graph to answer the questions that follow.

(i) Which risk factor gave the highest percentage of early deaths in men **and** women? [1 mark]

_____

(ii) Give **two** risk factors that caused more early deaths in men than in women. [2 marks]

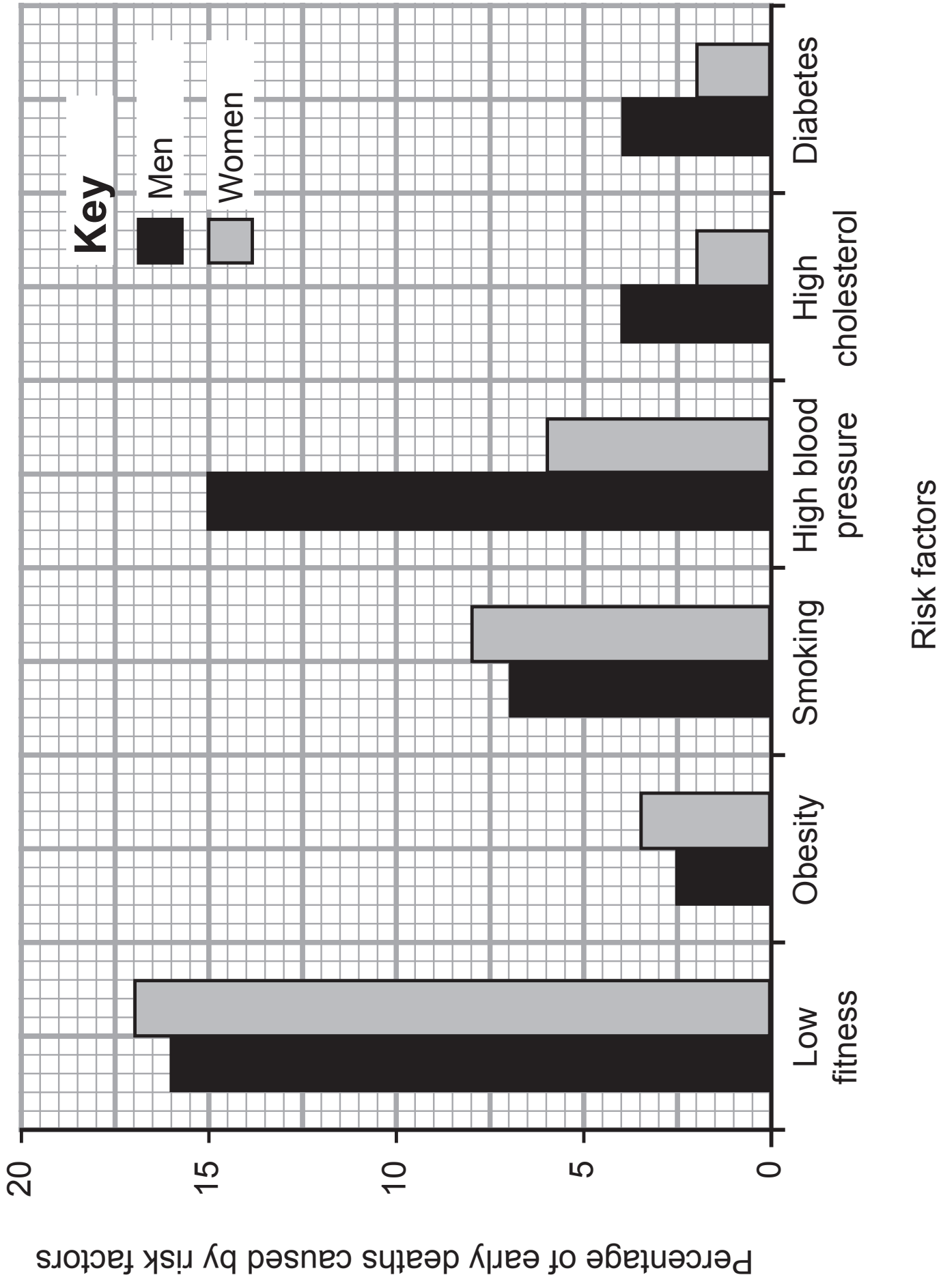
1. _____

2. _____

(iii) The total number of people in the study was 54 000. Half of the people in the study were men. Calculate how many **men** would be likely to die early as a result of diabetes. [3 marks]

Show your working.

_____



(b) Give **one** symptom of diabetes. [1 mark]

_____

(c) Many people have read the results of this study. Suggest **one** reason why some of these people might **not** act on the information in the study. [1 mark]

_____

_____

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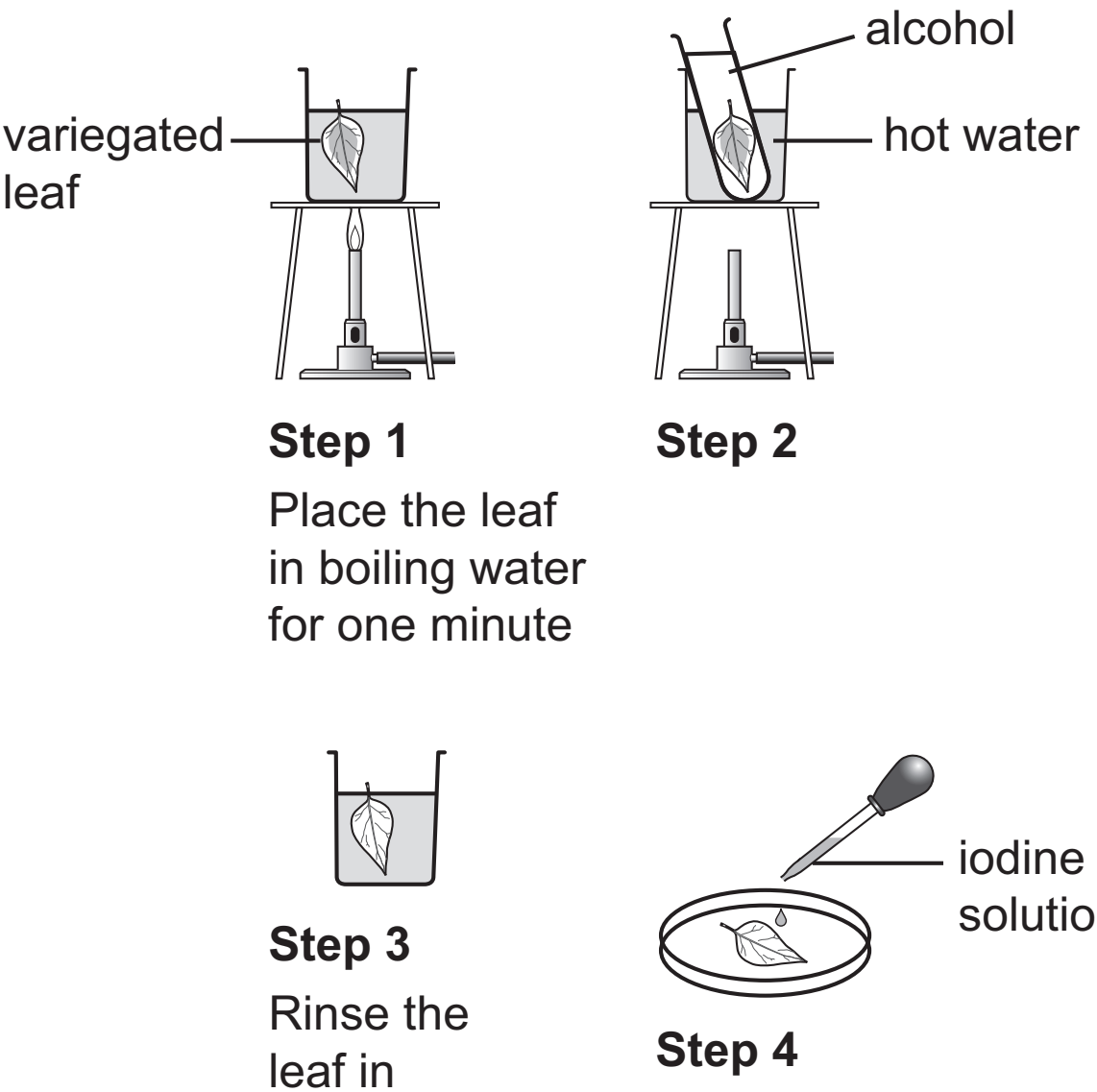
(Questions continue overleaf)

3 **(a)** Mike carried out an experiment into photosynthesis on a plant with variegated leaves. A variegated leaf is green in the centre with white edges.

Mike destarched the plant and then left it in light for two days.
He then carried out the starch test on one variegated leaf.
The diagram shows the starch test.



(i) Give the reason for carrying out step 1. [1 mark]

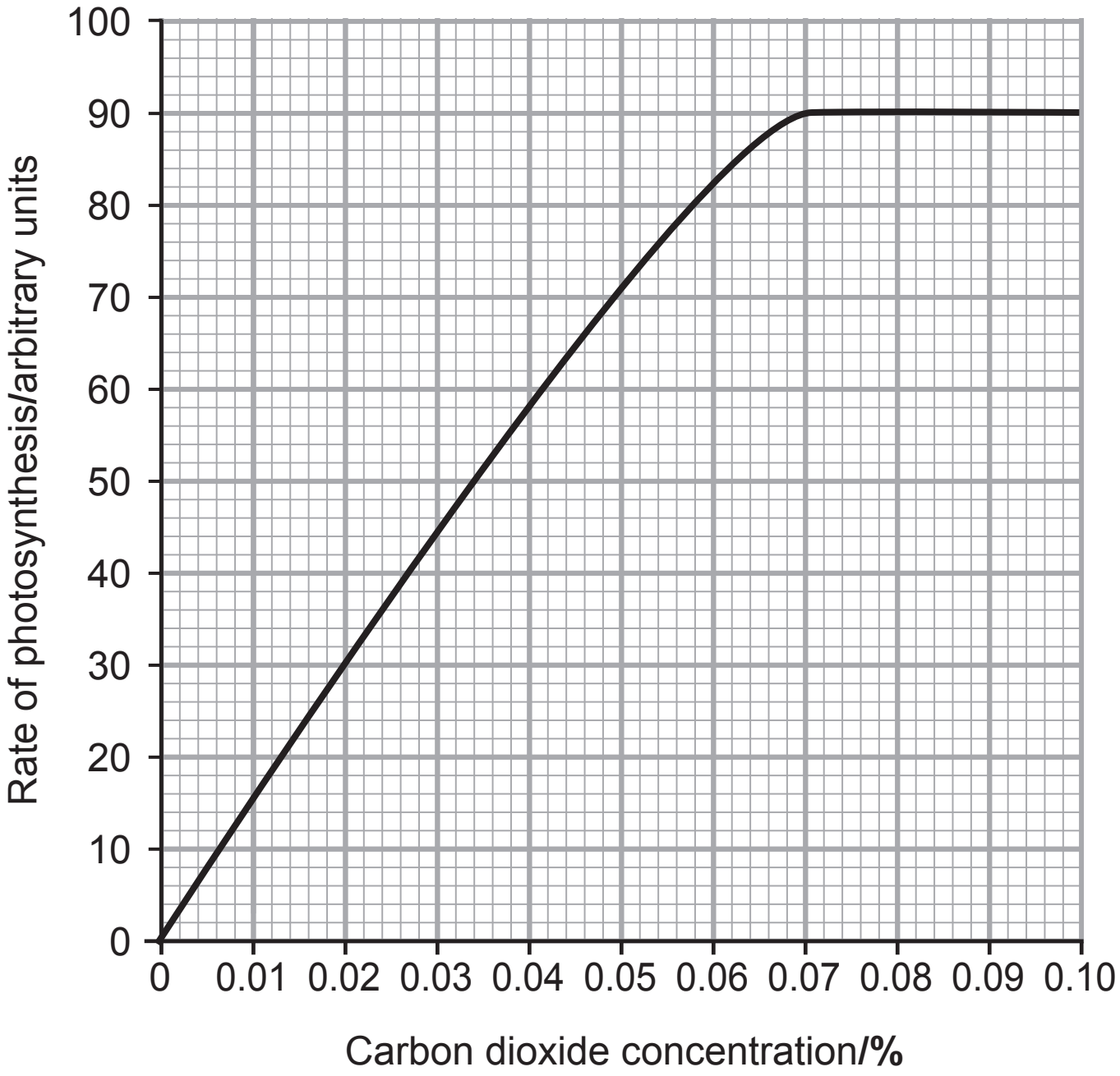
(ii) Give the reason for carrying out step 2. [1 mark]

(iii) Why was the Bunsen burner turned off before step 2? [1 mark]

(iv) Describe and explain the results Mike obtained when he carried out the starch test on this variegated leaf. [3 marks]

(b) A grower carried out an investigation, in his glasshouse, into how the rate of photosynthesis of tomato plants changed with different carbon dioxide concentrations. Temperature and light intensity were kept constant in the investigation.

The graph shows the grower's results.



(i) Use the results from the graph opposite to give the **minimum** carbon dioxide concentration the grower should use to get the best growth from his tomato plants.
Explain your answer. [2 marks]

Concentration _____ **%**

Explanation

_____

_____

_____

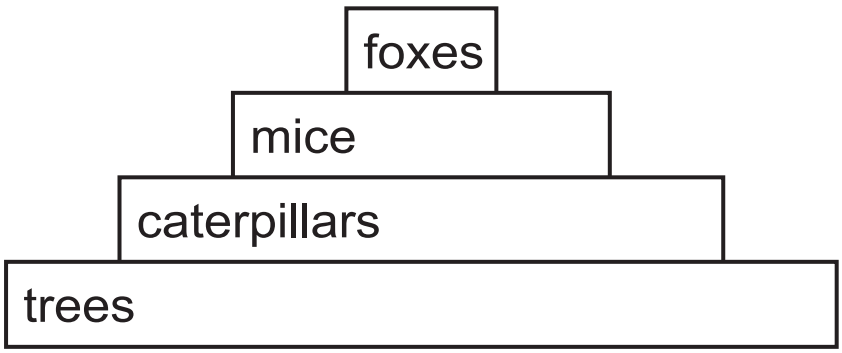
_____

(ii) Give **one** economic factor the grower would have to consider before increasing the carbon dioxide concentration in his glasshouse. [1 mark]

_____

_____

4 The diagram shows a pyramid of **biomass** for a small area of a wood.



(a) Draw a food chain for the organisms in this area of the wood. [2 marks]

(b) Name the secondary consumer in this food chain. [1 mark]

_____

(c) (i) In this area of the wood there were hundreds of caterpillars feeding on each tree.
Complete the pyramid of **numbers** below for the food chain you have drawn in part **(a)**.
Label your diagram. [2 marks]

(ii) There were hundreds of fleas living on each fox.
Add this information by drawing it on your pyramid of numbers above. [1 mark]

(d) Give **two** reasons for energy being lost between the mice and the foxes. [2 marks]

1. _____

2. _____

(e) At the end of one month the population of mice in this area of the wood was found to be 200.
Over the next month a study of the mice population was carried out.

The table shows the results of this study.

Number of mice			
Births	**Deaths**	**Immigrants**	**Emigrants**
100	60	4	20

(i) Calculate the number of mice in the population at the end of the second month. [3 marks]

Show your working.

_____

(ii) Suggest why some of the mice died. [1 mark]

_____

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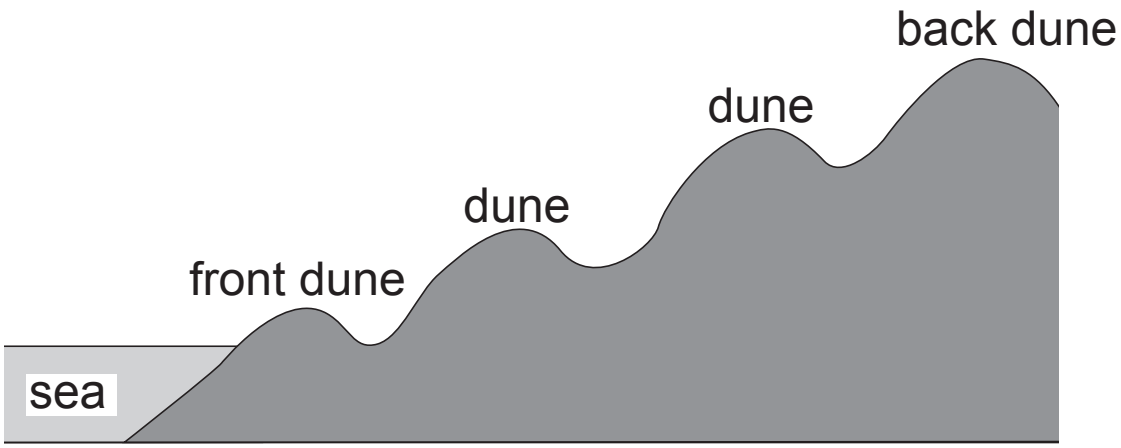
(Questions continue overleaf)

5 Marram grass is a plant found growing on sand dunes.

The photograph shows marram grass growing on sand dunes.

The diagram shows four sand dunes.



(a) Describe the method pupils used to carry out an investigation into how the percentage cover (distribution) of marram grass changed from the front sand dune to the back sand dune. [3 marks]

(b) The pupils investigated two abiotic factors.
These were the salt content and the pH of the sand the marram grass was growing in.

The table shows the pupils' results.

Distance from the front sand dune/metres	Percentage cover of marram grass	Salt content/ arbitrary units	pH
0	10	6.5	7.4
8	20	6	7.6
16	33	5.5	7.8
24	40	4.5	7.9
32	50	2.5	8.1
40	5	1.5	7.2

Use the results in the table to answer the following questions.

(i) Describe the **trend** in the percentage cover of marram grass from the front sand dune to the back sand dune. [1 mark]

_____

_____

_____

(ii) Give the salt content and pH of the sand that is best for the growth of the marram grass. [2 marks]

Salt content _____ arbitrary units

pH _____

(c) What would the pupils have used to measure the pH of the sand? [1 mark]

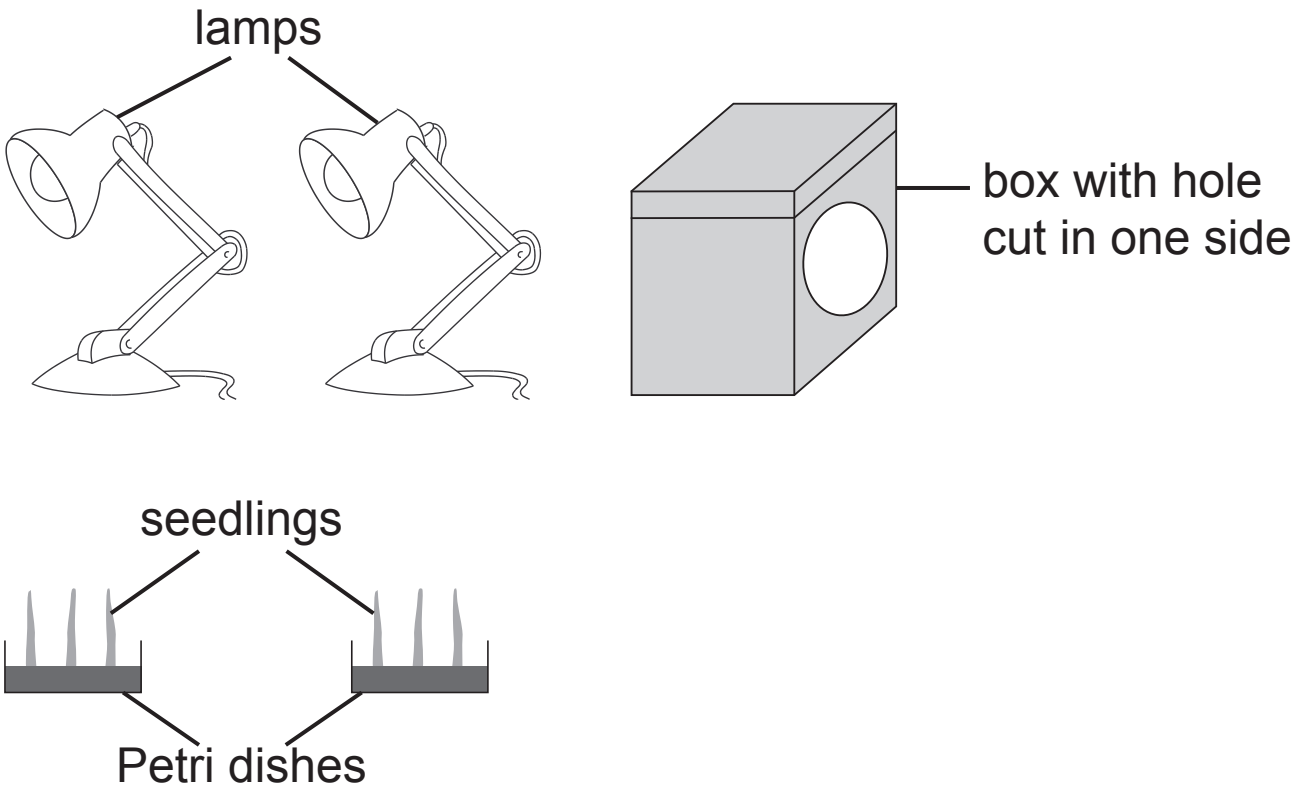
_____

(d) Give **one biotic** factor that may affect the distribution of the marram grass in the sand dunes. [1 mark]

_____

6 The growth response of a plant to light is called phototropism.
Cathy was asked to carry out an experiment to compare the **growth response** of plant seedlings to light shining from above and to light shining from one side.

(a) Describe how she would use the apparatus and materials in the diagram to carry out this experiment.



In this question you will be assessed on your written communication skills, including the use of specialist scientific terms. [6 marks]

(b) Describe the results you would expect Cathy to obtain. [2 marks]

_____

_____

_____

_____

(c) Give **two** factors she would have controlled in this experiment. [2 marks]

1. _____

2. _____

(d) **(i)** Which part of the seedlings responds to light? [1 mark]

_____

(ii) Name the plant hormone which causes this response to light. [1 mark]

_____

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(Questions continue overleaf)

7 **(a)** When the leaves of trees drop to the ground they are decomposed by various types of fungi.
These fungi produce enzymes to break down the different substances in the leaves.
Table 1 gives information about three types of fungi and the enzymes they produce.

Table 1

Fungus	**Enzyme produced**	**Substance broken down by enzyme**
Type 1	Lignase	Lignin, a woody substance in plant cell walls
Type 2	Amylase	Starch, found in leaf cells
Type 3	Cellulase	Cellulose, found in plant cell walls

Table 2 shows the percentage of substances **remaining** in the decomposing leaves over a period of 15 weeks.

Table 2

Time/ weeks	Percentage of substance **remaining/%**		
	Lignin	**Starch**	**Cellulose**
0	100	100	100
5	100	70	100
10	100	40	80
15	90	10	60

(i) Use the information in **Table 2** opposite to suggest which substance will take the **longest** time to be broken down. [3 marks]

Substance _____

Explain your answer using **data** from **Table 2**.

_____

_____

_____

_____

(ii) Use the information in **Tables 1** and **2** opposite to give the **type of fungus** that gave the fastest rate of substance breakdown in the leaves. [1 mark]

Type _____

(iii) Use the data in **Table 2** opposite to calculate the rate of breakdown of starch **per week** in the leaves over the 15 week period. [2 marks]

Show your working.

_____ **%** per week

(iv) What substance will be produced when amylase breaks down starch in the leaves? [1 mark]

_____

(b) Other fungi and bacteria continue to decompose the leaves.
This results in minerals being released into the soil.

(i) Name the plant cells that absorb minerals from the soil. [1 mark]

_____

(ii) Name **another** substance, apart from minerals, that these cells absorb from the soil. [1 mark]

_____

(iii) What substance do plants make from the nitrates they absorb from the soil? [1 mark]

_____

(c) (i) State **three** features that give the small intestine a large surface area for the absorption of digested foods in humans. [3 marks]

1. _____

2. _____

3. _____

(ii) Other than having a large surface area, give **two** adaptations of respiratory surfaces in humans. [2 marks]

1. _____

2. _____

THIS IS THE END OF THE QUESTION PAPER

SOURCES

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Q3(b) .....Source: Principal Examiner

Q5.....© Annie Haycock / Science Photo Library

Q5(b) .....Source: Principal Examiner

Q6.....Source: Principal Examiner

Q7(a) .....Source: Principal Examiner

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Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
Total Marks	