OCR GCSE GATEWAY BIOLOGY A · J247

BIOLOGY



EXAM QUESTION PACK

M4 GRAPHS

SCORE	PERCENTAGE
/44	%

STEMUP

These questions belong to OCR, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by OCR. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with OCR and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. OCR has not endorsed, approved or been involved in the production of it. OCR and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

OCR publishes its past papers, mark schemes and examiner reports. Always check the current specification at ocr.org.uk before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Gateway Biology A (9-1)

Maths 4: Graphs

Please note that you may see slight differences between this paper and the original.

Candidates answer on the Question paper.

OCR supplied materials:
Additional resources may be supplied with this paper.

Other materials required:
- Pencil
- Ruler (cm/mm)

Duration: Not set

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions, unless your teacher tells you otherwise.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Where space is provided below the question, please write your answer there.
- You may use additional paper, or a specific Answer sheet if one is provided, but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

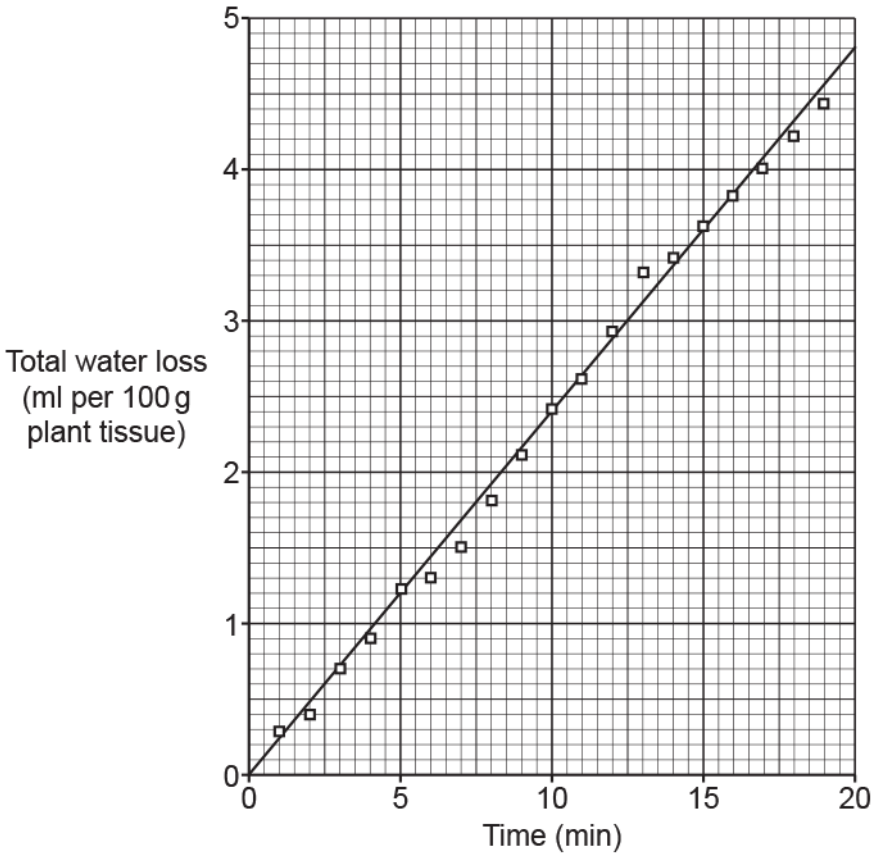
- The quality of written communication is assessed in questions marked with either a pencil or an asterisk. In History and Geography a *Quality of extended response* question is marked with an asterisk, while a pencil is used for questions in which *Spelling, punctuation and grammar and the use of specialist terminology* is assessed.
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **44**.
- The total number of marks may take into account some 'either/or' question choices.

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

1 The graph shows total water loss from a plant.



Calculate the water lost between 5 and 15 minutes using the line of best fit.

A 2.2 ml per 100 g
B 2.4 ml per 100 g
C 2.6 ml per 100 g
D 2.8 ml per 100 g

Your answer ☐ **[1]**

© OCR 2022. You may photocopy this page.

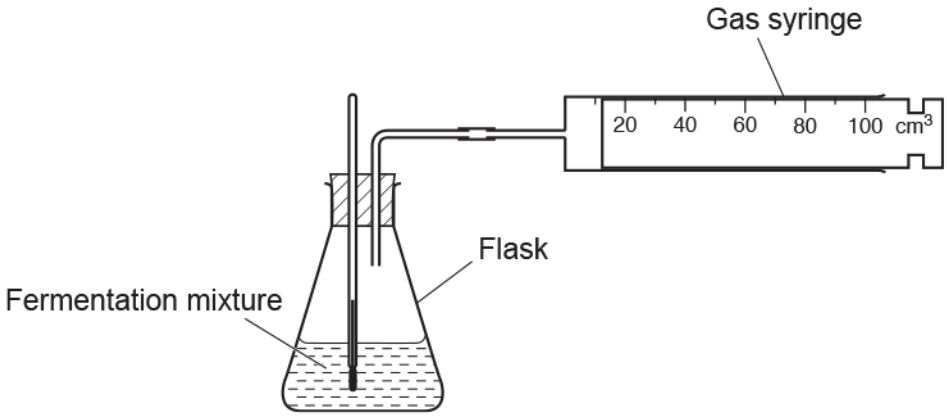
Created in ExamBuilder

STEMUP.CO.UK

2 Fermentation involves enzymes breaking down sugar and releasing carbon dioxide gas.

The volume of carbon dioxide released can be used to measure how fast these enzymes are working.

A student investigates if fermentation works faster at 25 °C or 30 °C.
She measures the volume of carbon dioxide released in 10 minutes.
The diagram shows the apparatus she uses.



The table shows the student's results.

Temperature (°C)	Volume of carbon dioxide gas released in 10 minutes (cm^3)				
	Trial 1	Trial 2	Trial 3	Mean	Range
25	23	25	22	23	22–25
30	34	29	33	.....	29–34

(i) Calculate the **mean** for the results at 30 °C and **complete the table**.

[2]

(ii) The student repeated the experiment at two more temperatures, 20 °C and 35 °C, to get enough readings to

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

plot a line graph.

Which measurement should the student plot on the **x-axis**?

[1]

(iii) Describe **one** way that the range would improve any conclusions made from the graph.

[1]

(iv) The mean volume at a temperature of 20 °C was 15 cm^3 and for a temperature of 35 °C it was 27 cm^3.

Describe what the student's results show about the effect of temperature on enzyme activity.

[2]

3 Two students investigate photosynthesis. Look at the notes from their investigation.

Aim of the experiment

To use pondweed to see how light intensity affects the rate of photosynthesis.

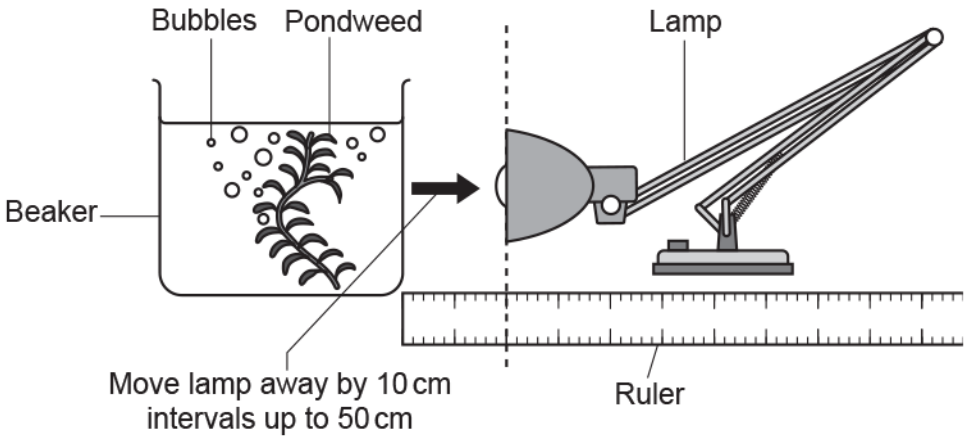
Method

1. Set up the apparatus as in the diagram.
2. Leave the pondweed for five minutes so it can adjust to the new light intensity.
3. Count the number of bubbles given off by the pondweed in one minute.
4. Move the lamp 10 cm further away from the beaker.
5. Leave the pondweed for five minutes so it can adjust again.
6. Count the number of bubbles given off by the pondweed in one minute.
7. Repeat by moving the lamp further away from the beaker by 10 cm intervals until 50 cm is reached.

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK



The table shows the results.

Distance from lamp to beaker (cm)	Number of bubbles given off (per minute)
10	30
20	14
30	6
40	2
50	0

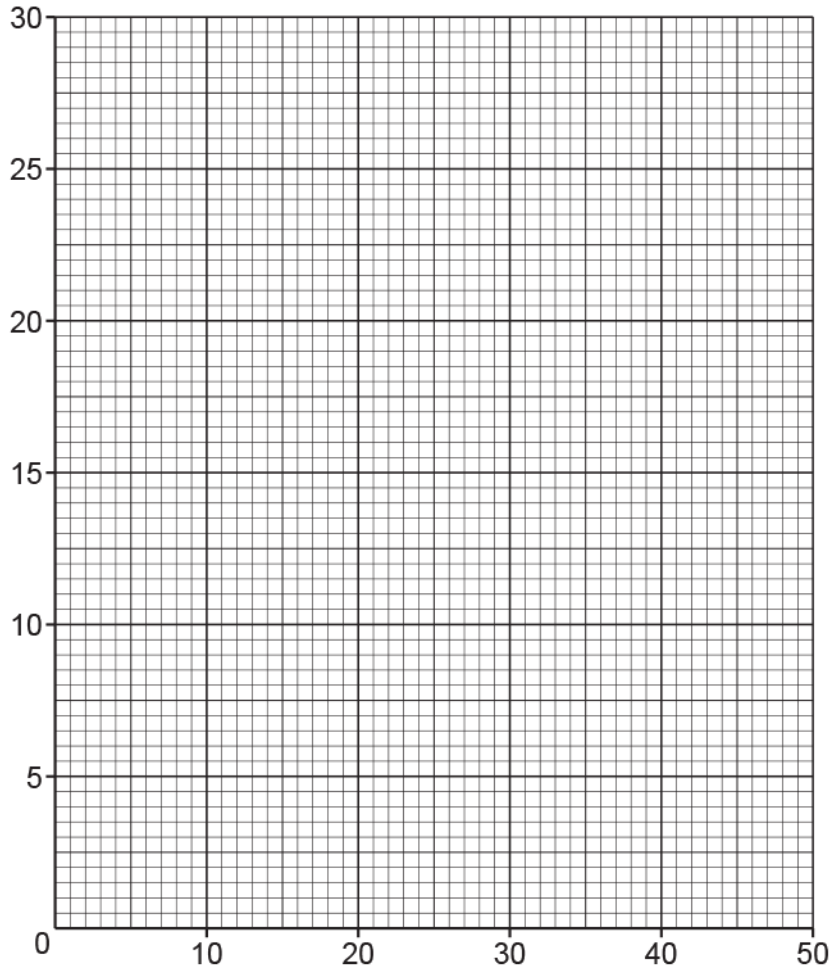
(i) One student started to draw a graph but did not finish.

Complete the graph using the results in the table and draw a curve of best fit.

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK



[4]

(ii) Write down what the students could conclude from their investigation.

Include data from the results table in your answer.

---

[2]

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

4(a) Gardeners use dead plant material to make compost. They add this compost to soil where they are growing plants.

A new way of making compost is called bokashi. In this process the compost is made **anaerobically** in a different type of composter.

Scientists compare the normal methods of making compost with bokashi.

This is their method:

- Take one large pile of dead plant material
- Divide the material into two samples of equal mass
- Place one sample into the normal composter and place one sample into the bokashi composter
- Measure the temperature in each composter every 10 days
- After 40 days, measure the mass of the compost.

Why did the scientists put the same mass of compost in each composter?

Tick (✓) **one** box.

To allow valid comparisons of the results. ☐

To decrease the temperature. ☐

To make the measurements more accurate. ☐

To make the results repeatable. ☐

[1]

(b) **Table 20.1** shows the scientists' temperature measurements.

	Temperature of the compost (°C)	
Time (days)	Normal compost	Bokashi compost
0	26	26
10	70	27
20	53	29
30	42	31
40	28	28

© OCR 2022. You may photocopy this page.

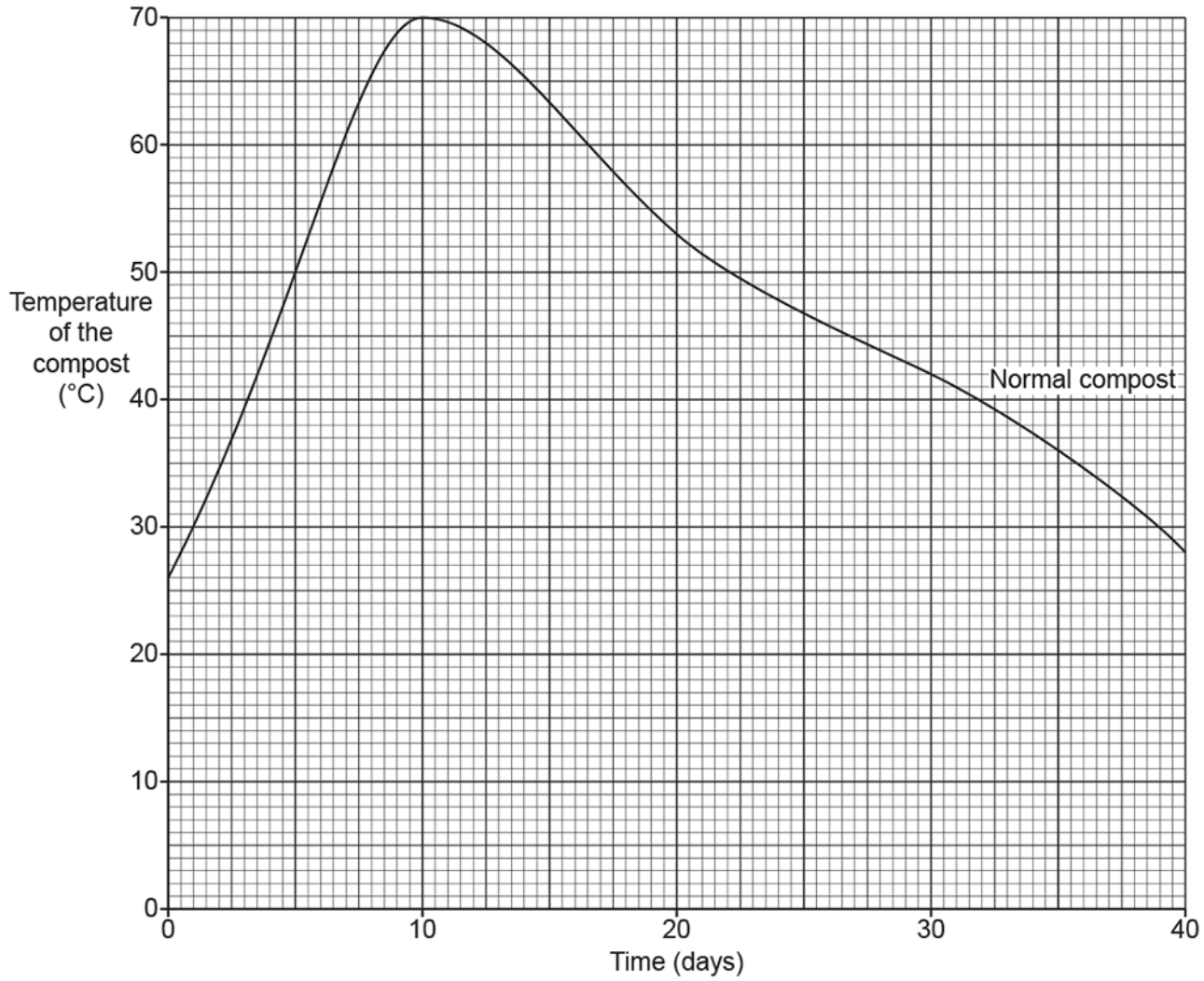
Created in ExamBuilder

STEMUP.CO.UK

Table 20.1

(i) The scientists' results for the normal compost are plotted on the grid.

Complete the graph by plotting the results for the **bokashi** compost and draw a curve of best fit.



[3]

(ii) Describe the change in the temperature of the **normal** compost during the investigation.

---

[2]

(iii) Use data from **Table 20.1** to calculate the difference between the maximum temperature of the normal compost and the maximum temperature of the bokashi compost.

Difference = ... °C **[2]**

(iv) Which **two** statements explain this difference in temperature between the two types of compost?

Tick (✓) **two** boxes.

Both types of compost are made by aerobic respiration. ☐

Normal compost is made by aerobic respiration. ☐

Normal compost is made by anaerobic respiration. ☐

Aerobic respiration and anaerobic respiration release the same amount of energy. ☐

Aerobic respiration releases more energy than anaerobic respiration. ☐

Aerobic respiration releases less energy than anaerobic respiration. ☐

[2]

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

(c) **Table 20.2** shows the scientists' results for the mass of the compost.

	Normal compost	Bokashi compost
Mass at start (kg)	1500	1500
Mass after 40 days (kg)	760	1200

Table 20.2

(i) The mass of the normal compost has decreased by 19 kg per day.

Calculate the decrease in mass of the bokashi compost per day.

Give your answer to the nearest **whole** number.

Decrease = ...kg per day **[3]**

(ii) Carbon dioxide is given off in the making of the compost. This causes most of the decrease in mass.

Scientists think that the bokashi method of composting might be better for the environment.

Use your answer from part **(i)** to justify the scientists' conclusion.

---

[1]

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

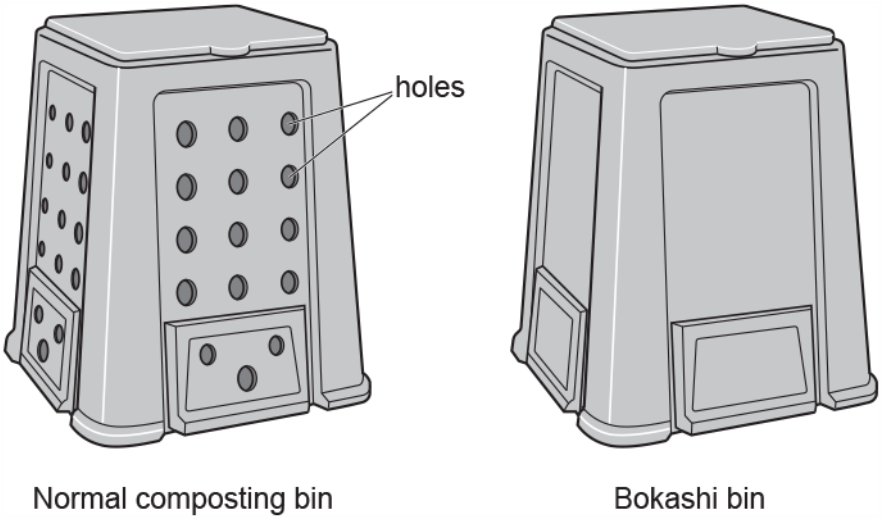
STEMUP.CO.UK

5(a) Gardeners often turn dead plant material from their garden into compost. They then add this compost to the soil where they are growing plants.

Compost can be made in a composting bin. In the bin **aerobic bacteria** turn dead plant material into compost.

Some people use a different way of making compost, called bokashi. In this process the compost is made **anaerobically.**

The drawings show a normal composting bin and a bokashi bin.



Explain the difference in the design of the two composting bins.

---

[2]

(b) Scientists investigate the two methods of making compost.

This is their method:

- Take one large pile of dead plant material
- Divide the material into two samples of equal mass
- Place one sample into the normal composter and place one sample into the bokashi composter
- Measure the temperature in each composter every 10 days
- After 40 days, measure the mass of the compost.

Write down **one** way that the scientists make sure that they can draw valid conclusions.

---

[1]

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

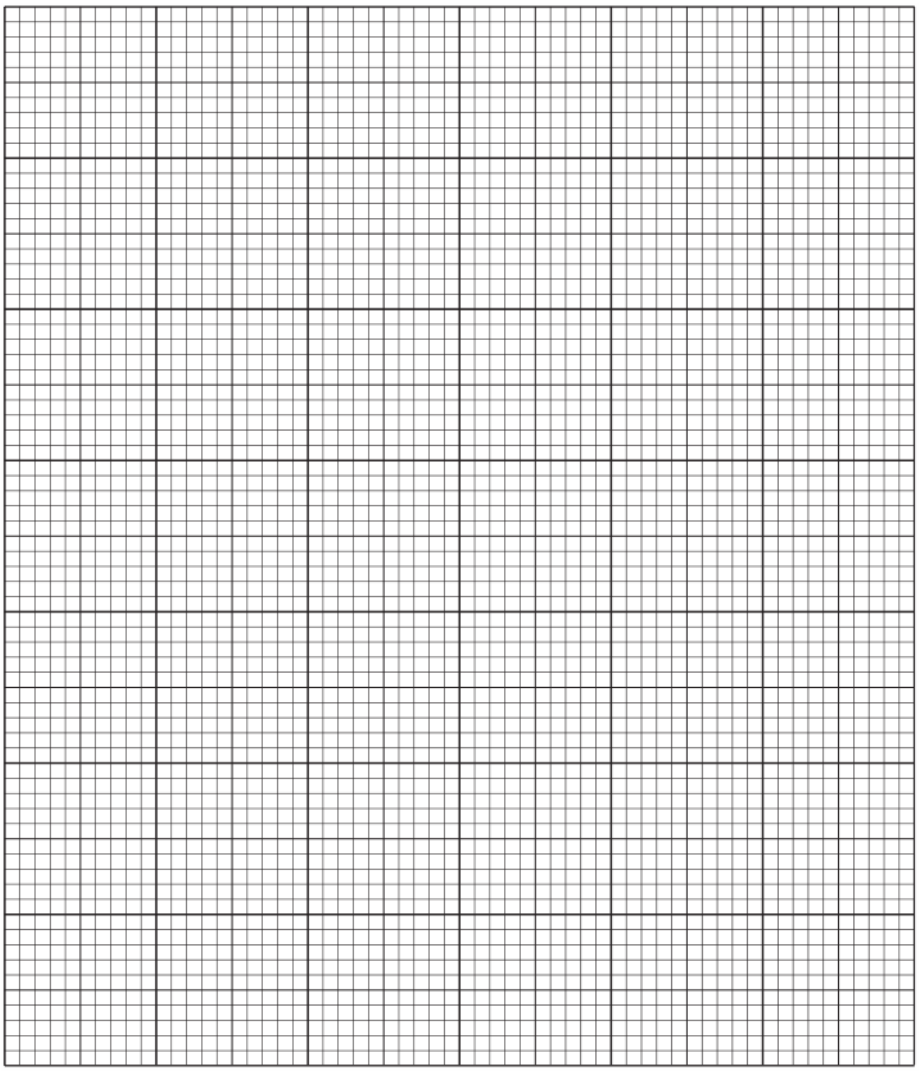
STEMUP.CO.UK

(c) **Table 18.1** shows the scientists' temperature readings.

	Temperature of the compost (°C)	
Time (days)	normal compost	bokashi compost
0	26	26
10	70	27
20	53	29
30	42	31
40	28	28

Table 18.1

(i) Plot the scientists' results on the grid for normal and bokashi compost, and draw **two** curves of best fit.



[5]

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

(ii) Explain why the temperature of the compost in the **normal** bin changed as shown in the graph.

[2]

(iii) Explain the difference in the temperature changes between the aerobic normal compost and the anaerobic bokashi compost.

[2]

© OCR 2022. You may photocopy this page.

Created in ExamBuilder

STEMUP.CO.UK

(d) **Table 18.2** shows the scientists' results for the mass of the compost.

	Normal compost	Bokashi compost
Mass at start (kg)	1500	1500
Mass after 40 days (kg)	750	1100

Table 18.2

A gas is given off in the formation of the compost. This causes most of the decrease in mass.

(i) The percentage decrease in the mass of the normal compost is 50%.

Calculate the percentage decrease in the mass of the bokashi compost.

Give your answer to **2** significant figures.

Percentage decrease = ... % **[3]**

(ii) The scientists concluded that the bokashi method of composting might be better for the environment.

Use your answer from part **(i)** to justify the scientists' conclusion.

---

[2]

END OF QUESTION PAPER