

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature						Date					

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General Certificate of Secondary Education
June 2008 / June 2009



SCIENCE / BIOLOGY
ISA B2.2 Photosynthesis

ASCC/BLYC/B2.2

To be conducted before 4 May 2009
For submission in May 2008 or May 2009 or May 2010

<p>For this paper you must have:</p> <ul style="list-style-type: none"> • results tables and charts or graphs from your own investigation. <p>You may use a calculator.</p>

For Teacher's Use	
Section	Mark
1	
2	
Total (max 34)	

Time allowed: 45 minutes

Instructions

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in **Section 1** and **Section 2**.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The maximum mark for this paper is 34.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

Did this candidate take part in the practical activity?	YES / NO
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Signature of teacher marking this ISA Date

SECTION 1

These questions are about the investigation that **you** did.

Answer **all** questions in the spaces provided.

1 What were you trying to find out in your investigation?

.....
.....
.....
.....

(2 marks)

2 (a) In your investigation, what was the **independent** variable (the variable that you deliberately changed)?

.....
(1 mark)

(b) (i) How many different values of this variable were used?.....
(1 mark)

(ii) Suppose you could choose **one** more value of this variable to use.

What value would you choose?

.....

Give a reason for your answer.

.....

.....

(1 mark)

3 State **one** variable that you needed to measure during your investigation.

.....

(1 mark)

4 Suggest why you needed to wait a short time before you collected results each time you changed the value of your **independent** variable.

.....
.....
(1 mark)

5 Suggest **one** way of making your investigation more accurate.

.....
.....
(1 mark)

6 (a) Which, if any, of your results would you repeat if you could?

.....
(1 mark)

(b) Explain your answer.

.....
.....
(1 mark)

7 What did you find out from your investigation?

I found out that

.....

.....

.....

.....
(2 marks)

8 Make sure that **your** results tables and charts or graphs are handed in with this paper. You will be awarded up to 6 marks for these. *(6 marks)*

SECTION 2

These questions are about an investigation that may be similar to the one that you did.

Answer **all** questions in the spaces provided.

Lettuces sold to the shops in April can be sold at a higher price than in June.

A farmer plans to speed up the growth of lettuces in his greenhouses by using heaters.

He works out that the cost of using electric heaters is about the same as using paraffin heaters.

The farmer sets up a series of experiments at different temperatures in his greenhouses, using either electric heaters or paraffin heaters.

He recorded the number of days before the lettuce plants were ready to sell.

His results are shown in **Tables 1** and **2**.

Table 1 Using an electric heater

Temperature in °C	Time in days before lettuce plants are ready to sell
16	40
18	32
20	25
22	20
24	17
26	16

Table 2 Using a paraffin heater

Temperature in °C	Time in days before lettuce plants are ready to sell
16	33
18	27
20	22
22	18
24	15
26	14

9 Describe the pattern shown by the results in **Table 2**.

.....

.....

.....

.....

(2 marks)

10 Which was the **dependent** variable in this investigation?

Put a tick (✓) in the box next to your choice.

- The type of lettuce plants used
- The time for the lettuces to be ready to sell
- The temperature
- The type of heater

(1 mark)

11 The farmer sowed 100 lettuce seeds in each of the test greenhouses.

Why will this give more reliable results than if only five lettuce seeds had been used in each test?

.....
.....

(1 mark)

12 The farmer decided to use paraffin heaters at 24 °C in his greenhouses.

Using information from **Tables 1 and 2**:

(a) suggest why he chose to use paraffin heaters instead of electric heaters;

.....
.....

(1 mark)

(b) suggest why he chose a temperature of 24 °C instead of 26 °C.

.....
.....

(1 mark)

Growth of the lettuces can also be speeded up by adding liquid fertiliser to the soil. Fertilisers increase the amount of minerals available to the lettuces.

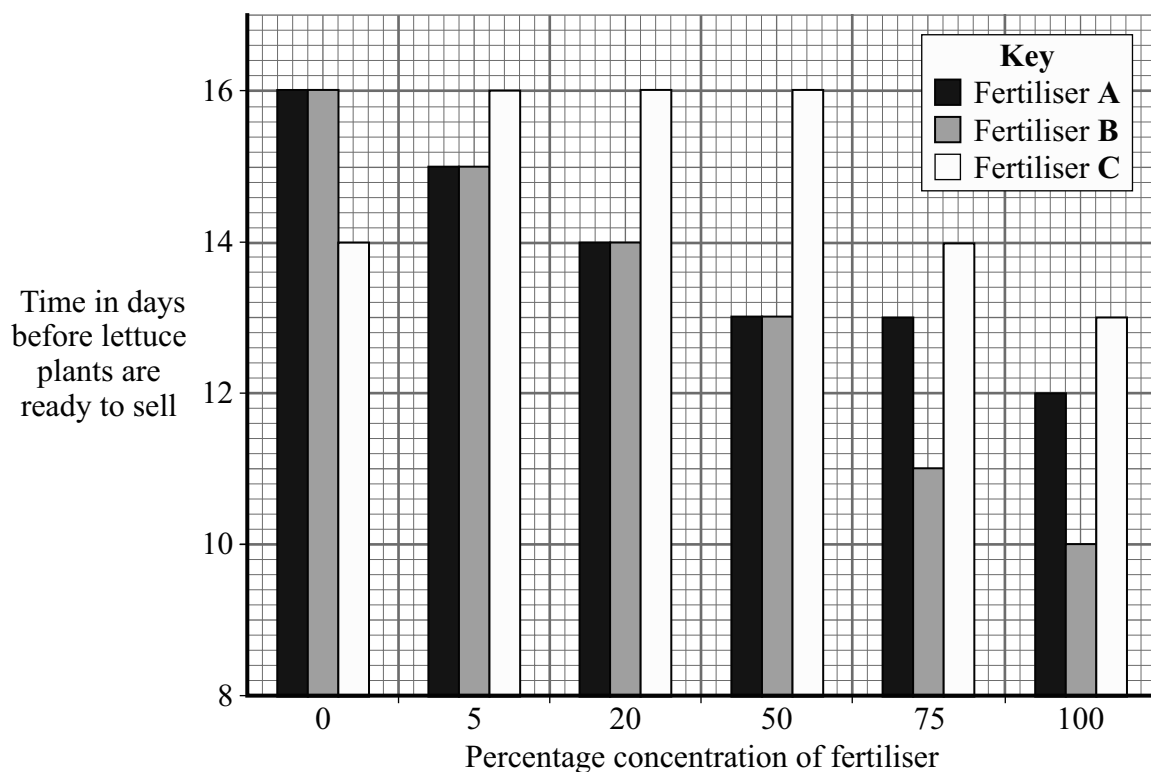
The farmer used a range of concentrations of three fertilisers: **A**, **B** and **C**.

At 100% concentration, the solution is undiluted fertiliser.

The farmer mixed different ratios of fertiliser and water to make up the same volumes of diluted fertiliser to water his lettuces. He also used water without fertiliser.

He grew the lettuces in a greenhouse heated at 24 °C using a paraffin heater.

The results are shown in a bar chart.



13 Each time the farmer watered the lettuces, he used the same volume of solution.

Why was it important to use the same volume of solution each time?

.....

.....

(1 mark)

14 What was the reason for doing the experiments with no fertiliser?

.....
.....

(1 mark)

15 Describe the effect of using increasing concentrations of fertiliser **B**.

.....
.....

(1 mark)

16 The result for fertiliser **C** at 0% concentration does not seem to fit the pattern of the other results for fertilisers at 0% concentration.

Suggest **one** reason for this.

.....
.....

(1 mark)

17 The farmer displayed the results of his fertiliser investigation as a bar chart.

Suggest why he chose a bar chart instead of a table.

.....
.....

(1 mark)

18 (a) Which fertiliser would you recommend the farmer to use?

Put a tick (✓) in the box next to your choice.

Fertiliser **A** Fertiliser **B** Fertiliser **C**

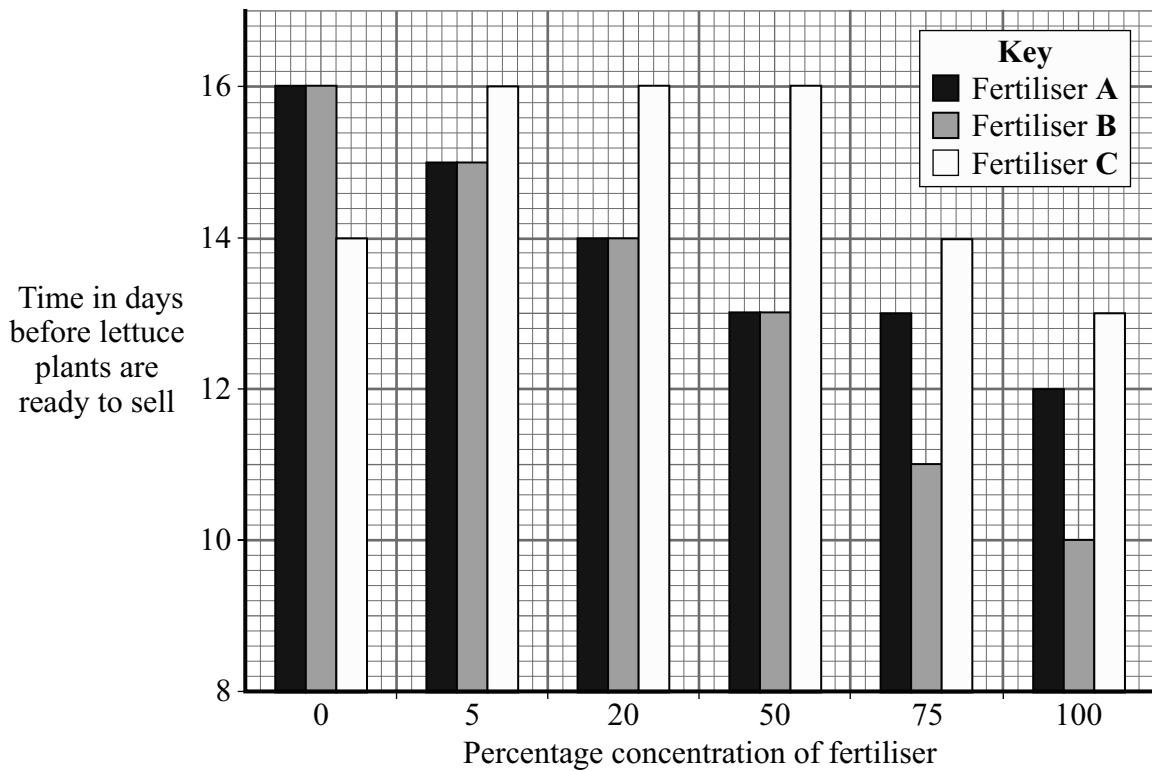
Explain your answer.

.....
.....
.....
.....

(2 marks)

Question 18 continues on the next page

To help you with this question, the bar chart is reprinted here.



- (b) The manufacturer of fertiliser A guarantees that using fertiliser A will always reduce growing time for plants by four days.

Do the results in the bar chart support this claim?

Draw a ring around your answer. **Yes** / **No**

Explain the reasons for your answer.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

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.....

.....

.....

(3 marks)

END OF QUESTIONS