

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Teacher's Use	
	Mark
Stage 1 Skills	
Stage 2 Skills	
Section A	
Section B	
TOTAL ISA Mark	



General Certificate of Education
Advanced Level Examination
June 2010

Biology

BIO6T/P10/test

Unit 6T A2 Investigative Skills Assignment

Written Test

For submission by 15 May 2010

For this paper you must have:

- the task sheet, your results and your calculations
- a ruler with millimetre measurement.
- a calculator.

Time allowed

- 1 hour 15 minutes

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 37.
- You will be marked on your ability to:
 - use good English
 - organise information clearly
 - use scientific terminology accurately.

Signature of Teacher marking the ISA Date

Section A

These questions relate to your investigation into the effect of light intensity on the rate of photosynthesis.

Use the task sheet, your results and your calculations to answer these questions.

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

6 In this investigation you found the rate of bubbling. Explain why the rate of bubbling can be used as a measure of the rate of photosynthesis.

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(2 marks)

7 Heat from the lamp causes small temperature rises during this investigation.

7 (a) Describe and explain how these temperature rises might have affected the data you collected.

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(2 marks)

7 (b) Suggest **one** way by which you could reduce these temperature rises.

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(1 mark)

8 A solution of sodium hydrogencarbonate was used in this investigation. Suggest why.

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(1 mark)

9 After setting up the apparatus, you were told to leave your plant for 5 minutes before making any measurements. Explain why you were told to leave your plant.

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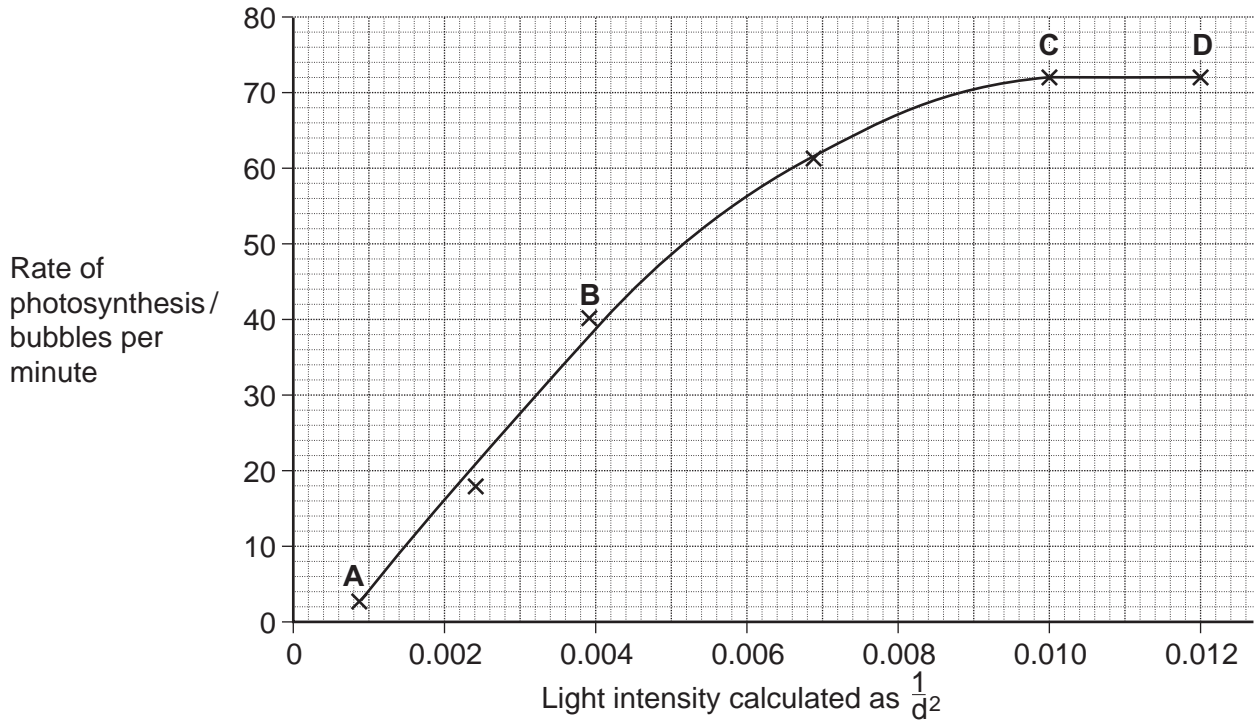
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(1 mark)

Turn over for the next question

Turn over ►

10 A student who carried out a similar investigation plotted a graph of his results.



10 (a) Explain the shape of the curve between points **A** and **B**.

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(2 marks)

10 (b) Explain the shape of the curve between points **C** and **D**.

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(2 marks)

11

Give **two** assumptions which have to be made in using the rate of bubbling as a measure of the rate of photosynthesis.

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(2 marks)

13

Turn over for the next question

Turn over ►

Resource Sheet

Introduction

Resource A – D relate to a single investigation.

Scientists investigated the effect of supplying extra carbon dioxide on the yield of tomatoes growing in a glasshouse. They compared the mean yield of tomatoes from 1995 to 1997 when no extra carbon dioxide was supplied with the mean yield of tomatoes from 1998 to 2000 when extra carbon dioxide was supplied.

Resource A

Tomato plants were grown in two glasshouses, each with an area of 2000 m². **Figure 1** shows the mean number of hours of sunshine per month during fruit production.

Figure 1

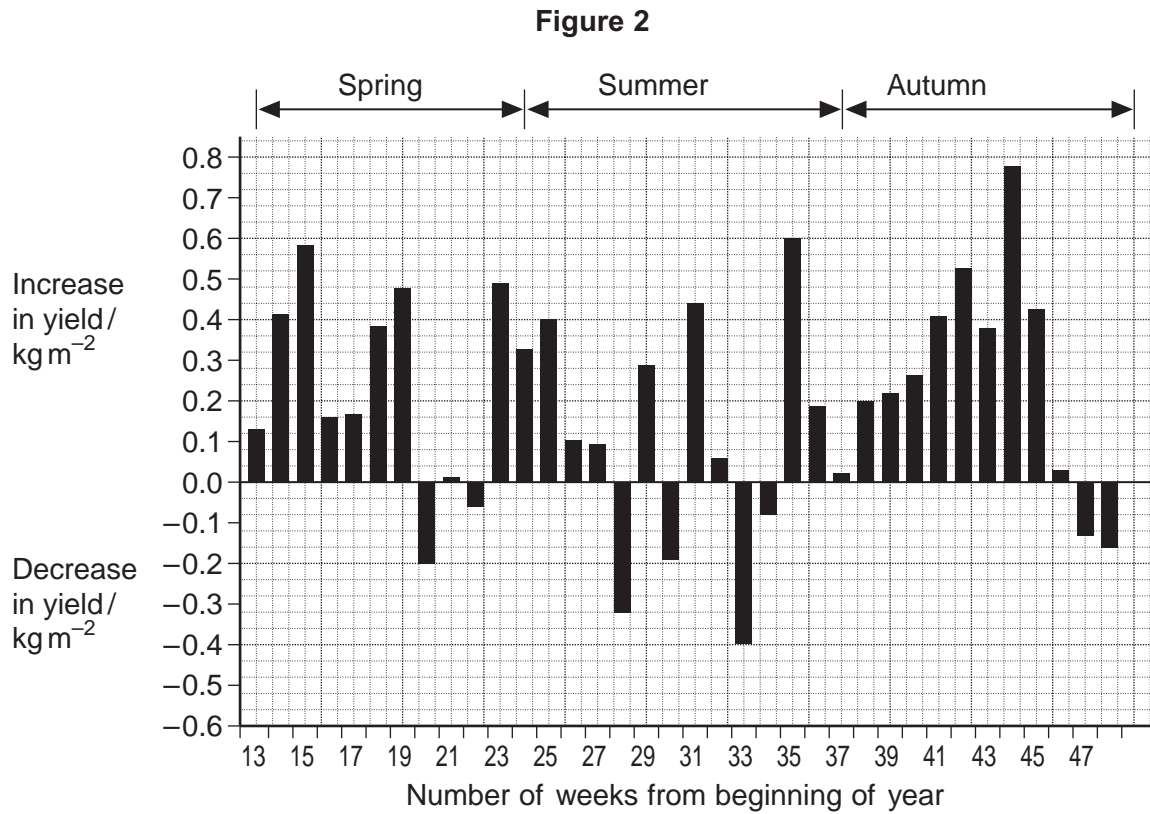
	1995 – 1997 (no extra carbon dioxide)	1998 – 2000 (extra carbon dioxide)
Mean number of hours of sunshine per month	148.91	147.00

- The scientists used heating to maintain the temperature inside the glasshouses above 18 °C. They opened the windows to keep the temperature below 30 °C.
- From 1998 to 2000 they maintained the carbon dioxide concentration between 0.06 % and 0.08 % when the windows were closed and between 0.04 % and 0.05 % when the windows were open.
- The carbon dioxide concentration in the air outside the glasshouse was 0.04 %.

Resource B

Figure 2 shows the mean difference between the yield of tomatoes with extra carbon dioxide and the yield with no extra carbon dioxide for each week during the harvesting period.

If the yield is greater when extra carbon dioxide is supplied, the difference in yield is shown as an increase. If the yield is lower when extra carbon dioxide is supplied, the difference is shown as a decrease.



The Resource Sheet continues on the next page.

Turn over ►

Resource C

Figure 3 shows the relationship between the time when the tomatoes were harvested and the yield.

Figure 3

Number of weeks from beginning of year	Mean yield per week with extra carbon dioxide / kg m⁻²	Mean yield per week without extra carbon dioxide / kg m⁻²
13 – 19	1.25	0.83
20 – 25	1.62	1.47
26 – 48	1.23	1.06

The commercial price for tomatoes varies with the time of year. The highest price is paid for tomatoes between weeks 13 and 19. The lowest price is paid between weeks 26 and 48.

Resource D

Whiteflies are an important insect pest of tomatoes. The adults can fly from plant to plant. Their young do not have wings. The adults and young feed on the plant sap and introduce viruses into the tomato plants. Feeding and the introduction of viruses both reduce the yield of tomatoes. The scientists controlled the number of whitefly in the glasshouses by releasing parasitic wasps. The wasps lay their eggs in the young of the whitefly. The wasp eggs hatch and feed on the young whitefly, killing them.

Section B

Use the information in the **Resource Sheet** and the Students' Statistics Sheet in your Task Sheet to answer the questions.

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

12 The scientists monitored the number of hours of sunshine per month. Explain why they monitored the number of hours of sunshine.

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(2 marks)

13 The temperature, the use of fertiliser and the number of insect pests were controlled during this investigation. Name **one** other factor which should have been controlled during the investigation. Explain why variation in this factor would affect yield.

Factor

Explanation

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(2 marks)

14 (a) An increase in carbon dioxide concentration affected the yield of tomatoes in week 35. Use **Figure 2** to describe how.

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(1 mark)

14 (b) There was a decrease in yield when extra carbon dioxide was supplied during some weeks of the year. Use information from **Resource A** to suggest why.

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(1 mark)

Turn over ►

15 Using **Figure 3**, calculate the percentage increase in yield when extra carbon dioxide was added for weeks 13 to 19. Show your working.

Percentage increase
(2 marks)

16 Additional information is required for tomato growers to decide whether it is economically profitable to add extra carbon dioxide to produce very early tomatoes. Give **two** pieces of information that the growers would require.

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(2 marks)

17 Adding extra carbon dioxide during the summer (weeks 24 – 36) is unlikely to be profitable. Use data from the resource sheet explain why.

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(2 marks)

18 The control experiment in this investigation was when data were collected with no extra carbon dioxide added. Some scientists said this control experiment was not satisfactory. Explain how you could improve the control experiment.

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(2 marks)

19 (a) Scientists used parasitic wasps to control the numbers of whitefly in the glasshouses. What term is used to describe this method of pest control?

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(1 mark)

19 (b) The scientists estimated the number of whitefly in each glasshouse by using yellow sticky traps hanging from the plants. The whitefly are attracted to the yellow colour and stick to the glue on the trap.

Suggest why it was important for the scientists to have an estimate of the number of whitefly in these glasshouses.

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(2 marks)

19 (c) Suggest why the use of sticky traps may **not** give an accurate measure of the total number of whiteflies in a glasshouse.

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(1 mark)

19 (d) Give **one** disadvantage of using a natural parasite, such as this wasp, rather than using chemical control.

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(1 mark)

Turn over ►

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Design an investigation to test the hypothesis that whitefly are attracted to a yellow sticky trap more than to a red sticky trap.

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(5 marks)

Extra space

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END OF QUESTIONS

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