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/Q10/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 38.
- You will be marked on your ability to:
  – use good English
  – organisation information clearly
  – use accurate scientific terminology.

Signature of Teacher marking the ISA ..... Date .....

Section A

These questions relate to your investigation on the effect of body temperature on the rate of movement.

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

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

5 (a) When you carried out the investigation at 30 °C, you put the animals in a boiling tube in the water bath before you measured their activity.
Explain why you were told to leave them for 5 minutes.

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(1 mark)

5 (b) Suggest why the temperature of the water bath should have been kept below 32 °C.

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(2 marks)

6 What temperatures did you monitor during the investigation? Explain why you decided to monitor these temperatures.

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(2 marks)

7 Name **one** factor, other than temperature, which you decided to control or monitor. Explain why you thought it necessary to control or monitor this factor.

Factor .....

Explanation .....

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(2 marks)

8 In order to obtain more data for a statistical test a student took additional readings. He used only one animal. Was it valid to use only one animal? Explain your answer.

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(2 marks)

9 Another student carried out a similar investigation. In addition to recording the number of times the animal crossed a line, she also recorded the number of times the animal reversed its direction of movement.

9 (a) Reversing its direction would affect measurements for the rate of movement of the animal. Explain how.

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(2 marks)

9 (b) How could the information about reversing the direction of movement be used when analysing the data?

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(1 mark)

10 The student suggested that her method might be improved by ruling more lines on the base of the Petri dish and using a clean Petri dish for each animal. Suggest how these modifications would improve her method.

10 (a) Ruling more lines on the base of the Petri dish

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(1 mark)

10 (b) Using a clean Petri dish for each animal

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(1 mark)

14

Resource Sheet

Introduction

During the last 50 years, there have been changes in the climate of the UK. One of the main changes is temperature. The data in the following resources all relate to southern England.

Resource A

Figure 1 shows the mean temperatures for January and February combined.

Figure 1

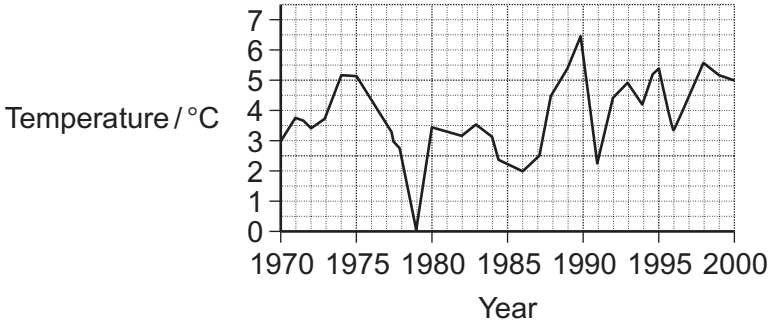
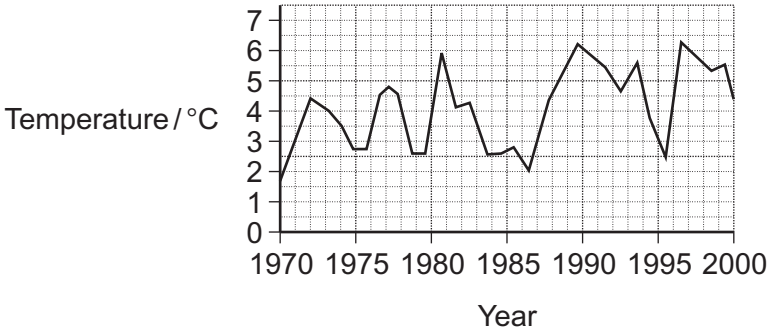


Figure 2 shows the mean temperatures for March.

Figure 2

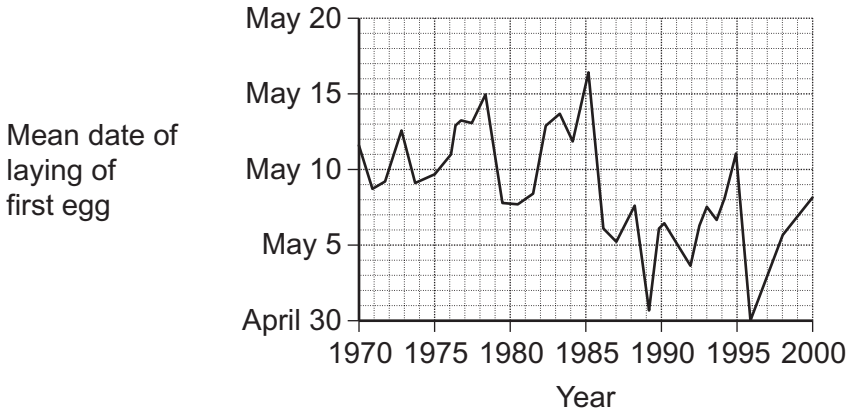


Resource B

Birds, such as chaffinches, have been recorded as breeding earlier. Chaffinches build nests. When the nest is complete, the female lays eggs until she has produced a full clutch of 4 to 6 eggs. After the eggs hatch, the parent birds feed the young on insects.

Figure 3 shows the mean date on which chaffinches laid their first egg.

Figure 3



The data from which this graph was drawn were collected by volunteers. They used standard record cards. The volunteers used one record card for each nest they found. Each card was used to record

- the geographical location
- the habitat in which the nest site was situated
- the date of each visit to the nest by the volunteer
- the number of eggs present in the nest at each visit.

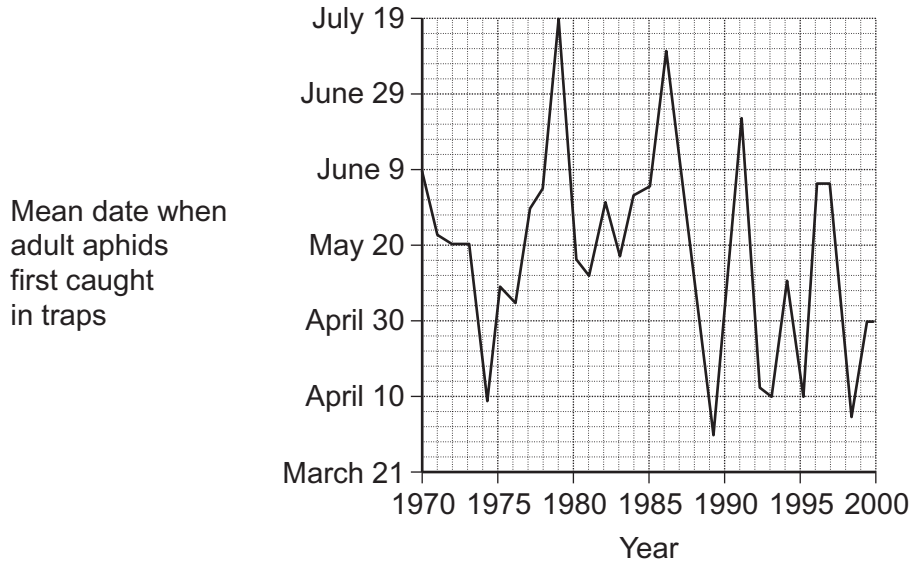
Visits were made to the nests at least once every 5 days.

Resource C

- Aphids are important insect pests of a wide range of crops.
- An aphid pierces a leaf with its mouthparts and feeds on the plant sap which contains sugars. When the aphid feeds it may transmit viruses to the plant.
- During warm periods, aphids give birth to up to five live young a day.
- In southern England, adult aphids usually die during the winter. Aphid eggs, however, survive the winter and hatch in the spring. Over the last 20 years scientists have noticed a trend for more adult aphids to survive the winter.
- Aphids can be controlled by using chemical insecticides or natural insect predators.

Scientists set traps to monitor the earliest date at which adult aphids were found. **Figure 4** shows the date when aphids were first caught in traps.

Figure 4



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.

11 Do the data in **Resource A** support the idea that there has been a rise in the mean temperatures in southern England between 1970 and 2000? Explain your answer.

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(2 marks)

12 Describe briefly how you would use a statistical test to find whether there is a significant correlation between mean March temperature and the date when chaffinches laid their first egg.

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(3 marks)

(Extra space) .....

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13 In chaffinches, the date of laying the first egg is determined by a number of factors. These include day length and temperature. What is the advantage to the bird of egg-laying being determined by

13 (a) daylength

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(2 marks)

13 (b) temperature?

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(2 marks)

14 Scientists found that there was a correlation between mean annual temperature and the date when chaffinches laid the first egg. Can you conclude that higher temperatures cause earlier laying of the first egg?
Explain your answer.

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(2 marks)

15 How does the way in which the data were collected affect the conclusions which can be drawn from **Figure 3**?

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(2 marks)

16 The aphids were caught in traps. A large number of randomly placed traps was used. Explain why

16 (a) a large number of traps was used

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(1 mark)

16 (b) the traps were placed randomly.

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(1 mark)

17 Scientists predict a very large increase in the number of aphids in the next 50 years. Use the information provided in the **Resource Sheet** to support this statement.

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(2 marks)

18 (a) Scientists produced a mathematical model that enabled them to predict the effect of an increase in temperature on the date when aphids first fly. This model predicts that aphids fly 16 days earlier for every 1 °C rise in mean temperature for January and February combined. Do the data from 1979 and 2000 support this model? Explain your answer.

(2 marks)

18 (b) (i) What is integrated control of pests?

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(2 marks)

Question 18 continues on the next page

18 (b) (ii) How could the use of information in **Resource C** and the model described in question **18(a)** help reduce the damage to crop plants by aphids when integrated control is used.

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(3 marks)

(Extra space) .....

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24

END OF QUESTIONS