

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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



General Certificate of Education  
Advanced Level Examination  
June 2010

# Human Biology

# HBI6T/P10/test

## Unit 6T A2 Investigative Skills Assignment

### Written Test

**For submission by 15 May 2010**

**For this paper you must have:**

- your Task Sheet, your results and your statistical test
- a ruler with millimetre measurements
- 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 35.
- You will be marked on your ability to:
  - use good English
  - organise information clearly
  - use accurate scientific terminology.

Signature of Teacher marking this ISA ..... Date .....

**Section A**

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

Use your Task Sheet, your results and your statistical test to answer them.

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

- 1** You were told to use a waterbath at 30 °C (step 4). Suggest how this temperature can be monitored.

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(1 mark)

- 2** You should have kept the lamp the same distance from the water bath throughout the investigation. Explain why.

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(2 marks)

- 3** The algal beads varied in size and shape. Could this have affected your results? Give reasons for your answer.

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(2 marks)

- 4** You shook the tube containing the beads every few minutes. You decided when the colour change in the hydrogencarbonate was complete by comparison with a standard red indicator.

- 4 (a)** Suggest why you were told to shake the beads every few minutes.

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(1 mark)

- 4 (b)** Explain why your method may not have given an accurate measure of the time for the colour change to be complete.

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(1 mark)

- 5** Suggest how gel beads could be used in a control experiment for this investigation. Explain what information this control experiment would provide.

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(2 marks)

- 6** Hydrogencarbonate indicator is usually used as an indicator of pH. It is yellow in acid conditions and turns red as the pH rises. Explain why the colour changes in your investigation.

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(2 marks)

- 7** Buffers are often used in investigations of enzyme-controlled reactions. Explain why buffers are often used in this way.

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(1 mark)

Turn over ►

- 8 The changing pH in your investigation caused the colour change you saw. Explain how the change in pH might affect the rate of photosynthesis by the algae.

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(3 marks)

(Extra Space) .....

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15
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## Resource Sheet

The information in the Resource Sheet is about the production of biofuels as an alternative to fossil fuels.

### Introduction

Reserves of fossil fuels are rapidly running out. Research is being carried out to find alternative fuels. Plants can be grown to produce biofuels. These plants can be harvested, dried and burnt to release energy.

### Resource A

Scientists investigated three species of grass as possible biofuels.

**Table 1** shows some features of these grasses. All of these grasses produce large amounts of wind-borne pollen.

**Table 1**

Feature	Switch grass	Canary reed grass	Elephant grass
Region from which they come	North America	UK	Asia
Grown from	Seed	Seed	Chopped pieces of root
Plant life span / years	1	1	20
Percentage water content when harvested	38	42	12
Yield as dry mass / tonnes per hectare per year	5 to 9	10	12 to 25

1 hectare = 10 000 square metres

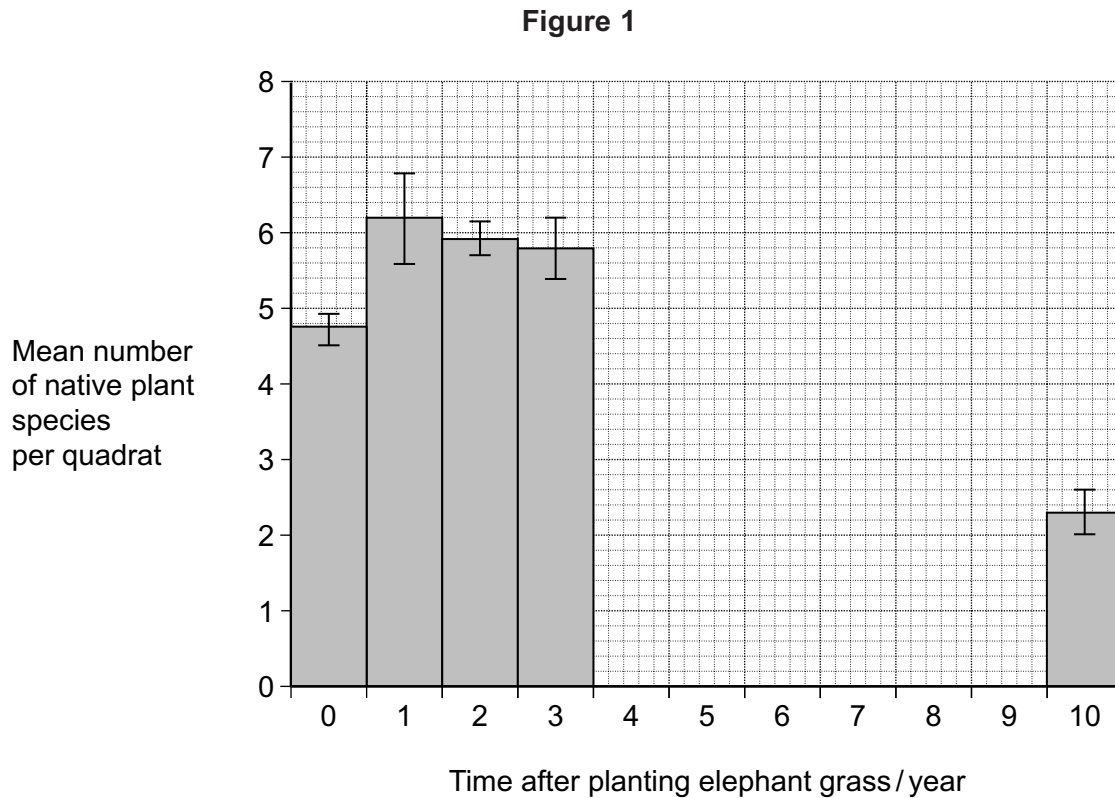
Turn over ►

**Resource B**

Elephant grass has been introduced as a source of biofuel in the UK. This involves growing the grass on a large scale. Ecologists are concerned about the effect this may have on native species in the UK.

Ecologists in the UK investigated the number of native plant species in the edges of fields of elephant grass of different ages. In each field, they recorded the native species present in forty quadrats placed at the edges of fields. Each quadrat was 10 metres long and 1 metre wide.

**Figure 1** shows their results.



**Resource C**

The dry mass of a sample of grass is found using the following method.

- Place the sample in an oven at 100 °C for several hours.
- Remove the sample, weigh it and return it to the oven for several more hours.
- Repeat until the mass of the sample remains constant.

**Resource D**

Diesel is a fuel made from oil. Biodiesel is a fuel made from plants such as rape and soya. It can replace the fuel used by diesel engines. **Table 2** shows information about the resources used to make diesel fuel from three different sources.

**Table 2**

		Relative use of resources in producing fuel				Percentage of existing farmland needed to grow enough biofuel plants to replace half the diesel used annually
Source of diesel or biodiesel	Carbon dioxide emissions produced while making each unit of fuel / arbitrary units	Water	Fertiliser	Pesticide	Energy	
Oil	83	high	None	None	high	None
Rape	37	high	medium	medium	low	30
Soya	49	high	low	medium	low	210

Turn over ►

**Section B**

Use the information in the **Resource Sheet** to answer the questions.

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

**9**

The yield of the grass crops in **Resource A** was measured as dry mass / tonnes per hectare per year.

Explain why the yields were measured per hectare per year.

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(2 marks)

**10**

After reading **Resources A** and **B** a farmer concluded that elephant grass was the best grass to grow as a biofuel.

Use these resources about the features of elephant grass to advise him whether his conclusion is correct.

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(4 marks)

(Extra Space) .....

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- 11** Plans are in place to use previously uncultivated land and land cleared by felling forests to grow biofuels.  
Suggest how growing large areas of the grasses shown in **Resource A** might affect human health.

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(2 marks)

- 12 (a)** Scientists determined the yields of two biofuel crops. They used the method outlined in **Resource C**.  
Suggest why this method involves repeated heating and weighing of the samples until the results remain constant.

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(1 mark)

- 12 (b)** The scientists results are shown in **Resource D**. Describe a statistical technique the scientists could use to see if there is any relationship between the yield of the two biofuel crops and the amount of fertiliser used to grow them.

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(3 marks)

(Extra Space) .....

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Turn over ►

**13** Use **Resource D** to answer this question.

**13 (a)** Identify and explain **one** piece of evidence that suggests the use of biofuels may be beneficial to the environment.

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(2 marks)

**13 (b)** Identify and explain **one** piece of evidence that suggests the use of biofuels may **not** be beneficial to the environment.

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(2 marks)

14

The European Union 'set-aside' scheme pays farmers to leave fields uncultivated. Use your knowledge and relevant information in **Resource A, B, C** or **D** to suggest the likely ecological effects of a decision to grow elephant grass on the populations of insects currently found on set-aside land.

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(4 marks)

(Extra Space)

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20

END OF QUESTIONS