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Surname						Other Names					
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Candidate Declaration. I have read and understood the Notice to Candidate and can confirm that I have produced the attached work without assistance other than that which is acceptable under the scheme of assessment.											
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For Teacher's Use	
Section	Mark
PSA	
Stage 1 Skills	
Stage 2 Skills	
Section A	
Section B	
TOTAL (max 50)	



General Certificate of Education
Advanced Level Examination
June 2013

Biology

BIO6T/Q13/test

Unit 6T A2 Investigative Skills Assignment

Written Test

For submission by 15 May 2013

For this paper you must have: <ul style="list-style-type: none"> the task sheet, your results and your calculations a ruler with millimetre measurements a calculator. 	Time allowed <ul style="list-style-type: none"> 1 hour 15 minutes
Instructions <ul style="list-style-type: none"> 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 space 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 <ul style="list-style-type: none"> The marks for questions are shown in brackets. You are expected to use a calculator where appropriate. The maximum mark for this paper is 37. You will be marked on your ability to: <ul style="list-style-type: none"> use good English organise information clearly use scientific terminology accurately.

Details of additional assistance (if any). Did the candidate receive any help or information in the production of this work? If you answer yes give the details below or on a separate page.

Yes No

Teacher Declaration:

I confirm that the candidate's work was conducted under the conditions laid out by the specification. I have authenticated the candidate's work and am satisfied that to the best of my knowledge the work produced is solely that of the candidate.

Signature of teacher Date

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Section A

These questions relate to your investigation of the energy content of foods rich in carbohydrates.

Use the Task Sheet and your results to answer the questions.

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

6 You were told to hold the test tube at an angle and facing away from you and anyone else (step 3).

Suggest **one** reason, other than for safety, why this was a better method than keeping the tube in a vertical position.

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(1 mark)

7 Use your results to calculate the mean energy content, in kJ, of 100 g of marshmallows.

Mean energy content of 100 g of marshmallows = kJ
(1 mark)

In shops, nutritional information for cream crackers and marshmallows is shown on the packets in which they are sold. **Figure 1** summarises nutritional information from two packets.

Figure 1

	Nutritional information per 100 g of food substance	
	Cream crackers	Marshmallows
Energy /kJ	1820.0	1768.0
Total carbohydrates /g	67.5	67.7
Simple sugars /g	1.5	44.8
Dietary fibre /g	3.7	2.0
Total fat /g	13.4	16.9
Total protein /g	9.8	4.0

8 Nutritional information is shown per 100 g. Explain **one** advantage to the shopper of showing information in this way.

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(2 marks)

9 You measured the energy content of cream crackers and marshmallows. Is this a valid measurement of the carbohydrate content of these food substances? Explain your answer.

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(2 marks)

Turn over ►

10 The data for energy content on the food packet were obtained using apparatus that does not allow any significant heat loss during burning. The value you calculated for the energy content of marshmallows (Question 7) should be lower than the value given in **Figure 1**.

Give **two** reasons, other than differences in marshmallows, why the value you calculated should be lower.

Reason 1

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Reason 2

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(2 marks)

11 Explain why the information about mass in **Figure 1**

11 (a) adds up to less than 100 g for cream crackers

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(1 mark)

11 (b) adds up to more than 100 g for marshmallows.

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(1 mark)

12 Cream crackers contain a lot of starch.

12 (a) Explain how information in **Figure 1** supports this statement.

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(2 marks)

12 (b) Describe how you could show that cream crackers contain starch.

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(2 marks)

13 You could plot a graph of your results to see if there is a relationship between the mass of a marshmallow and its energy content.

What type of graph should you use to show whether there is a relationship between the mass and the energy content of each marshmallow? Explain your answer.

Type of graph

Explanation

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(2 marks)

16

Turn over for the next question

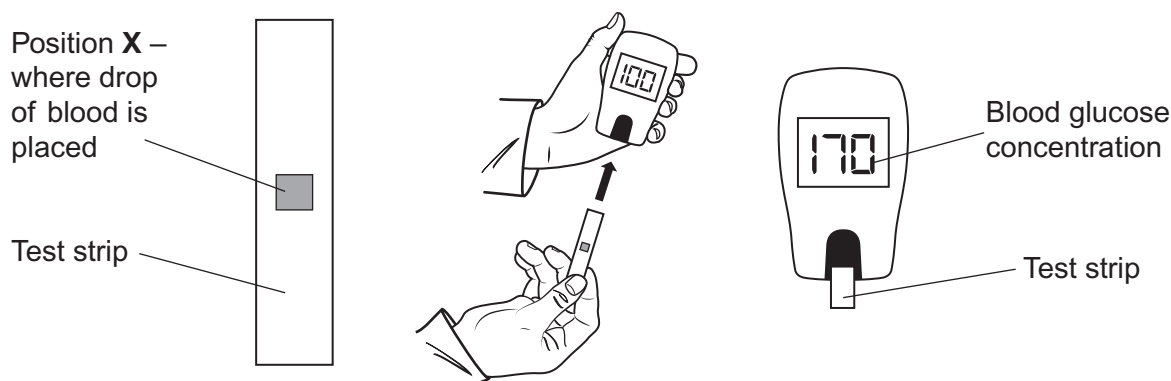
Turn over ►

Resource Sheet

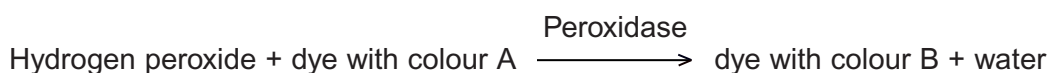
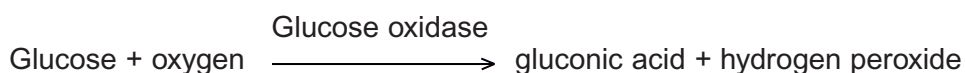
Resource A

A glucometer is a device used to measure blood glucose concentration. A person uses a test strip that goes into the glucometer. They put a drop of blood onto the test strip. There are substances on the test strip that produce a colour change with glucose. The higher the concentration of glucose, the deeper the colour produced. The glucometer measures the depth of colour produced and converts this into a glucose concentration. A new test strip is used for each blood test.

Figure 2 – glucometer and test strip



The following equations show how the substances on the test strip produce a colour change.



Non-diabetics have no glucose in their urine. Diabetics have glucose in their urine if their blood glucose concentration rises above about $170 \text{ mg } 100 \text{ cm}^{-3}$.

Before the glucometer was available, diabetics used test strips to measure the concentration of glucose in their urine as a means of measuring their blood glucose concentration. When testing urine, the colour of the test strip is compared against a colour chart which gives a glucose concentration range for the colour produced.

Resource B

There are two types of diabetes: type 1 and type 2.

- People with type 1 diabetes do not produce enough insulin.
- People with type 2 diabetes do produce insulin but have cells which do not respond to insulin.

Doctors use a glucose tolerance test to help diagnose people with diabetes. They start each test after a person has not eaten overnight. They measure a person's blood glucose concentration. The person then drinks a solution containing 75 g of glucose. The doctors measure the person's blood glucose concentration 2 hours later. During the test, the person remains at rest.

Figure 3 shows three diagnoses that can be made from the results of the test.

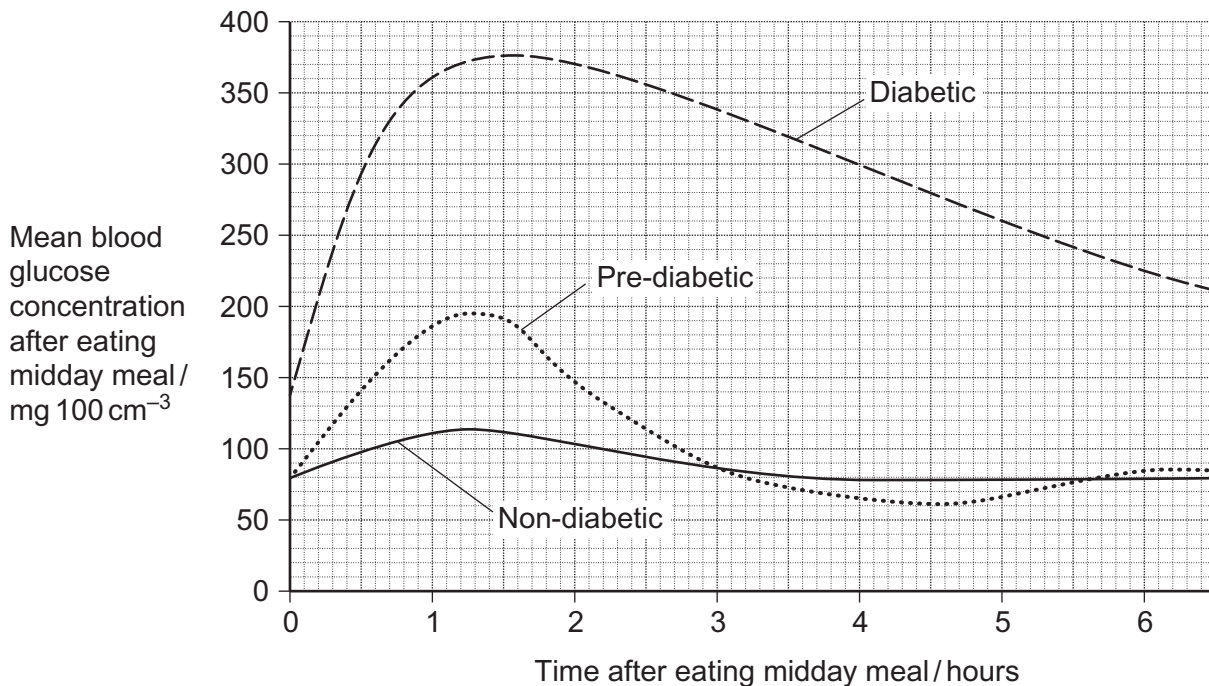
Figure 3 – glucose tolerance test results and diagnoses

Blood glucose concentration after 2 hours / $\text{mg } 100 \text{ cm}^{-3}$	Diagnosis	Comments
≤ 110	Non-diabetic	Low risk for future diabetes
Between 140 and 200	Pre-diabetic	High risk for future diabetes. Some doctors recommend that the upper value should be lowered to $180 \text{ mg } 100 \text{ cm}^{-3}$
≥ 200	Diabetic	Confirm by doing a second test

A researcher monitored the mean blood glucose concentration of a non-diabetic, a pre-diabetic and a diabetic after they had each eaten a midday meal.

His results are shown in **Figure 4**.

Figure 4



Turn over ►

Section B

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

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

Use **Resource A** to answer Questions **14** to **15**.

14 Identify all the substances located at position **X** on the test strip before a drop of blood is added.

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(2 marks)

15 Before the glucometer was available, diabetics used test strips to measure the concentration of glucose in their urine as a means of measuring their blood glucose concentration.

Give **two** reasons why this method of testing urine would **not** give an accurate measurement of blood glucose concentration.

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(2 marks)

Use **Resource B** to answer Questions **16** to **21**.

16 People with type 1 diabetes are described as being insulin-dependent. Suggest why they are described as insulin-dependent.

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(1 mark)

17 Some people with type 2 diabetes have cells which do **not** respond to insulin. Explain how this leads to a reduced ability to regulate blood glucose concentration.

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(3 marks)

(Extra space)
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18 During a glucose tolerance test the person remains at rest. Why is it important that the person remains at rest?

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(2 marks)

19 Use **Figure 4** to calculate how many times the maximum mean blood glucose concentration of the pre-diabetic is greater than the maximum of the non-diabetic person. Show your working.

Answer =
(2 marks)

Turn over ►

20 Give **three** differences between the method used by the researcher to obtain the results in **Figure 4** and the method doctors use to carry out a glucose tolerance test.

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 - 2.....
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 - 3.....
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- (3 marks)*

21 Some doctors have recommended that the upper value used in the glucose tolerance test should be lowered to $180 \text{ mg } 100 \text{ cm}^{-3}$.
Using information from **Figure 3** and **Figure 4**, suggest why.

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(3 marks)

(Extra space)

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22

A laboratory worker suspected she had type 2 diabetes but did not have a glucometer. Instead she added a drop of her blood to a test strip and used a colour chart to estimate her blood glucose concentration as $140 \text{ mg } 100 \text{ cm}^{-3}$.

Is it valid to conclude that she did have type 2 diabetes?

Use this information, and **Resource A** and **Resource B**, to explain your answer.

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(Extra space) (3 marks)

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21

END OF QUESTIONS