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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 Subsidiary Examination
June 2014

Biology

BIO3T/Q14/test

Unit 3T AS Investigative Skills Assignment

Written Test

For submission by 15 May 2014

For this paper you must have: <ul style="list-style-type: none"> the task sheet, your results and your graph 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 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 <ul style="list-style-type: none"> The marks for questions are shown in brackets. The maximum mark for this paper is 35. You are expected to use a calculator where appropriate. 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

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Section A

These questions relate to your investigation into estimating the concentration of glucose in a solution.

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

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

- 1** The reaction between glucose and potassium manganate (VII) is shown by the equation:



Use your observations to give the colour, if any, of substance X.

[1 mark]

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- 2** In step 4, you had to decide when the pink colour disappeared. This is the end point of the reaction. How did you try to ensure that your end point was consistent?

[1 mark]

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- 3** You were **not** told to carry out repeats in this investigation.

Suggest **one** advantage of carrying out repeats.

[1 mark]

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- 4** You did **not** use a water bath in this reaction. Do you think this affected your results?

Explain your answer.

[1 mark]

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5 You were told to use a glass rod to stir the mixture continuously (step 4).
Suggest why. **[1 mark]**

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6 In your investigation, it was not appropriate to use a millisecond timer.
Suggest why. **[1 mark]**

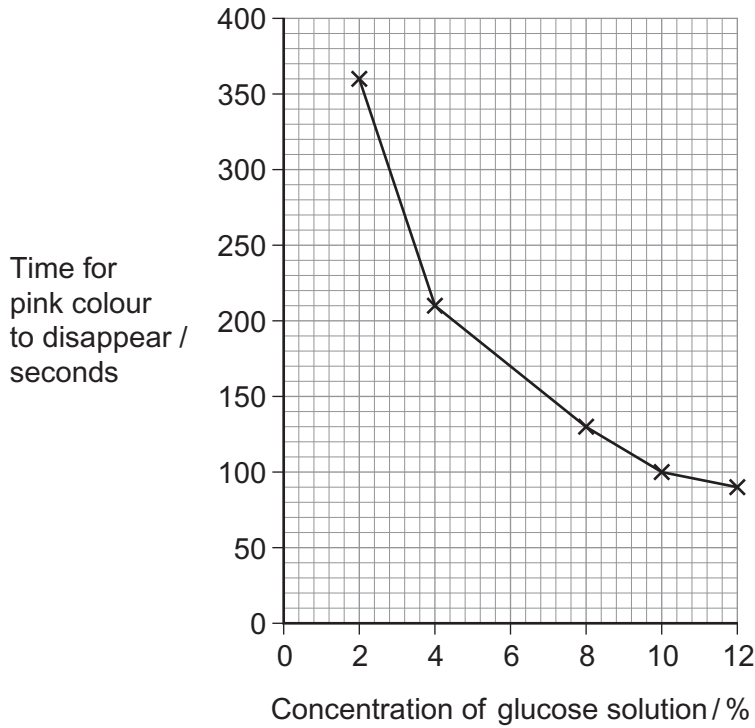
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7 In this investigation, were your data quantitative or qualitative?
Explain your answer. **[1 mark]**

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8 A student carried out a similar experiment to yours. **Figure 1** shows the reference curve from her results.

Figure 1



8 (a) The student obtained a result of 170 seconds for unknown solution **A**. From this she estimated the concentration of this solution to be 6%.

Using **Figure 1**, she was only able to estimate the concentration of solution **A**. Explain why she could only make an estimate.

[2 marks]

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8 (b) Suggest how she could modify her method to find the true concentration of this solution.

[1 mark]

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9 Another student wanted to use Benedict’s reagent and a water bath to estimate the concentration of glucose in solution **A**. Using the same five concentrations of glucose solutions as in your investigation, describe how he should do this.

[4 marks]

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Turn over for the Resource Sheet

Resource Sheet

Resource A

Many sports drinks contain water, sodium chloride and carbohydrates. The manufacturers of the sports drinks claim that carbohydrates provide an energy boost. The sodium chloride is used to increase absorption of glucose in the small intestine.

Scientists investigated the effect of a sports drink on the performance of runners in 5 km races. They recruited 100 runners who had previously run a 5 km race in similar times. During this race, Race 1, they had water they could drink.

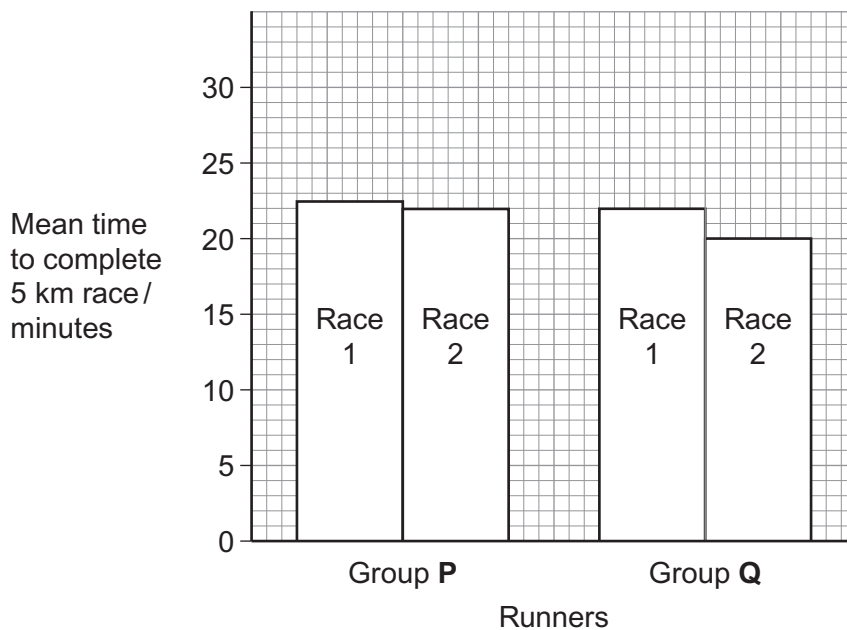
The scientists divided the runners into two equal groups, **P** and **Q**. Both groups ran a second 5 km race, Race 2. During this race:

- group **P** had water available
- group **Q** had the sports drink available.

The scientists recorded the mean time for each group to complete this race.

Figure 2 shows their results.

Figure 2

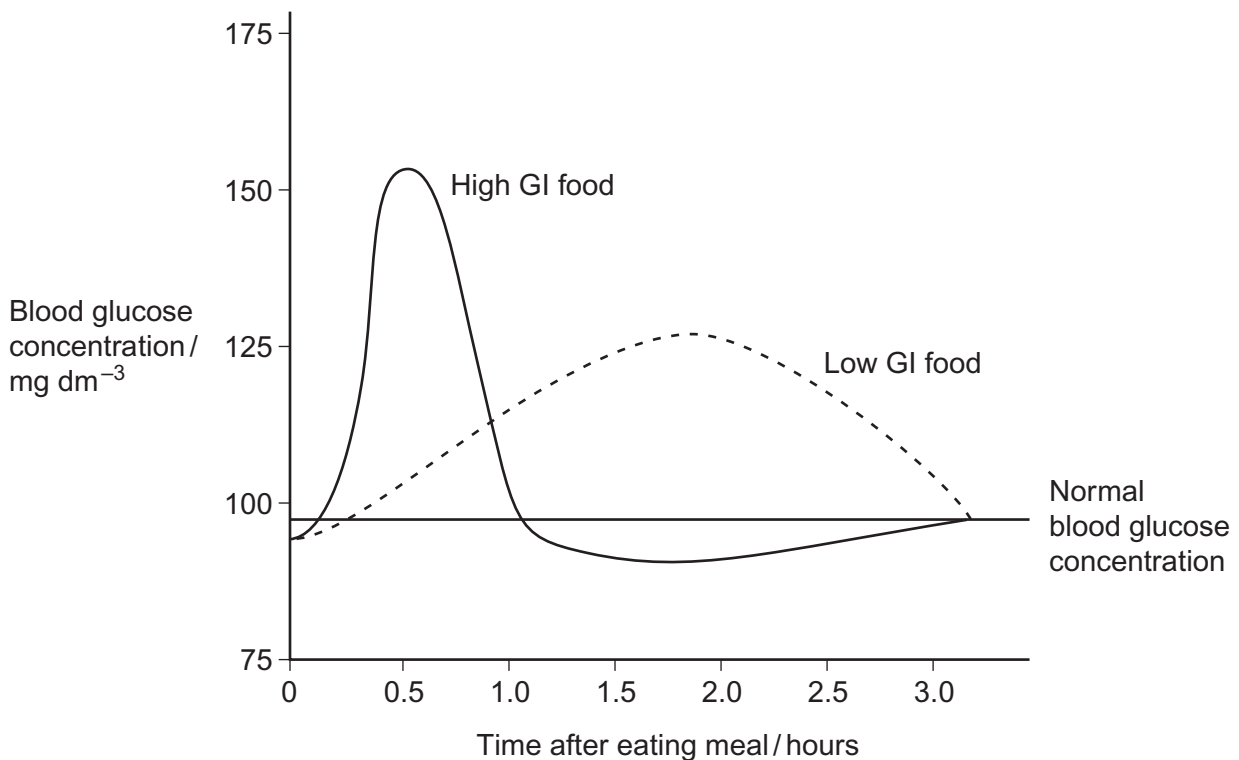


Resource B

The glycaemic index (GI) is a measure of the increase in blood glucose concentration after eating a given mass of a food compared with eating the same mass of pure glucose. The GI of pure glucose has a value of 100.

The GI of a food depends on several factors such as how much starch and sugars it contains. High GI foods include those containing lots of simple sugars or white flour. The carbohydrates in these foods are rapidly digested and absorbed. Low GI foods include wholegrain bread and breakfast cereals that contain a lot of fibre. The carbohydrates in these foods are digested and absorbed more slowly.

Figure 3 shows changes in blood glucose concentration after eating meals of high GI food and meals of low GI food.

Figure 3

Section B

Use the information in the **Resource Sheet** and your own knowledge to answer the questions.

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

Use **Resource A** to answer **Questions 10 to 13**.

10 Use **Figure 2** to calculate the percentage decrease in the mean time taken for group **Q** to complete Race 2 compared with Race 1.

Show your working.

[2 marks]

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11 One of the runners concluded that the sports drink improved performance.

Do these data support his conclusion?

[3 marks]

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12 The runners were matched for the time taken to run the first race.

Give **three** other factors for which they should have been matched.

[3 marks]

Factor 1

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Factor 2

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Factor 3

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13 The sports drink contains sodium chloride. Sodium chloride increases uptake of glucose in the small intestine.

Explain how.

[4 marks]

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Turn over for the next question

Turn over ►

Use **Resource B** to answer **Questions 14** and **15**.

- 14** Complete **Table 1** to give **four** differences between the effects of high GI and low GI foods on blood glucose concentration.

[4 marks]

Table 1

High GI foods	Low GI foods

- 15** White bread and wholegrain bread contain similar proportions of starch. White bread has a higher GI than wholegrain bread.

Suggest **one** explanation for the difference in GI.

[2 marks]

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Use both **Resource A** and **Resource B** to answer **Question 16**.

16 Explain how a sports drink could provide an energy boost when running.

[3 marks]

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[Extra space]

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END OF QUESTIONS