

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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



General Certificate of Education
Advanced Subsidiary Examination
June 2010

Human Biology

HBI3T/P10/test

Unit 3T AS Investigative Skills Assignment

Written Test

For submission by 15 May 2010

For this paper you must have:

- your task sheet, your results and your graph
- 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 sodium chloride concentration on the percentage change in mass of carrot tissues.

Use your Task Sheet, your results and your graph to answer them.

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

- 1** The outline method told you to cut all of the cylinders from the cortex of the carrot. Suggest why.

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(1 mark)

- 2** Give **two** factors that you considered when you decided on the number of cylinders to put in each tube.

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(2 marks)

- 3** It is better to use percentage change in mass of carrot cylinders than change in mass. Explain why.

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(2 marks)

- 4** You were told to place all your tubes in the same place. Explain why putting your tubes in different places in the laboratory might affect your results.

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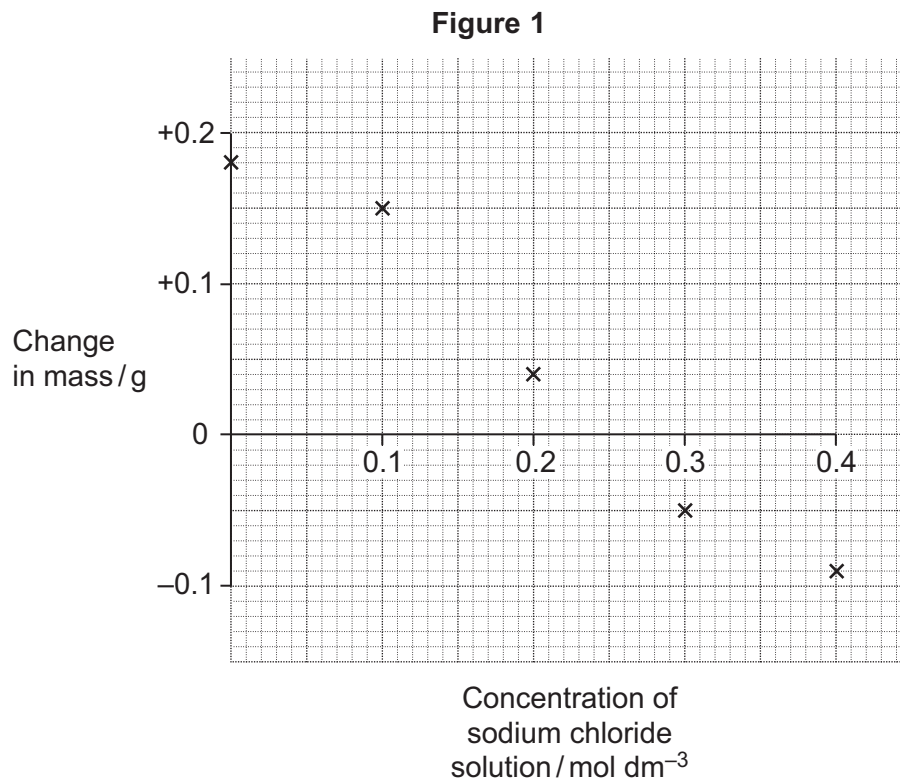
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(2 marks)

- 5 A student carried out a similar investigation to yours, but used a different plant tissue. **Figure 1** shows how she plotted her results.



- 5 (a) (i) Use the points in **Figure 1** to plot a curve. (2 marks)

- 5 (a) (ii) Use this curve to find the concentration of sodium chloride solution that would produce no change in the mass of plant tissue.

Concentration of sodium chloride solution mol dm⁻³
(1 mark)

- 5 (b) What does the answer to Question 5 (a)(ii) tell you about the water potential of the plant tissue?

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(1 mark)

Question 5 continues on the next page

Turn over ►

- 5 (c)** Explain why there is no change in mass of the plant tissue in this concentration of sodium chloride solution.

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(2 marks)

- 5 (d)** Use your biological knowledge to describe and explain what has happened in the plant tissue in the 0.3 mol dm^{-3} sodium chloride solution in this investigation.

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(3 marks)

(Extra Space)

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- 5 (e)** Conclusions drawn from your graph may be more reliable than conclusions from this graph. Suggest why.

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(1 mark)

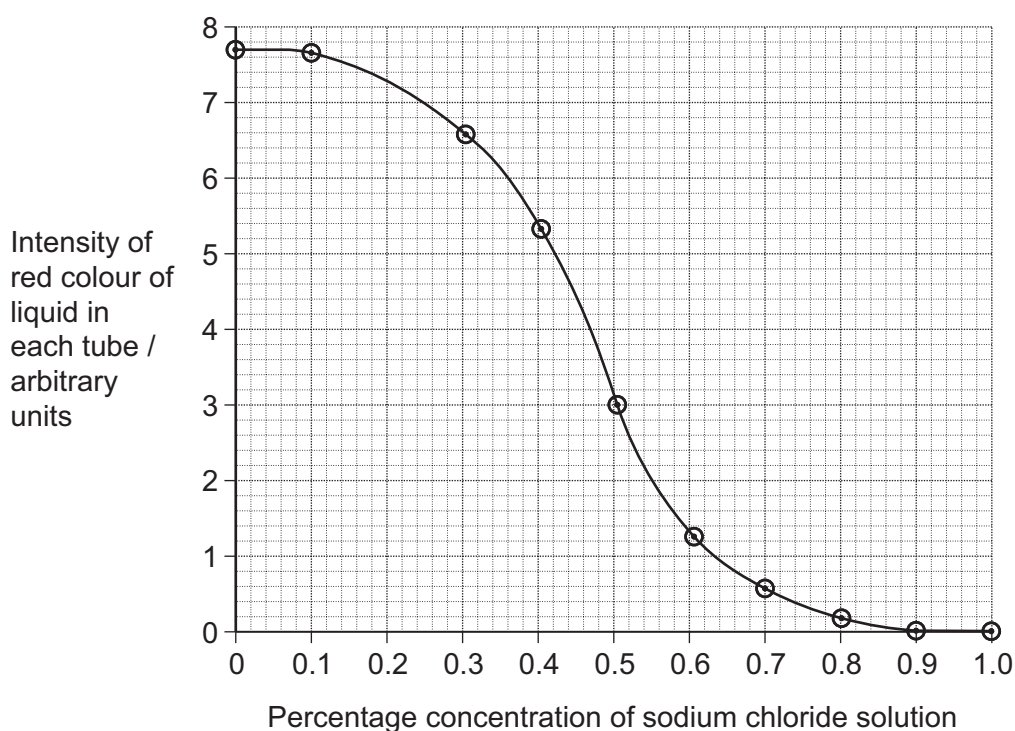
Resource Sheet

Resource A

A scientist investigated the effects of different concentrations of sodium chloride solution on red blood cells. He took a sample of blood and spun it in a tube in a centrifuge. The blood cells formed a red pellet in the bottom of the tube. Above the pellet there was a pale yellow liquid.

He then took a 0.2 cm^3 sample of blood and mixed it with 15 cm^3 of distilled water before spinning it in a centrifuge. No red pellet formed and the tube contained a clear red liquid. He repeated this experiment with different concentrations of sodium chloride solution instead of distilled water. When he had centrifuged all of the tubes, he measured the intensity of the red colour of the liquid in each tube using a colorimeter. **Figure 2** shows the results.

Figure 2



Turn over ►

Resource B

There is a Guideline Daily Amount (GDA) for the maximum amount of sodium chloride we should eat each day. **Table 1** shows the sodium chloride content of 100 grams of some processed foods. The sodium chloride content is shown in grams and as a percentage of GDA. The table also gives the manufacturers' recommended portion size for each food.

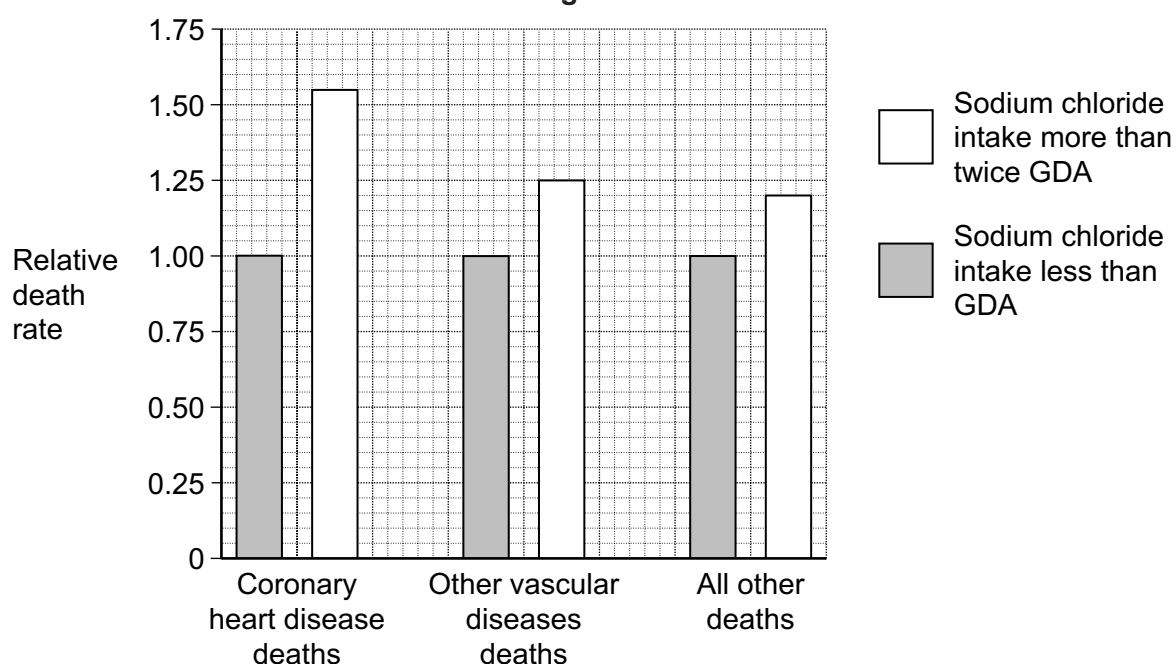
Table 1

Food	Mass of sodium chloride / g per 100 g of food	Percentage of GDA of sodium chloride in 100 g of food	Recommended portion size / g
Cereal bar	0.72	12	60
Fish fingers	0.90	15	200
Oven ready pizza	1.44	24	100
Yeast extract	9.60	160	4

Resource C

Doctors in Canada collected data on a group of people who took in less than the Guideline Daily Amount (GDA) of sodium chloride and compared it with data from a group who took in more than twice the GDA. They recorded the annual death rates in both groups from coronary heart disease, other vascular diseases and all other causes. For each cause of death, they calculated the ratios of death rates of the high sodium chloride group to the low sodium chloride group. They called this the Relative Death Rate. Their results are shown in **Figure 3**.

Figure 3



Section B

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

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

Use **Resource A** to answer **Question 6**.

- 6 (a)** What substance makes the liquid red in the centrifuged tubes?

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(1 mark)

- 6 (b)** When the blood was added to distilled water, the liquid was red after centrifuging.
Explain why it was red.

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(3 marks)

(Extra Space)
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Question 6 continues on the next page

Turn over ►

6 (c) Explain the shape of the curve shown in **Figure 2**

6 (c) (i) between 0.35 and 0.55 percentage concentration of sodium chloride

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(3 marks)

(Extra Space)

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6 (c) (ii) between 0 and 0.05 percentage concentration of sodium chloride.

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(1 mark)

6 (d) Patients in hospital may be given intravenous infusions directly into a vein. These infusions are often a solution of sodium chloride. Use **Figure 2** to suggest what concentration of sodium chloride you would expect to find in an intravenous infusion. Explain your answer.

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(2 marks)

Use **Resource B** to answer **Question 7**.

- 7 (a)** Use data from **Table 1** to calculate the Guideline Daily Amount of sodium chloride. Show your working.

Answer
(2 marks)

- 7 (b)** Which of the recommended individual portions of food shown in **Table 1** would provide the smallest amount of sodium chloride?

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(1 mark)

Turn over for the next question

Turn over ►

Use **Resource C** to answer **Question 8**.

- 8 (a)** In the investigation, the groups of people taking less than the GDA and more than twice the GDA were matched for other factors. For example, they contained people in the same age range and contained the same proportions of men and women.

Suggest **one** other factor that should be matched between the two groups.

Explain how change in this factor could affect the results.

Suggested factor

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Explanation

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(2 marks)

- 8 (b)** Food manufacturers are reducing the amount of sodium chloride in processed foods. Describe **two** pieces of evidence that this is likely to lower the risk to people's health.

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(2 marks)

- 9** Most doctors believe that sodium chloride intake should be reduced. However, many isotonic sports drinks that are recommended for athletes contain sodium chloride. Suggest why.

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(1 mark)

END OF QUESTIONS