

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

For Teacher's Use Total ISA mark

General Certificate of Education
June 2009
Advanced Subsidiary Examination



HUMAN BIOLOGY
Investigative Skills Assignment (ISA)
Written test

HBI3T/Q09/test

For submission by 15 May 2009

<p>For this paper you must have</p> <ul style="list-style-type: none"> the task sheet, your results and your graph a ruler with millimetre measurements. <p>You may use a calculator.</p>
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For Teacher's Use	
Section	Mark
Stage 1 skills	
Stage 2 skills	
Section A	
Section B	
TOTAL ISA MARK	

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.
- All working must be shown.
- Do all rough work in this book. Cross through any work you do not want marked.

Information

- The maximum mark for this test is 34.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.
- Use accurate scientific terminology in all answers.

Signature of Teacher marking this ISA Date

SECTION A

These questions relate to your investigation into the effect of temperature on the rate of digestion of starch by amylase.

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

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

1 You used a buffer solution in your investigation. What are buffer solutions for?

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(1 mark)

2 You were told to use a water bath at 60 °C. Explain why a water bath is used.

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(1 mark)

3 You put the tubes containing the separate amylase and starch solutions in a water bath for 10 minutes before mixing. Explain why.

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(1 mark)

4 Did you use a water bath at room temperature? Explain the reason for your choice.

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(1 mark)

5 In each experiment, how did you determine when all the starch had been digested and no further samples needed to be taken?

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(2 marks)

- 6 You could use the data you collected from your investigation to estimate the time it would take for all the starch to be digested at a temperature of 5 °C. Explain how.

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(3 marks)

(Extra space)

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- 7 A student made up a 1% solution of amylase using water and a 10% solution of amylase. Complete the table to show the volume of water and the volume of 10% solution of amylase that a student would need to make 10 cm³ of a 1% solution of amylase.

Volume of water / cm ³	Volume of 10% solution of amylase / cm ³

(1 mark)

- 8 One student suggested that this investigation could be improved by carrying out an experiment with starch but no amylase. Do you agree that this would improve the investigation? Explain your answer.

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(1 mark)

- 9 A student produced a bar chart to show the results of his experiment with amylase. Why was this type of graph unsuitable?

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(1 mark)

Turn over ►

- 10** A teacher collected class data for the time it took for all the starch to be digested at 60 °C. He then calculated the mean and standard deviation for the data. What information does the standard deviation provide?

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(1 mark)

- 11** Afterwards, one student decided to carry out an experiment at a higher temperature. He heated his enzyme solution and the starch solution to 80 °C for 10 minutes before mixing them together. He found starch was still present 15 minutes after mixing. Explain why.

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(3 marks)

(Extra space)

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- 12 **Table 1** shows the results obtained by a student who used the same Task Sheet as you did. The student took samples to test with iodine solution every 30 seconds.

Table 1

Temperature / °C	Time for starch to disappear / s
22	30
34	30
49	30

These results did not allow this student to draw a useful graph. She decided to modify her method and repeat the experiment.

Suggest **two** ways in which she could modify the experiment in order to collect data which would be more useful.

1

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2

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(2 marks)

RESOURCE SHEET

INTRODUCTION

The information on this resource sheet is about pancreatitis and its treatment.

Resource A

Doctors measured the concentration of pancreatic enzymes in the blood of healthy people and of people with pancreatitis. **Table 2** shows their results.

Table 2

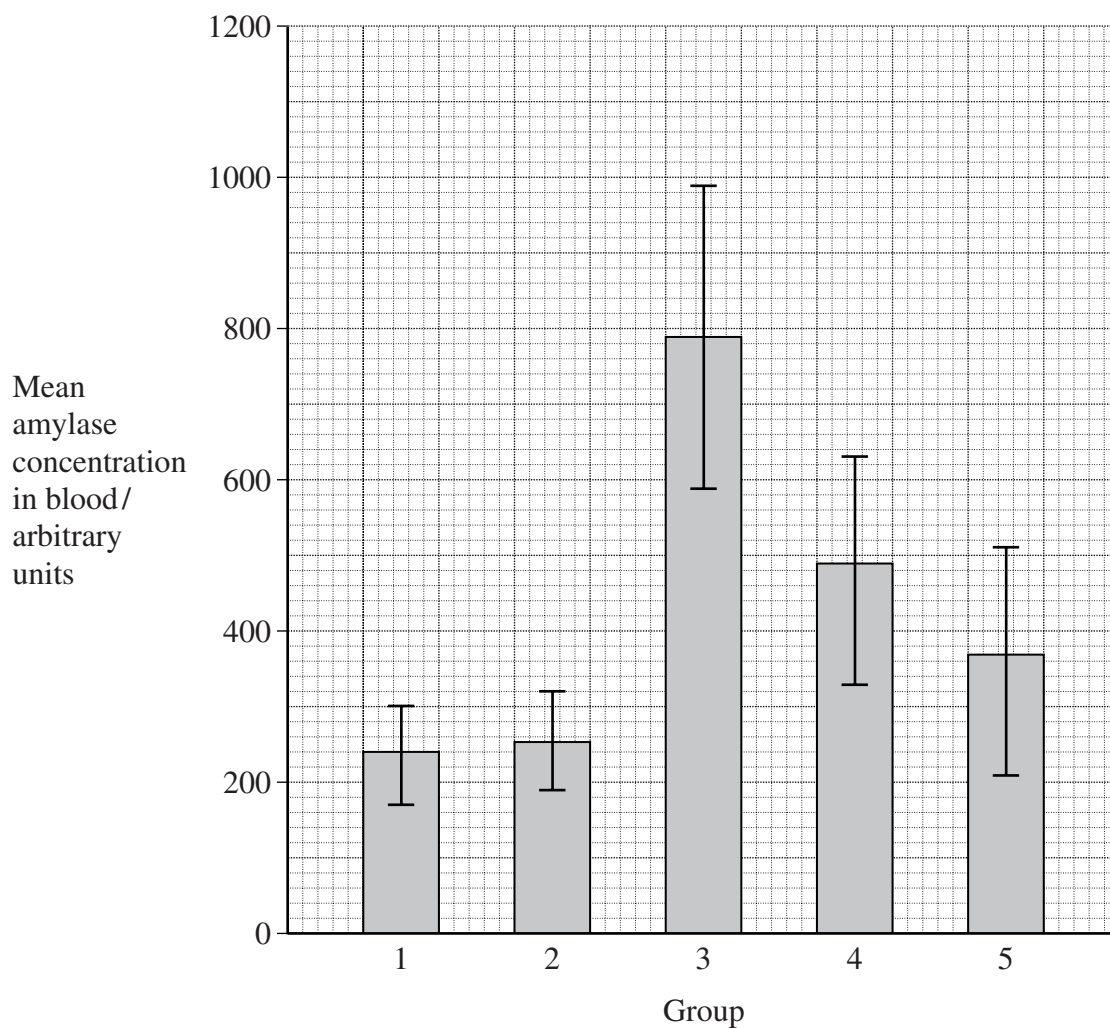
Condition of people tested	Mean lipase concentration in blood / arbitrary units	Mean amylase concentration in blood / arbitrary units
Healthy people	265	218
People with pancreatitis	2427	783

Resource B

Doctors investigated the effects of two drugs, **X** and **Y**, on the concentration of amylase in the blood of people with pancreatitis. The doctors used five groups of volunteers in this investigation. The groups were

1. Healthy people
2. Healthy people injected with saline solution
3. Pancreatitis patients before treatment
4. Pancreatitis patients injected with saline solution containing drug **X**
5. Pancreatitis patients injected with saline solution containing drug **Y**

The graph shows the results. The bars show the standard deviations.

**Turn over ►**

Resource C

Resource C shows the results of a different trial on the same drugs.

In a different trial, doctors investigated the effects of drugs **X** and **Y** on the concentration of chymotrypsin in the faeces of people with pancreatitis. Chymotrypsin is an enzyme that digests protein. The doctors used four groups of volunteers in this investigation. **Table 3** shows the results of measurements of chymotrypsin.

Table 3

Group	Mean concentration of chymotrypsin in faeces / arbitrary units
Healthy people injected with saline solution	28.0
Pancreatitis patients injected with saline solution	22.7
Pancreatitis patients injected with saline solution containing drug X	24.6
Pancreatitis patients injected with saline solution containing drug Y	25.8

SECTION B

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

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

Use **Resource A** to answer **Questions 13** and **14**.

13 **Table 2** shows the enzyme concentration in arbitrary units. Suggest appropriate units that could be used for the enzyme concentration.

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(1 mark)

14 **Table 2** shows that healthy people and people with pancreatitis have a different concentration of amylase in their blood. Explain why.

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(3 marks)

(Extra space)

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Use **Resource B** to answer **Questions 15** to **19**.

15 The volunteers were divided randomly into groups 3 and 4. Explain why they were divided randomly.

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(1 mark)

Turn over ►

16 Give **two** conclusions you can make from the graph about healthy people compared with people with pancreatitis.

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(1 mark)

17 The saline solution used in this investigation had the same water potential as blood plasma. Explain why this was important.

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(2 marks)

18 Drug **X** reduces the mean concentration of amylase in the blood. Calculate the percentage reduction in amylase concentration when people with pancreatitis take this drug. Show your working.

Answer *(2 marks)*

19 Is it important to have the same number of people in each group in this trial? Explain your answer.

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(1 mark)

Use **Resources A and B** to answer this question.

- 20** A doctor claimed that drug **Y** was more effective than drug **X** in treating pancreatitis. Evaluate the reliability of this claim.

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(3 marks)

(Extra space)

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Use **Resource C** to answer **Questions 21 and 22**.

- 21** The results for concentrations of chymotrypsin in faeces were lower for pancreatitis patients than for healthy people. Suggest an explanation.

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(1 mark)

- 22** What do these results suggest about the effectiveness of drugs **X** and **Y**?

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(1 mark)

END OF QUESTIONS