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Section	Mark
Task 1	
Task 2	
Section A	
Section B	
TOTAL EMPA MARK	



General Certificate of Education
Advanced Subsidiary Examination
June 2012

Human Biology

HBI3X

Unit 3X AS Externally Marked Practical Assignment Written Test

For submission by 15 May 2012

For this paper you must have: • your Task Sheet 2, your results and your calculations • 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 30. • You will be marked on your ability to: – use good English – organise information clearly – use scientific terminology accurately.

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Teacher Declaration:

I confirm that the candidate has met the requirements of the practical skills verification (PSV) in accordance with the instructions and criteria in section 3.8 of the specification.

Practical Skills Verification	Yes ☐
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Signature of teacher Date

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Section A

These questions relate to your investigation with trypsin.

Use your Task Sheet 2, your results, processed data and your graph to answer the questions.

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

- 10** How did you decide what was a suitable length of time to leave your tubes in the water bath before mixing (step 6 and step 7)?

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(1 mark)

Another student carried out the same investigation as you but also included experiments with a 1.5% trypsin solution and a 2.0% trypsin solution. She also set up a control experiment.

- 11 (a)** Describe what the contents of the tube used in the control experiment should be.

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(2 marks)

- 11 (b)** What relative rate of reaction would you expect her to obtain for the control experiment?

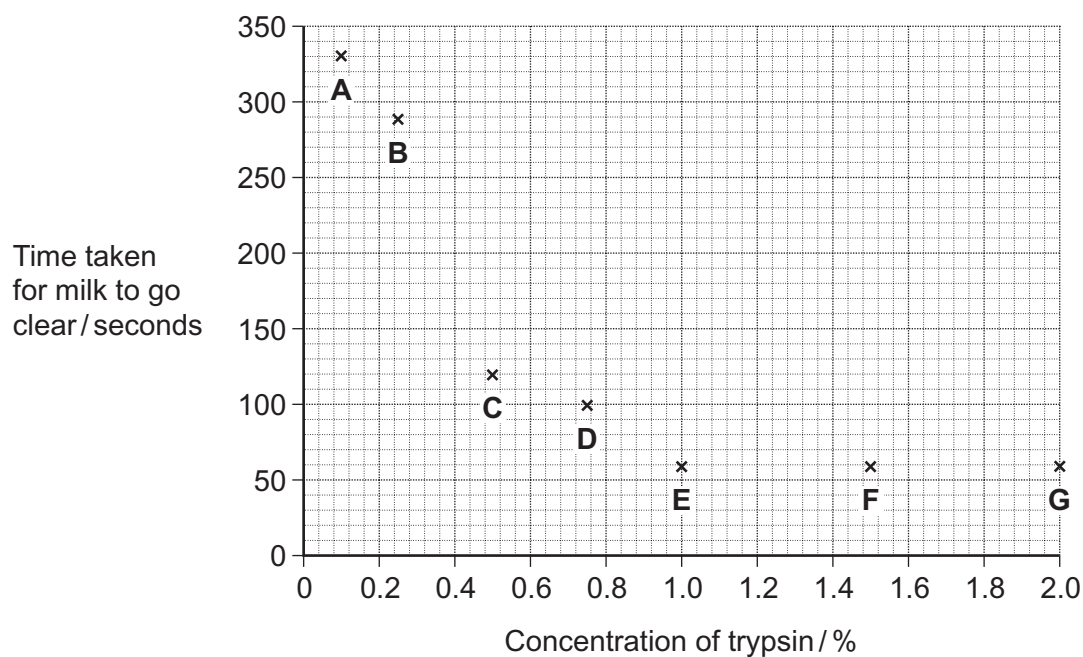
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(1 mark)

- 12** Before processing her data, she plotted her results on the following graph.



- 12 (a)** Describe her results between **A** and **C**.

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(1 mark)

Question 12 continues on the next page

Turn over ►

- 12 (b)** Use your knowledge of enzymes to suggest an explanation of her results between **A** and **C**

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between **E** and **G**.

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(3 marks)

- 12 (c)** She described her graph as a scatter diagram. She drew a line of best fit and concluded that it showed a positive correlation. Explain why both her description and her conclusion were **not** correct.

Description

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Conclusion

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(2 marks)

- 13** Biuret reagent is used as an indicator to show the presence of protein in a solution. This indicator turns from blue to purple when added to a solution containing protein. When milk protein is hydrolysed by trypsin, amino acids are released. Amino acids do not change the colour of biuret reagent.

- 13 (a)** What is meant by *hydrolysed*?

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(1 mark)

- 13 (b)** At the end of the investigation, the student tested each tube with biuret reagent. She found that the indicator turned purple in each tube although the milk protein had been fully hydrolysed.

Explain why.

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(2 marks)

13

Turn over ►

Resource Sheet

Introduction

Trypsin is an enzyme important in the digestion of proteins in the gut and is also found in other parts of the body.

Resource A

If trypsin is present in the lungs, it can damage proteins in lung tissue. Alpha-1-antitrypsin inhibits the action of trypsin by binding to the enzyme. Alpha-1-antitrypsin is also a protein.

Alpha-1-antitrypsin is produced in the lungs when trypsin is present. Scientists investigated whether there was a correlation between different types of lung disease and the concentration of alpha-1-antitrypsin in lung tissue. They recruited four groups of people. The four groups investigated were:

- 49 healthy people
- 19 people with emphysema
- 31 people with bronchiectasis
- 34 people with asthma.

Their results are shown in **Figure 1**.

Figure 1

Group	Concentration of alpha-1-antitrypsin in lung tissue / arbitrary units			
	Range	Mean	Median	Standard deviation
Healthy people	5.4 to 10.5	7.4	7.5	± 1.3
People with emphysema	6.3 to 10.6	9.0	9.2	± 1.5
People with bronchiectasis	6.4 to 10.7	9.2	9.3	± 1.5
People with asthma	5.7 to 16.9	8.1	7.9	± 2.2

Resource B

Paper chromatography can be used to separate amino acids from a mixture in a solution. An outline of the method is as follows.

- Add the mixture to chromatography paper
- Run in a suitable solvent
- Use a stain to show where spots of each amino acid are on the paper
- Identify the amino acids

Turn over for Question 14

Turn over ►

Section B

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

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

Use the information provided in **Resource A** to answer **Questions 14 to 18**.

- 14** The binding of alpha-1-antitrypsin stops trypsin from working.
Suggest how.

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(2 marks)

- 15** What is meant by 'healthy people' in this investigation?

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(1 mark)

16 Explain the meaning of the following terms used in **Figure 1**.

16 (a) Range

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(1 mark)

16 (b) Median

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(1 mark)

16 (c) Standard deviation

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(2 marks)

Turn over for the next question

Turn over ►

- 17** What do these results show about the concentration of alpha-1-antitrypsin in people with emphysema and bronchiectasis?

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(3 marks)

(Extra space)

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- 18** A biology student, reading the results of the investigation, concluded that people with lung disease have higher concentrations of alpha-1-antitrypsin in their lungs. Evaluate this conclusion.

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(3 marks)

(Extra space)

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Use the information provided in **Resource B** to answer **Question 19**.

- 19** Researchers investigated which amino acids were present in alpha-1-antitrypsin. They hydrolysed a sample of alpha-1-antitrypsin and obtained a mixture of amino acids.

Describe how you would adapt the method in **Resource B** to identify the amino acids present in this mixture. Credit will be given for the use of appropriate apparatus and techniques.

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(Extra space) (4 marks)

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END OF QUESTIONS

There are no questions printed on this page

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