

Centre Number						Candidate Number				
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.										
Candidate Signature						Date				

For Examiner's Use Total EMPA mark	
Examiner's Initials	
Section	Mark
Task 1	
Task 2	
Section A	
Section B	
TOTAL EMPA MARK	



General Certificate of Education
Advanced Subsidiary Examination
June 2013

Biology

BIO3X

Unit 3X AS Externally Marked Practical Assignment Written Test

For submission by 15 May 2013

For this paper you must have: <ul style="list-style-type: none"> the Task Sheet 2, 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 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 32. 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 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 <input type="checkbox"/>
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Signature of teacher Date

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Section A

These questions are about your investigation into the effect of surface area to volume ratio on the uptake of a substance.

Use your copy of Task Sheet 2, your results and your graph to answer the questions.

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

9 Other than surface area and volume, give **one** variable that could have affected diffusion in this investigation.

Explain how this variable would affect diffusion of acid into the agar.

Variable

Explanation

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(2 marks)

10 Suggest **two** limitations of the method you used that could have affected your results.

1

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2

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(2 marks)

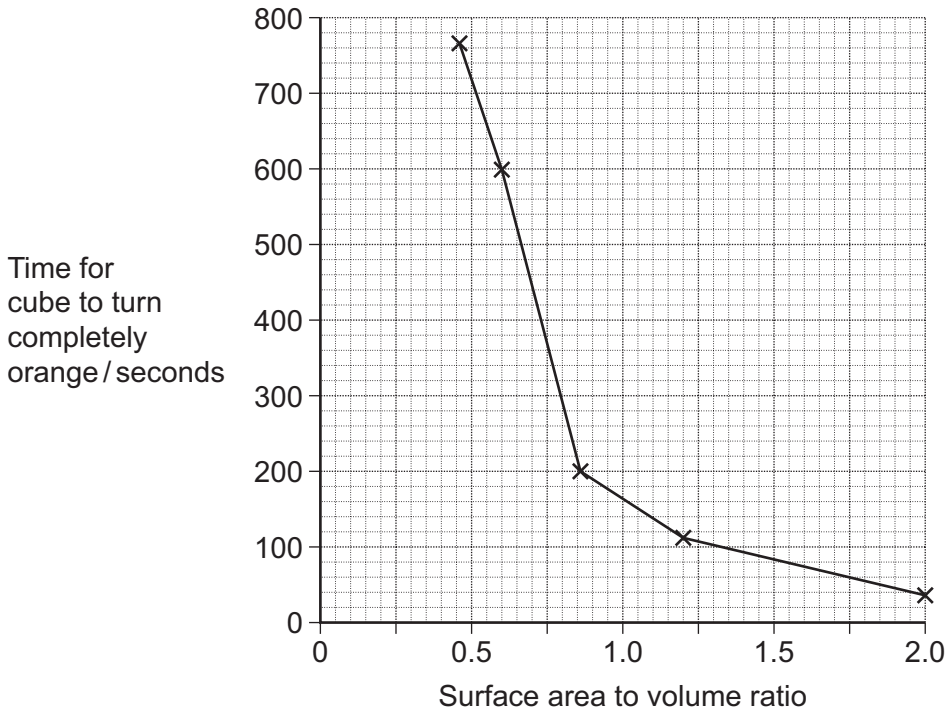
11 You used agar cubes as model cells to find the relationship between surface area to volume ratio and the rate of diffusion.

Evaluate the use of agar cubes as model cells in this investigation.

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(2 marks)

12 A student carried out a similar investigation to yours. The graph shows her results.



12 (a) Describe her results.

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(2 marks)

Question 12 continues on the next page

Turn over ►

12 (b) She used agar cubes as models to investigate the hypothesis that very small animals are able to carry out efficient gas exchange without gas exchange surfaces such as gills or lungs.

Explain how her data support this hypothesis.

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(2 marks)

13 The student also used her results to explain the advantage of some adaptations of the leaves of xerophytes.

Suggest and explain how **one** adaptation of the leaves of xerophytes affects surface area to volume ratio and water loss.

Adaptation

Explanation

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(2 marks)

14 Another student carried out a similar investigation to yours but he used different concentrations of acid with agar cubes all measuring 10 mm × 10 mm × 10 mm. As in your investigation, he obtained a range of times for the agar cubes to change colour.

Explain why.

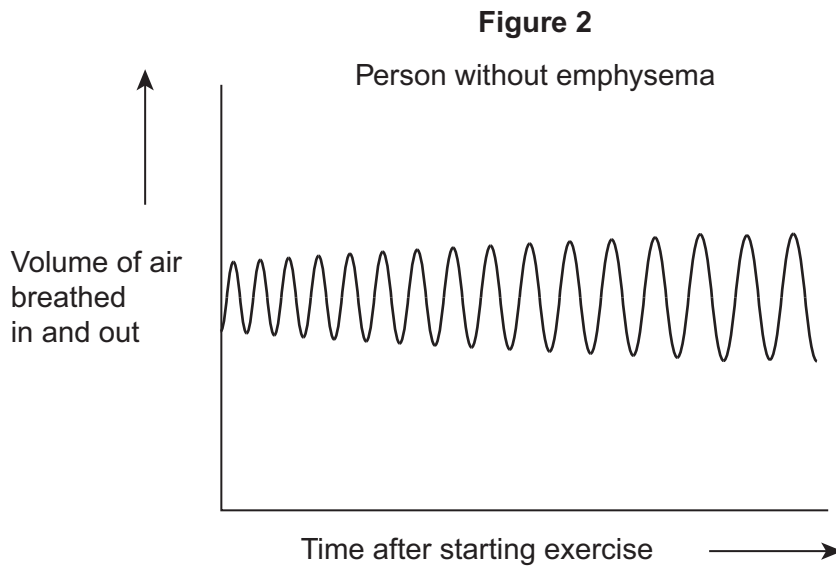
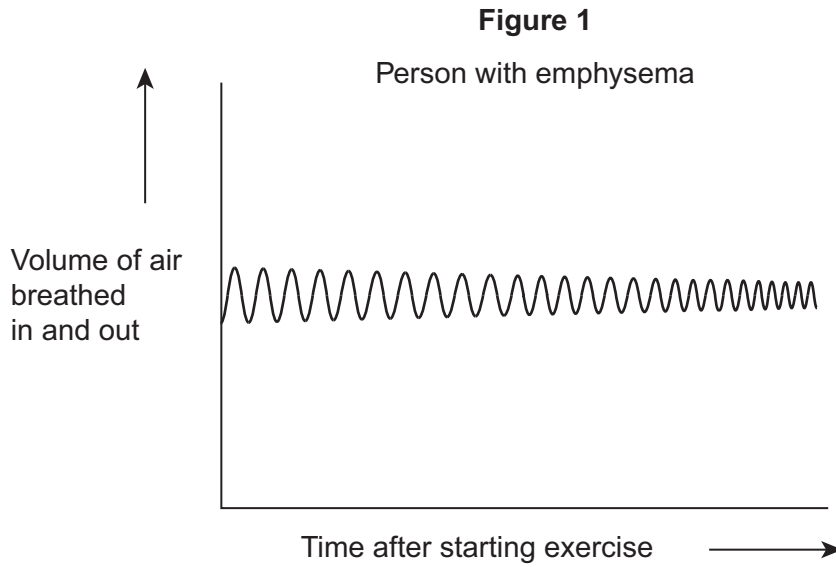
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(2 marks)

Resource Sheet**Resource A**

Emphysema is a disease which affects lung function.

A doctor measured the rate and volume of breathing of a person with emphysema after he started exercise, **Figure 1**. The doctor made the same measurements for a person without emphysema, **Figure 2**.



Turn over ►

Resource B

Doctors investigated the effect of the smoking habits of men on their non-smoking wives.

The doctors recruited 540 non-smoking women aged 40 or older. They divided these women into groups according to the smoking habits of their husbands.

After 14 years, the doctors recorded how many of the wives had died and their cause of death. They used these data to determine the relative risk of a wife dying from a particular disease according to her husband's smoking habit.

In this comparison, they gave the relative risk to the wife of a non-smoker as 1.00. A value greater than 1.00 shows an increased risk compared to the wife of a non-smoker.

The results are shown in **Figure 3**.

Figure 3

Cause of death	Relative risk of wife dying		
	Husband non-smoker	Husband smokes 1 to 19 cigarettes / day	Husband smokes more than 19 cigarettes / day
Lung cancer	1.00	1.61	2.08
Emphysema	1.00	1.29	1.49
Cervical cancer	1.00	1.15	1.14
Stomach cancer	1.00	1.02	0.99
Heart disease	1.00	0.97	1.03

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 15 to 18**.

15 Describe **two** differences between the breathing of a person with emphysema and a person without emphysema.

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(2 marks)

16 The person with emphysema found it difficult to carry out the exercise.
Explain why.

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(3 marks)

(Extra space)

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Turn over ►

17 People suffering from emphysema have less elastic tissue in their lungs.

Explain how this affects the efficiency of gas exchange in the alveoli.

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(3 marks)

(Extra space)

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18 (a) Micrographs of lung tissue taken from people with emphysema show large air spaces compared with lung tissue from healthy people.

Explain why.

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(1 mark)

18 (b) Explain why the presence of these large air spaces reduces gas exchange.

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(2 marks)

Use **Resource B** to answer **Questions 19** to **20**.

19 A journalist concluded from these data that if a husband smoked, it greatly increased the risk of his wife dying of certain diseases. Evaluate this statement.

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(4 marks)

(Extra space)

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Turn over for the next question

Turn over ►

20

The doctors told the men who smoked that continuing to smoke cigarettes would increase their risk of suffering heart disease in later life.

Explain how smoking cigarettes increases the risk of developing heart disease.

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(Extra space) (3 marks)

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18

END OF QUESTIONS

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