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Section	Mark
PSA	
Stage 1 Skills	
Stage 2 Skills	
Section A	
Section B	
TOTAL (max 50)	



General Certificate of Education
Advanced Subsidiary Examination
June 2012

Human Biology

HBI3T/Q12/test

Unit 3T AS Investigative Skills Assignment

For submission by 15 May 2012

For this paper you must have: - the 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 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 - 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 scientific terminology accurately.

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Yes ☐ No ☐

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Section A

These questions relate to your investigation into the effect of surface area and volume of cells on the absorption of substances.

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

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

- 1** You were told to keep the blade of the scalpel vertical when cutting the blocks of gelatine (steps 2 and 3). Explain why.

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(2 marks)

- 2** You were told to put the tube on its side and spread the blocks out along the tube. This was to make sure that the blocks did not touch each other (step 6). Explain why it was important that the blocks did not touch each other.

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(2 marks)

- 3** In acid, your blocks became orange. Explain why.

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(1 mark)

- 4** Other than surface area and volume, suggest **two** factors that could affect the rate of colour change.

1

2
(2 marks)

- 5** When carrying out an investigation, it is usually a good idea to repeat an experiment. Explain **two** advantages of repeating an experiment.

1

.....

2

.....

(2 marks)

Turn over for the next question

Turn over ►

- 6** A student carried out a similar investigation to yours. Her results and calculations are shown in **Figure 3**.

Figure 3

Dimensions of block / mm	Surface area divided by volume	Mean time for colour change / minutes
10 x 10 x 20	0.5	28.0
10 x 10 x 10	0.6	16.3
10 x 10 x 5	0.8	9.3
5 x 5 x 5	1.2	6.2
10 x 10 x 2	1.4	1.1

- 6 (a)** Describe the relationship between the surface area divided by volume and the mean time for colour change of the blocks.

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(1 mark)

- 6 (b)** The student used the data in **Figure 3** to estimate how long it would take a block of gelatine where the surface area divided by volume was 1.1 to change colour. Describe the steps she took to do this.

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(2 marks)

- 7** For each size of block, the student calculated a measure of the variation of the data about the mean time. What did she calculate?

.....

(1 mark)

- 8 A researcher wanted to investigate the rate of absorption of various chemotherapy drugs by tumours of different sizes. She considered using blocks of gelatine as model tumours.

Use your knowledge of the structure of cells to evaluate her model.

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(4 marks)

(Extra space)

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Resource Sheet

Introduction

These resources are about the absorption of nicotine.

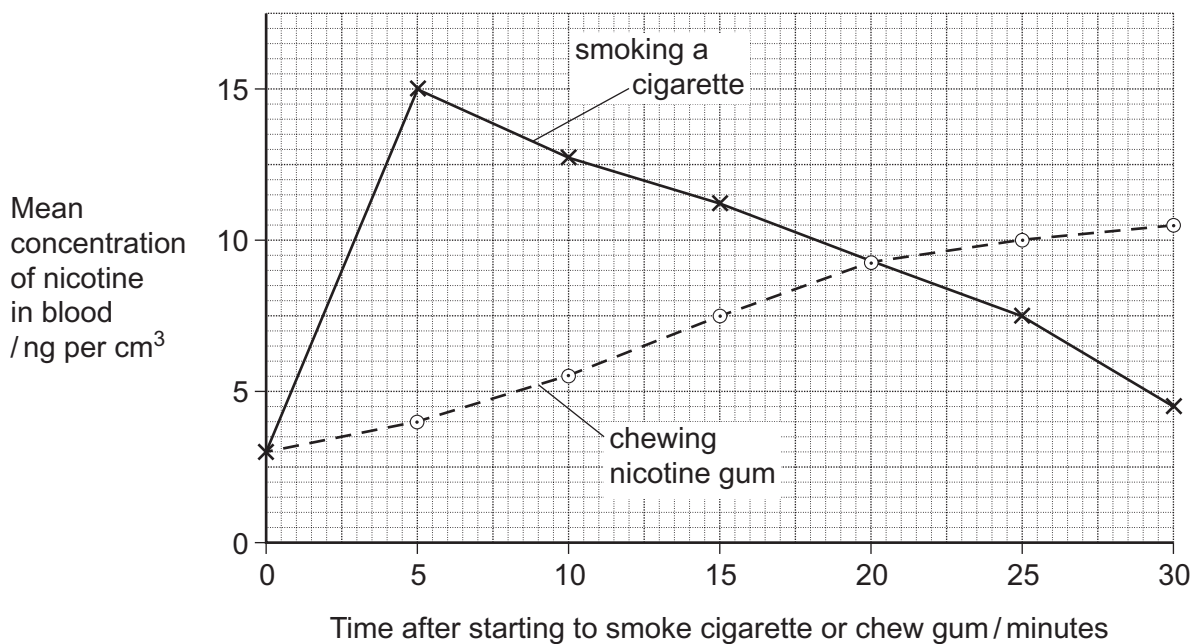
People who smoke are much more likely to develop tumours and cancer. Nicotine is the substance in tobacco that causes people to become addicted to smoking.

Resource A

Nicotine gum is chewing gum containing nicotine. It is chewed by some people to give the effect of smoking without using cigarettes.

Doctors investigated the increase in concentration of nicotine in the blood of smokers who either smoked a single cigarette or started to chew nicotine gum. **Figure 4** shows their results

Figure 4



Resource B

Official figures show that large numbers of new cases of lung cancer caused by smoking are reported every year.

A scientist compared the use of nicotine gum and a nicotine nasal spray to help people give up smoking. He recruited a large number of volunteers who had just given up smoking. The volunteers were matched for the number of cigarettes they used to smoke each day. Half of the volunteers used the gum and the other half used the nasal spray. He reported an 81% success rate for the gum and a similar result for the nasal spray. The scientist's work was peer reviewed by two other scientists before it was published in a scientific journal.

Despite the report by the scientist, a health authority decided not to recommend the use of the gum or the nasal spray to people trying to give up smoking.

Turn over ►

Section B

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

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

Use the information provided in **Resource A** to answer **Questions 9 to 11**.

- 9 (a)** **Figure 4** shows the mean concentration of nicotine in the blood due to smoking a cigarette or chewing nicotine gum.
Describe **two** differences in the results for the cigarette and chewing this gum during the first 10 minutes.

Difference 1

.....

Difference 2

.....

(2 marks)

- 9 (b)** Suggest **one** reason for each of the differences you described.

Difference 1

.....

Difference 2

.....

(2 marks)

- 10** It took longer for the mean concentration of nicotine in the blood of the volunteers chewing gum to rise to 8ng per cm³ than those smoking a cigarette. How much longer did it take?

.....

(1 mark)

- 11 (a)** What was the percentage increase in the mean concentration of nicotine in the blood five minutes after starting to smoke a cigarette? Show your working.

.....%
(2 marks)

- 11 (b)** The concentration of nicotine in the blood was recorded as ng per cm³.
What was the advantage of this?

.....
.....
.....
(1 mark)

Use the information provided in **Resource B** to answer **Questions 12 to 14**.

- 12** The scientist recruited a large number of volunteers. The volunteers were matched for the number of cigarettes they used to smoke each day.
Suggest **one** reason why

- 12 (a)** a large group of volunteers was used

.....
.....
(1 mark)

- 12 (b)** the volunteers were matched for the number of cigarettes they used to smoke each day

.....
.....
(1 mark)

Turn over ►

13

The scientist investigated whether the nasal spray was better than the gum for helping people to stop smoking. He used large, matched groups of volunteers. Outline a method he could have used to see which was better to help people stop smoking.

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(4 marks)

(Extra space)

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- 14 (a)** The scientist reported an 81% success rate for the gum.
Despite the report by the scientist, a health authority decided not to recommend the use of the gum. Suggest why.

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(3 marks)

(Extra space)

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- 14 (b)** The scientist's work was peer reviewed by two other scientists before it was published in a scientific journal. Give **one** reason for a peer review.

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(1 mark)

18

END OF QUESTIONS