Centre Number						Candidate Number				
Surname						Other Names				

Notice to Candidate. The work you submit for assessment must be your own. If you copy from someone else or allow another candidate to copy from you, or if you cheat in any other way, you may be disqualified.

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 Teacher's Use	
Section	Mark
PSA	
Stage 1 Skills	
Stage 2 Skills	
Section A	
Section B	
TOTAL (max 50)	

General Certificate of Education
Advanced Subsidiary Examination
June 2011

Biology BIO3T/P11/test

Unit 3T AS Investigative Skills Assignment

For submission by 15 May 2011

For this paper you must have:	**Time allowed**
• the task sheet, your results and graph • a ruler with millimetre measurement • a calculator.	• 1 hour 15 minutes
Instructions:	**Information**
• 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.	• The marks for questions are shown in brackets. • The maximum mark for this paper is 36. • You will be marked on your ability to: – 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's work was conducted under the conditions laid out by the specification. I have authenticated the candidate's work and am satisfied that to the best of my knowledge the work produced is solely that of the candidate.

Signature of teacher ..... Date .....

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Section A

These questions relate to your investigation of the effect of different enzymes on apple juice production.
Use your Task Sheet and your results table and graph to answer them.

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

1 Give **two** variables which were controlled in your investigation.

1. .....

2. .....

(2 marks)

2 Temperature was not controlled in your investigation. How did you find out if there were temperature changes which could have influenced your data?

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(1 mark)

3 The pH was not controlled in your investigation. The optimum pH for pectinase activity is 6.0. The optimum pH for cellulase activity is 5.0. Describe how this information could be used to improve your investigation.

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(2 marks)

4 Is a control experiment necessary in this investigation? Explain your answer.

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(1 mark)

5 Your investigation was carried out only once. Give **two** ways in which repeating your investigation several times would make it more reliable.

1 .....

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2 .....

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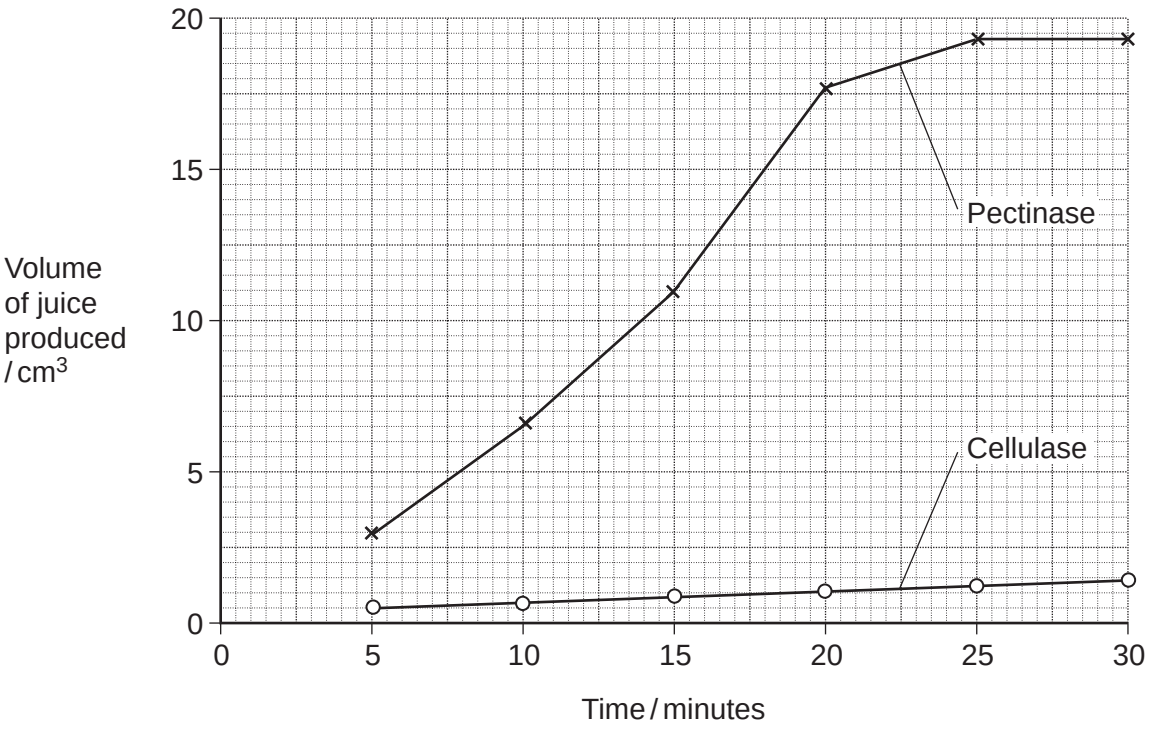
(2 marks)

6 A student carried out a similar investigation to yours. He obtained the following results.



6 (a) Describe these results.

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(2 marks)

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6 (b) The student suggested that more juice would be produced if the enzymes were used together. In order to investigate this, he used the same procedure as in the Task Sheet, but added 1 cm^3 of pectinase and 1 cm^3 of cellulase to the apple pulp. Was he correct to use these volumes of the enzymes? Explain your answer.

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(2 marks)

7 Commercial juice makers add both pectinase and cellulase to the fruit. This produces more juice. Suggest why adding both enzymes produces more juice than either enzyme on its own.

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(2 marks)

14

Turn over for the next question

Resource Sheet

Introduction

There are many reports of fruit and substances produced from fruit being beneficial to health. Two of the fruit products which have been studied are cranberry juice and a substance from the peel of oranges called modified citrus pectin (MCP).

Resource A

This resource is about an investigation into the effect of cranberry juice on the concentration of high density lipoprotein (HDL) in the blood.

HDL removes cholesterol from cells such as those in coronary artery walls. HDL takes this cholesterol to the liver where it is removed from the body.

Scientists advertised for volunteers to take part in an investigation. From these volunteers they selected 31 healthy men to take part in a 16 week investigation. The scientists gave each volunteer 500 cm^3 of juice to drink each day. Every 4 weeks they increased the concentration of cranberry juice in the drink.

The scientists recorded the concentration of HDL in the blood of the volunteers. The results are shown in the table.

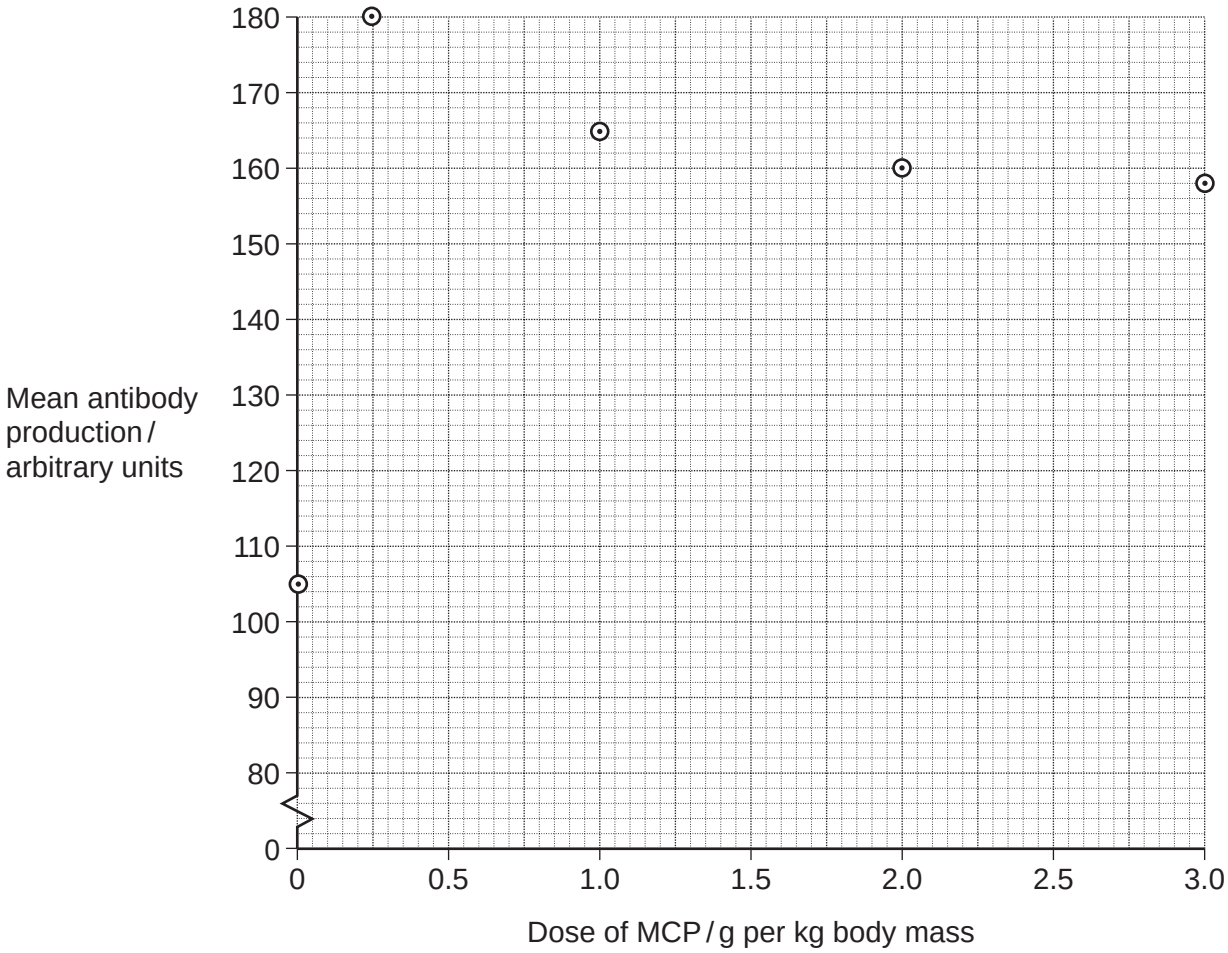
Time / weeks	Concentration of cranberry juice / %	Mean concentration of HDL in the blood at end of the 4 week period (± SD) / mol dm^{-3}
1 – 4	0	1.19 (± 0.20)
5 – 8	25	1.22 (± 0.17)
9 – 12	50	1.27 (± 0.18)
13 – 16	100	1.27 (± 0.20)

Resource B

Scientists tested a claim that modified citrus pectin (MCP) increased the production of antibodies by the immune system.

- They divided a large number of mice into five groups.
- They gave the mice in each group a different amount of MCP in their food.
- The scientists then stimulated antibody production in the mice. They did this by injecting them with a solution containing sheep red blood cells.

The results are shown in the graph.



Section B

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

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

Use **Resource A** to answer **Questions 8** to **11**.

8 A low concentration of HDL increases the risk of coronary heart disease. Explain why.

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(3 marks)

Extra space .....

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9 A placebo juice was used to dilute the cranberry juice. This placebo juice had the same concentration of sugars, minerals and vitamins as the cranberry juice. Explain why the placebo juice was used rather than water.

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(2 marks)

10 Can you conclude from this investigation that drinking cranberry juice results in a lower risk of coronary heart disease? Explain your answer.

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(4 marks)

Extra space .....

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11 Before starting this investigation the scientists obtained the approval of the ethics committee at their university. The ethics committee decided that the investigation was ethical and safe. Suggest **two** reasons why.

1 .....

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2 .....

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(2 marks)

Use **Resource B** to answer **Questions 12** to **17**

12 The data obtained in this investigation have been plotted on a graph. How would you join the points? Give a reason for your answer.

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(1 mark)

13 Use the graph to describe the effect of MCP on mean antibody production.

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(2 marks)

14 Calculate the percentage increase in antibody production from when there was no MCP in the diet to when the dose is 1.0 g per kg.

Answer ,,% *(2 marks)*

Do not write outside the box

15 The dose of MCP given to the mice was calculated in g per kg body mass. Explain why the dose was calculated per unit mass.

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(1 mark)

16 Explain how antibodies were produced when the mice were injected with sheep red blood cells.

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(3 marks)

(Extra space) .....

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17 A newspaper suggested that these data show that taking MCP will give people increased resistance to disease. With reference to the data give **two** reasons why this conclusion may **not** be valid.

1 .....

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2 .....

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(2 marks)

END OF QUESTIONS

22

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