

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

Human Biology

HBI3T/P11/test

Unit 3T AS Investigative Skills Assignment

For submission by 15 May 2011

For this paper you must have: - the task sheet, 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 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.
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

As part of AQA's commitment to assist students, AQA may make your coursework available on a strictly anonymous basis to teachers, examining staff and students in paper form or electronically, through the internet or other means, for the purpose of indicating a typical mark or for other educational purposes. In the unlikely event that your coursework is made available for the purposes stated above, you may object to this at any time and we will remove the work on reasonable notice. If you have any concerns please contact AQA.

To see how AQA complies with the Data Protection Act 1988 please see our Privacy Statement at aqa.org.uk

Section A

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

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

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

- 1** You filled one well in each Petri dish with distilled water. Explain why.
-
-
-
-
- (2 marks)
- 2** You were told to set up 3 Petri dishes. Give **two** reasons why these repeats improved the reliability of your results.
- 1
-
- 2
-
- (2 marks)
- 3** You were told to fill all the wells to the same level. Why was it important to standardise the level?
-
-
- (1 mark)
- 4** It was important to cover the Petri dishes with lids (step 3). Give **two** reasons why.
- 1
-
- 2
-
- (2 marks)

- 5** You had to decide for yourself the number of times to measure the diameter of each clear area and the direction in which to make the measurements.
Explain why measuring the diameter of each clear area in more than one direction improves reliability.

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

- 6 (a)** When iodine solution was added to the Petri dishes a blue-black colour appeared.
Explain why.

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

- 6 (b)** Explain what caused the clear areas around some of the wells.

.....
.....
.....
.....
.....
.....
(3 marks)

Turn over for the next question

Turn over ►

- 7 A student carried out a similar investigation to yours. Some of his results are shown in the table below.

Concentration of amylase / g dm ⁻³	Mean diameter of clear area / mm
1.00	25
0.50	21
0.25	18

The clear area was largest where the highest concentration of amylase was used. Explain why.

.....

.....

.....

.....

.....

.....

(3 marks)

- 8 A scientist carried out the same investigation as you did. She recorded the surface areas of clear agar as the dependent variable.

- 8 (a) Suggest how she found out the surface areas of clear agar in her Petri dishes.

.....

.....

.....

.....

(2 marks)

- 8 (b) Suggest **one** advantage of measuring surface area instead of diameter.

.....

.....

(1 mark)

There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

Turn over ►

Resource Sheet

Introduction

Humans produce two different amylase enzymes, coded for by two different genes. Each of these enzymes can digest both starch and glycogen.

The information on this resource sheet is about amylase from human saliva and amylase from human pancreatic juice.

Resource A

Scientists obtained samples of the amylases of the same concentration from saliva and from pancreatic juice.

They measured the rates at which these amylases digested three polysaccharides.

Figure 1 shows their results.

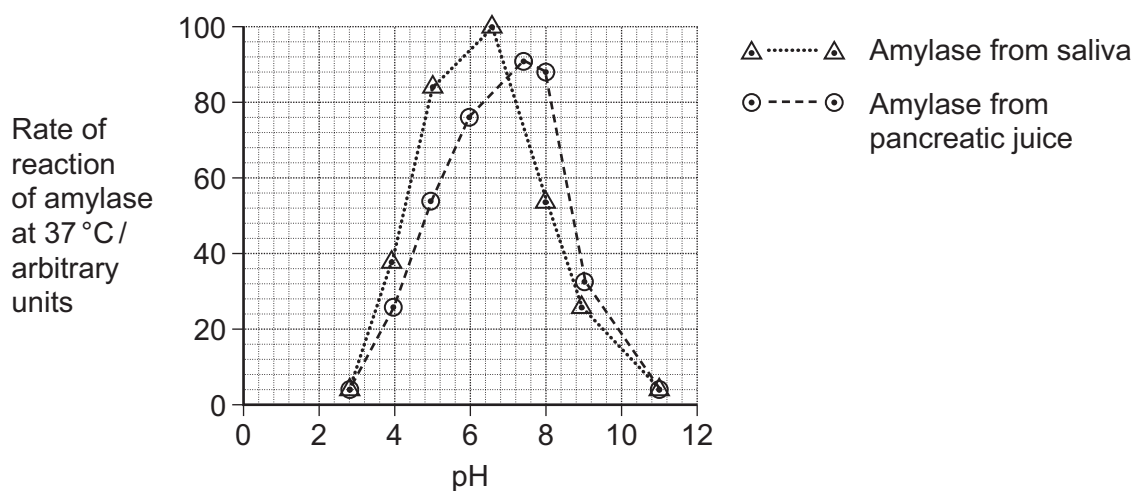
Figure 1

Polysaccharide	Rate of digestion by enzyme / arbitrary units	
	Amylase from saliva	Amylase from pancreatic juice
Starch from potato	1.00	0.67
Starch from maize	0.62	0.92
Glycogen	0.52	0.41

Resource B

A scientist investigated the effect of pH on the rates of reaction of amylase from saliva and amylase from pancreatic juice at 37 °C. His results are shown in **Figure 2**.

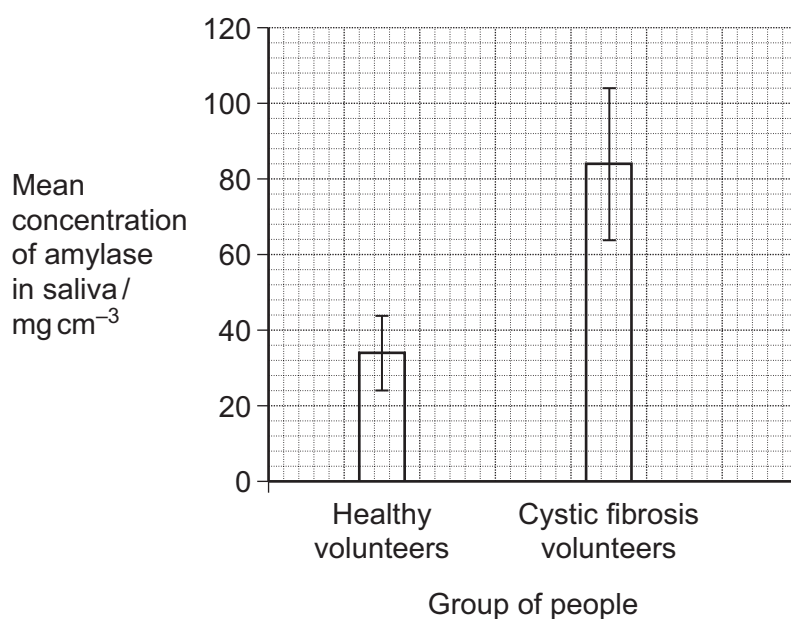
Figure 2



Resource C

Doctors measured the concentration of amylase in the saliva of two groups of people, healthy volunteers and volunteers with cystic fibrosis. Their results are shown in **Figure 3**. The bars show the standard deviations.

Figure 3



Turn over ►

Section B

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

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

Use **Resource A** to answer **Question 9**.

- 9** Compare the rates of digestion of polysaccharides by amylase from saliva and amylase from pancreatic juice.

.....

.....

.....

.....

(2 marks)

Use **Resource B** to answer **Questions 10 and 11**.

- 10 (a)** The scientist kept the temperature constant at 37 °C when investigating the effect of pH on enzyme activity.
Explain how a rise in temperature would affect the activity of the enzyme.

.....

.....

.....

.....

(2 marks)

- 10 (b)** Suggest how the scientist could have kept temperature constant during his investigation.

.....

.....

(1 mark)

- 10 (c)** Other than temperature, name **two** factors that must also be kept constant when investigating the effect of pH on enzyme activity.

1

2

(2 marks)

- 11 (a)** Give **two** pieces of evidence that amylases from saliva and from pancreatic juice are different.

1

.....

2

.....

(2 marks)

- 11 (b)** The amylases from saliva and from pancreatic juice are coded for by different genes. Explain why the amylases have slightly different structures.

.....

.....

.....

.....

(2 marks)

Use **Resource C** to answer **Questions 12 to 14**.

- 12** Calculate the percentage difference in the mean amylase concentration in the saliva of the two groups of volunteers. Show your working.

..... % difference
(2 marks)

- 13 (a)** A doctor concluded that the concentration of amylase in saliva could be used as a reliable test for cystic fibrosis. Do the results in **Figure 3** support this conclusion? Explain your answer.

.....

.....

(1 mark)

Question 13 continues on the next page

Turn over ►

- 13 (b)** The healthy volunteers and the cystic fibrosis volunteers were matched groups. They were matched for factors such as age.
Explain why matched groups were used in this investigation.

.....

..... (1 mark)

- 14** An increased concentration of amylase in saliva might be an advantage to a person with cystic fibrosis.
Suggest why.

.....

.....

.....

.....

(2 marks)

17

END OF QUESTIONS