

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
TOTAL	



General Certificate of Secondary Education
June 2011

Human Health and Physiology 44152

Unit 2 Investigations in Human Health and Physiology ISA 1 – Amylase action

Valid for submission in May 2011

For this paper you must have:

- results tables and charts or graphs from your own investigation.

You may use a calculator.

Time allowed

- 45 minutes

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in **Section 1** and **Section 2**.
- 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 34.
- You are expected to use a calculator where appropriate.
- In some questions you will be marked on your ability to:
 - use good English
 - organise information clearly
 - use specialist terms where appropriate.

Signature of teacher marking this ISA: Date:



J U N 1 1 4 4 1 5 2 0 1

Section 1

These questions are about the investigation that you did on the activity of the enzyme amylase.

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

1 This question is about the **independent** variable in your investigation.

1 (a) What was the **independent** variable (the variable that you deliberately changed)?

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

1 (b) What interval did you choose for the **independent** variable?

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

1 (c) You wanted to find the temperature at which the enzyme worked best. Look at your results. Did the interval you chose allow you to do this?

Draw a ring around your answer. **Yes / No**
Give a reason for your answer.

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

2 Describe the change in colour of iodine solution when starch suspension is added to it.

The iodine solution changes colour from.....to
(2 marks)

3 In your investigation, what was the temperature at which amylase worked best?

Tick (✓) the box beside the range which includes this temperature.

15 – 24 °C	<input type="checkbox"/>	35 – 44 °C	<input type="checkbox"/>	55 – 64 °C	<input type="checkbox"/>
25 – 34 °C	<input type="checkbox"/>	45 – 54 °C	<input type="checkbox"/>	65 – 74 °C	<input type="checkbox"/>

(1 mark)



4 Your investigation included a control experiment.

4 (a) Why should you do a control experiment in an enzyme investigation?

.....
.....

(1 mark)

4 (b) Describe what you did in your control experiment.

.....
.....

(1 mark)

5 Think about the reliability of your investigation.
Suggest **two** changes that would improve the reliability of your results.

1

2

(2 marks)

6 Look at your results table and graph or chart.

Describe how temperature affects the time taken for amylase to digest starch.

.....
.....
.....
.....
.....
.....

(2 marks)

7 Make sure that **your** results table and graphs or charts are handed in with this paper.
You will be awarded up to 6 marks for these.

(6 marks)

18

Turn over for the next section

Turn over ►



Section 2

These questions are based on a vocational application of your own investigation. In some questions you will also be required to relate your own method / results to this new context.

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

On surgical wards in hospitals, bed linen often gets stained with blood. Biological detergents contain enzymes that digest blood stains. A technician from the hospital laundry investigated the effect of temperature on the activity of a biological detergent called SO-CLEAN.

- She stained four pieces of cloth with blood and left them to dry.
- She left one stained cloth unwashed.
- She washed the other three stained cloths using SO-CLEAN at 20 °C, 30 °C and 40 °C respectively.
- She left the cloths to dry.
- The cloths were observed by eye and compared for stain removal.

Table 1 shows her results.

Test	Estimated percentage (%) of blood stain remaining
Unwashed	100
Washed at 20 °C	80
Washed at 30 °C	
Washed at 40 °C	40

- 8 Look at the pattern of your own results. Estimate the percentage of blood stain remaining for the cloth washed at 30 °C. Put your answer into **Table 1**.

(1 mark)

- 9 To make the investigation a fair test, certain control variables need to be kept the same. State **two** variables that the technician should have kept the same.

1

2

(2 marks)



- 10** A detergent company claims that their new biological detergent, AQAWASH, works better at lower temperatures than SO-CLEAN. The technician at the hospital decided to test this claim. She used the same method as before, but this time she used a light sensor to measure stain removal. The more light that passes through the cloth, the more the stain has been removed.

Table 2 shows the hospital technician's results for AQAWASH.

Temperature of washing detergent (°C)	Percentage (%) of light that passed through the cloth			Mean percentage (%) of light that passed through the cloth
	Trial 1	Trial 2	Trial 3	
20	54	57	54	55
25	69	70	68	
30	82	74	80	81
35	82	80	84	82
40	85	83	81	83

- 10 (a)** Calculate the mean percentage of light that passed through the cloth washed at 25°C. Put your answer into **Table 2**.
(1 mark)
- 10 (b)** The cloth washed at 30°C includes an anomalous result.
Circle the anomalous result on the table.
(1 mark)
- 10 (c)** Describe fully the effect of increasing the temperature on the removal of stain using AQAWASH.

Use the results from **Table 2** and ideas from your own investigation to do this.

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.....

.....

(2 marks)

Turn over for the next question

Turn over ►



To help you with the following questions **Table 2** is repeated below.

Table 2 shows the hospital technician's results for AQAWASH.

Temperature of washing detergent (°C)	Percentage (%) of light that passed through the cloth			Mean percentage (%) of light that passed through the cloth
	Trial 1	Trial 2	Trial 3	
20	54	57	54	55
25	69	70	68	
30	82	74	80	81
35	82	80	84	82
40	85	83	81	83

Table 3 shows the hospital technician's results for SO-CLEAN when using the light sensor.

Temperature of washing detergent (°C)	Percentage (%) of light that passed through the cloth			Mean percentage (%) of light that passed through the cloth
	Trial 1	Trial 2	Trial 3	
20	38	40	42	40
25	46	45	50	47
30	53	57	58	56
35	63	67	68	66
40	79	75	77	77

11 State **two** ways in which the results for AQAWASH differ from those for SO-CLEAN.

- 1
-
- 2
-

(2 marks)



12 The technician wanted to display all the mean results from both **Tables 2 and 3** on a graph or a chart.

What sort of graph or chart should she use?

Tick (✓) the box beside the correct answer.

Bar chart

Pie chart

Scattergram

Line graph

(1 mark)

13 The investigation was criticised because there were no tests on cloths without stain.

Give **one** reason why the technician should have done this.

.....
.....

(1 mark)

14 The technician recommends the use of AQAWASH at 30 °C for washing the hospital laundry.

Suggest **one** reason why it may be better to wash laundry at temperatures as low as 30 °C.

.....
.....

(1 mark)

Turn over for the next question

Turn over ►

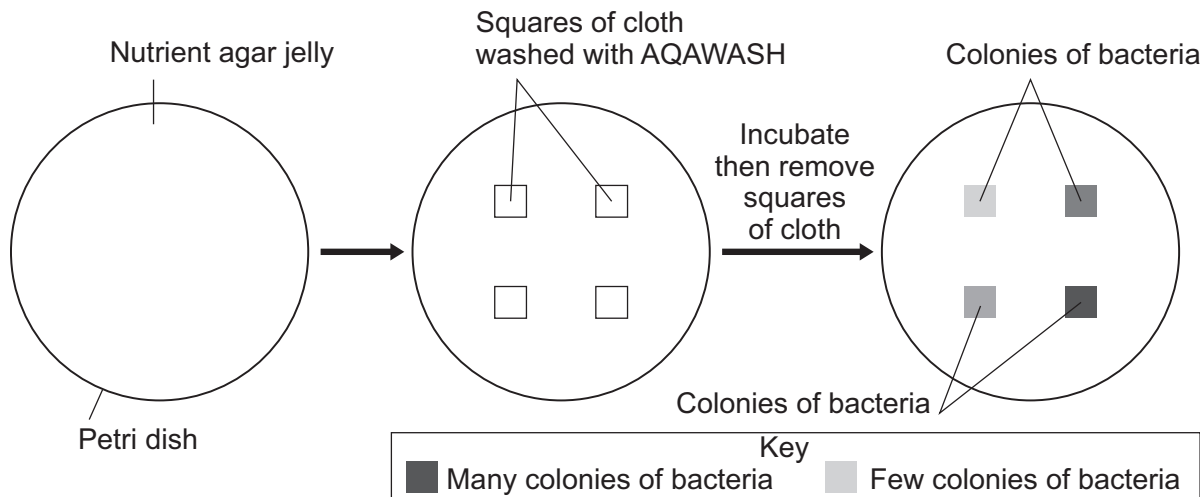


15

At low temperatures bacteria are removed from laundry but not killed. Nurses worry that bacteria such as MRSA will spread if AQAWASH is used at 30 °C. The nurses suggest that AQAWASH is used at temperatures as high as the laundry will stand.

The technician is asked to find the lowest temperature at which using AQAWASH will kill all the bacteria in stained laundry.

The technician decides to use dishes containing sterile nutrient jelly to culture bacteria as shown in the diagrams below.



Describe how the technician could find the lowest temperature at which using AQAWASH will kill all the bacteria in stained laundry.

Use ideas from your own investigation and the information above to help you.

In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

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(4 marks)

16

END OF QUESTIONS

